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Assessing Student Performance between Face-to-Face and Online Course Formats in a College-Level Communications Course

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Abstract

This observational study adds to a small number of college-specific studies comparing student performance in online and face-to-face versions of the same course. It also complements more large-scale college-based studies that compare the delivery formats across courses, disciplines, and institutions. Using descriptive statistics and the chi-square and ANOVA methods, the author examined comparative educational outcomes by measuring student performance and key factors of student performance in the same mandatory professional communications course taught simultaneously in an online and face-to-face format over a 5-semester time frame. The findings are consistent with other comparative studies that have established that in comparison to face-to-face students, online students are generally more academically prepared; more mature; and more commonly full-time employed, fluent in the English language, and female. Similar to other studies, the factors of gender, age, education, and writing proficiency are significant indicators of student achievement; the factors of employment hours, native language, and direct/indirect entry are not, which shows some discrepancy with other studies. In terms of overall student performance, online and face-to-face-component students earned similar grades and had similar completion and retention rates. This finding does not concur with a number of studies that show that online students are significantly less likely to successfully complete courses than their face-to-face counterparts. Course type (mandatory, elective, remedial, regular), advancement in a course of study (lower year, upper year), and delivery mode choice (fully online vs. mix of online and face-to-face) are probed as explanatory variables for differences in findings.

Cette étude d'observation s'ajoute à un nombre particulier d'études spécifiques aux collèges qui comparent la performance des étudiants et des étudiantes dans la version enseignée en ligne et la version enseignée face à face du même cours. L'étude vient également s'ajouter à des études plus vastes menées dans des collèges qui comparent les formats d'enseignement dans divers cours, diverses disciplines et divers établissements. Grâce à l'emploi de statistiques descriptives et des méthodes du chi-carré et ANOVA, l'auteure a examiné les résultats éducationnels comparatifs après avoir mesuré la performance des étudiants et des étudiantes ainsi que les facteurs clés de performance des étudiants et des étudiantes dans le même cours obligatoire de communications professionnelles enseigné simultanément en ligne et face à face au cours de 5 semestres. Les résultats sont conformes à ceux d'autres études comparatives qui ont établi qu'en comparaison des étudiants et des étudiantes qui suivent le cours face à face, les étudiants et les étudiantes qui suivent le cours en ligne sont généralement mieux préparés académiquement, plus matures et généralement davantage employés à temps plein, parlent anglais couramment et sont des femmes. Tout comme dans d'autres études, les facteurs relatifs au sexe, à l'âge, au niveau d'études et à la compétence en matière d'écriture sont des indicateurs importants de la réussite étudiants et des étudiantes. Les facteurs relatifs au nombre d'heures d'emploi, à la langue maternelle et à l'entrée directe/indirecte ne le sont pas, ce qui indique une certaine divergence par rapport aux autres études. En ce qui concerne la performance globale des étudiants et des étudiantes, les étudiants et les étudiantes face à face et les étudiants et les étudiantes en ligne ont obtenu des notes comparables et leur niveau de complétion et de rétention étaient semblables. Ce résultat ne correspond pas à ceux d'un certain nombre d'études qui indiquent que les étudiants et les étudiantes en ligne sont considérablement moins à même de compléter et de réussir leurs cours par rapport à ceux et celles qui suivent ces cours face à face. Le type de cours (obligatoire, facultatif, de rattrapage, régulier), l'avancement dans un programme d'études (première année, dernière année) et le choix du mode d'enseignement (entièrement en ligne ou un mélange de cours en ligne et de cours face à face) sont interrogés en tant que variables explicatives des différences dans les résultats.

Keywords
online and face-to-face delivery formats, student performance, factors of student performance; formats en ligne et face à face, performance des étudiants et des étudiantes, facteurs qui affectent la performance des étudiants et des étudiantes

Cover Page Footnote
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Online course offerings have been on the rise at postsecondary educational institutions in Canada (Bates, 2018; Canadian Digital Learning Research Association [CDLRA], 2019) and North America more generally (Community College Research Center [CCRC], 2013b; James et al., 2016; Xu & Jaggars, 2011; Wolff et al., 2014). A survey of a representative sample (80%) of colleges and universities across Canada conducted by the CDLRA (2019) shows a "significant increase" in Canadian institutions' online course offerings between 2010 and 2011 and a "more gradual increase" between 2011 and 2016. In 2018, 19% of college students outside of Quebec, and 18% of university students in Canada took at least one online course (CDLRA, 2019). Reviewing its survey data, the CDLRA (2019) comes to the conclusion that online learning is an "important part of Canadian post-secondary education…likely to continue to expand and grow," (p. 9) with a key strategic reason being improved access to education for a highly diverse population of so-called nontraditional learners that cannot or prefer not to attend classes face-to-face.

Most research done on postsecondary online instruction in North America has focused on undergraduate and graduate students—especially so in the U.S. —not on college or community college[1] students (Ramey et al., 2018; Wolff et al., 2014). This points to a shortcoming in the sense that community college student demographics show some distinctive differences to the student demographics at universities and undergraduate colleges. A literature review by Wolff et al. (2014), for instance, comes to the conclusion that, compared to undergraduate students at four-year colleges and universities, community college students are "more likely to attend part time, be employed full time, care for a child as a single parent, enter college courses without a high school diploma, and/or require remedial coursework" (p. 167). Xu and Jaggars (2013) similarly note that community colleges attract more nontraditional students than undergraduate and graduate institutions, with the term "nontraditional" referring to students to whom one or more of the following factors apply: "(1) part-time attendance, (2) full-time employment, (3) delayed postsecondary enrollment, (4) financial independence, (5) having dependents, (6) being a single parent, and (7) not possessing a high school diploma" (p. 1).[2] The online delivery format is attractive to many nontraditional students since several of the above factors can make attending face-to-face classes difficult or impossible (Xu & Jaggars, 2013; see also Mather & Sarkans, 2018, for an up-to-date literature review). In the U.S., a higher proportion of community colleges are enrolling online students than undergraduate colleges (McFarland et al., 2017). This difference does not seem to exist in Canada where the percentage of students taking at least one online course in 2018 was 19% for colleges and 18% for universities, and the percentage of online course registrations was 8% for both (CDLRA, 2019).

The purpose of this study is to contribute to the task of college-specific, objectively measured data collection, evaluation, and communication, and hence to add to the existing number of studies done at (community) colleges, and Canadian (or, more specifically, Ontario) colleges in particular. Most studies consulted in the course of this research present U.S. data rather than

[1] In Canada, the term "college" is generally used to describe educational institutions that offer diploma and certificate programs in the applied arts, technology, health care, and business; trades and apprenticeship training; language and skills training; as well as applied Bachelor degrees (the Quebec college system is distinctly different from the rest of the country; Usher, 2018). The U.S. American term "community college" (see Education USA, n.d., for a definition) refers to educational institutions that offer educational services and qualifications that are similar to those at Canadian "colleges".

[2] Statistics Canada (2019a) data from the academic years 2016-17 and 2017-18 shows that 28% of college students in Ontario were enrolled part-time as compared to 14% of university students; 912 college students in Ontario were enrolled with the aim of achieving a general equivalency diploma/high school diploma as compared to zero university students.

Canadian data; this points to a shortcoming in applied research conducted on online delivery at Canadian colleges, which in 2016-17 had a population of 731,130 students (Statistics Canada, 2019a). Between the academic years of 2016-17 and 2018-19, the author taught the same mandatory professional communications course (abbreviated as COMM course) in a fully online format and in a format with a face-to-face component at an Ontario college. The goal of the study was to analyze the following questions:

1. Is there a difference in student achievement (measured by final grades) in the same fully online and face-to-face-component course with the same professor?
2. Is there a difference in attrition rates and failure rates in the same fully online and face-to-face-component course with the same professor?
3. What factors most significantly affect student achievement? Is there a difference in factors between the fully online and face-to-face-component versions of the course?

Contextualizing Research Questions 1 and 2

Large-scale comparative studies carried out by CCRC researchers Jaggars and Xu (CCRC, 2013b; Jaggars & Xu, 2010; Xu & Jaggars, 2011, 2013) at the Virginia community college system and the Washington State community and technical college system suggests that when comparing face-to-face and online delivery, face-to-face delivery generally leads to better outcomes at the community college level. Jaggars and Xu's research shows that, while on average academically more prepared, online students are less likely to complete courses than their face-to-face counterparts (withdrawal and course failure rates are higher) and less likely to receive a C or better when they do complete courses; a California-based community college study by Hart et al. (2018) comes to similar conclusions. The Virginia and Washington State studies further found that students taking developmental or remedial courses were particularly disadvantaged in online courses. Smart and Saxon (2016) come to a similar result in a small-scale quantitative study of a developmental English course at an Alabama community college. The Washington State study (Xu & Jaggars, 2011) also focused on advancement in a student's course of study; it found that completion rates in online courses improved in upper years. Jaggars and Xu (CCRC, 2013b; Jaggars & Xu, 2010; Xu & Jaggars, 2011) emphasize that their Virginia and Washington State findings both correspond and differ with other comparative, college-based studies: they concur that online students are less likely to actually complete courses, but contradict that students completing courses online earn similar grades to students completing face-to-face courses. Online students were less likely to receive a C or better than their face-to-face counterparts in Jaggars and Xu's studies (Jaggars & Xu, 2010; Xu & Jaggars, 2011).

A quantitative study conducted by James et al. (2016) on students enrolled in five community colleges located in Florida, Ohio, Texas, Washington State, and Hawaii complicates the broad agreement that online community college students have a weaker retention rate than their face-to-face counterparts. Separating between fully online students and students taking a blend of online and face-to-face courses, James et al. (2016) found that taking all courses online had "a mild negative impact on…students' retention" whereas taking only some courses online did not. A similar correlation of full-time online enrollment and decreased student performance and retention is established by Shea and Bidjerano (2017, 2018), who conducted a study of online students at thirty community colleges in New York State. Shea and Bidjerano (2018) note that "the 'tipping point' for the beneficial effect of online enrollment on degree completion" is at "approximately 40%

of coursework... Beyond that level, students attain college credentials at lower levels than their classroom-only counterparts" (p. 290). Most community college students, Shea and Bidjerano (2018) recommend, should hence "be advised to enrol in face-to-face courses primarily and supplement these courses with online courses" (p. 290).

Course type as an online retention risk factor has received little research attention to date. One notable quantitative study by Wladis et al. (2014) uses data from a large urban community college in the Northeast U.S. to establish which types of courses are more or are less suitable for an online format and to assist educational institutions target resources to the development and running of those online courses at highest risk of dropout. Wladis et al. (2014) found that students taking a required or mandatory course online "are roughly equally as likely to remain in the course whether they take it online or face-to-face" (p. 7), while students taking a lower-level elective course online "are much more likely to withdraw online than in the face-to-face environment" (p. 7). Wladis et al. (2014) suggest targeting lower-level elective courses with supplementary support.

Contextualizing Research Question 3

Information on the impact of student characteristics on achievement in online courses can help educational institutions target online courses to those student demographics most likely to benefit from online education, while setting up support networks for those student demographics likely to experience challenges in an online learning environment. Factors of student performance that have commonly been traced in comparative studies are as follows: course load; employment status; caregiver status; age; gender; ethnic background; GPA; subject matter; and proficiency in reading, writing, and math. Among these factors, this study investigated age, gender, employment hours, education, native language, direct/indirect entry, and writing proficiency.

A number of studies that focus on demographic factors of online student performance in North America suggest that in comparison to face-to-face students online students are more academically prepared; more mature; and more commonly full-time employed, fluent in the English language, and female (e.g., Aragon & Johnson, 2008; CCRC, 2013b; Halsne & Gatta, 2002; Jaggars & Xu, 2010; Xu & Jaggars, 2011, 2013). These findings are consistent with the author's own findings.

Gender and Age

Looking at the factors of gender and age within the context of online course delivery, Xu and Jaggars' (2013) literature review shows that a large number of studies has been undertaken on the topic and that the studies are somewhat split between establishing and not establishing an interaction between mode of delivery and age/gender as indicator of student achievement. There seems to be no conclusive evidence either way. A literature review by Amro et al. (2015) arrives at the same conclusion. While the author's findings did not establish an interaction, gender and age by themselves were significant factors affecting student achievement.

Employment

In the academic years during which the author conducted this study, about 46% of Ontario students aged 20-29 years were engaged in some form of employment during the fall and winter terms, with the full-time student employment rate being around 41% and the part-time student

employment rate around 72% (Statistics Canada, 2019b). The overall female student employment rate was higher (around 49%) than the male (around 44%; Statistics Canada, 2019b).[3] While Statistics Canada's Labour Force Survey cited here does not provide any data on hours worked per week, a Canadian Association of University Teachers (CAUT, 2019) overview of student labour force participation in Canada in 2017 shows that the majority (around 80%) of full-time college and university students aged 20-29 were employed on a part-time basis. A number of studies (Dundes & Marx, 2007; Marshall, 2010; Pike et al., 2008; Porter & Umbach, 2019; Torres et al., 2010-2011) have shown a negative correlation when students work long hours (20 hours comes up as a significant threshold in several studies); working a smaller number of hours, especially on campus, has been positively related to not only grades but also key employability skills.

Native Language

An overview of student profiles published by Colleges Ontario (2019) shows that in 2017, 68% of Ontario college students specified English as their native language, 3% specified French, and 29% specified a language other than English or French. In the COMM course used in this study, online students were significantly above the 68% college average of English native speakers (at 92.87%), while face-to-face-component students were significantly below the average (at 45.68%).[4] This finding aligns with other studies of online student demographics, which have found a high percentage of native speakers enrolled in online courses (Aragon & Johnson, 2008; CCRC, 2013b; Halsne & Gatta, 2002; Jaggars & Xu, 2010, 2011; Xu & Jaggars, 2013;). A review of quantitative studies on non-native English speakers (Feast, 2002; Ghenghesh, 2015; Graham, 1987; Roessingh & Douglas, 2012) suggests that being an English language learner is an indicator of academic performance. The author sees this finding confirmed in the online courses surveyed.

Writing Proficiency

Writing proficiency was included as a factor of student achievement since writing is a key skill required and built upon in the professional communications course (COMM course) used in this study. As a means of measuring writing proficiency, the author focused on student performance (in the form of final grades) in the College's developmental English course (WRIT course), which is a prerequisite for the COMM course. The developmental English course reviews the basics of writing, reading, and critical thinking, and students are placed into it based on their score in the writing entrance exam, which is a post-admissions assessment that takes place before students start their classes. The author decided to focus on overall student performance in the WRIT course rather than on writing entrance exam scores due to the former being more representative of students' writing skills at the point they start the COMM course. WRIT course grades were found to be a factor of student performance for both online and face-to-face-component students in the COMM course.

[3] In comparison, the employment rates for students throughout Canada in the given time frame and age range is as follows: (1) overall employment rate: 52%, (2) full-time students: 46%, (3) part-time students: 76%, (4) female students: 56%, and (5) male students: 47% (Statistics Canada, 2019b). Statistics Canada (2019b) defines students as "people enrolled at an educational institution."

[4] The average between the two student populations is 69.28% and hence close to the 68% average at Ontario colleges.

Course Design

In terms of course design, the author focused on three common course design features to trace differences and similarities in student learning perceptions in the face-to-face-component and online versions of the COMM course: design for engagement (student-professor), design for clarity (organization, consistency), and design for retention (use of rubrics/feedback that is relevant, personalized, and timely). In addition to collecting demographic data, the student survey conducted at the end of each term (see Appendix A) included questions aimed at ascertaining and comparing student experiences and preferences –online and face-to-face – in relation to the three course design features. Only student-professor engagement showed an association with delivery format.

Method

Methodologically, this study follows an approach that has been used in similar observational, course-level studies that focus on a quantitative comparative analysis of online and face-to-face course delivery (e.g., Halsne & Gatta, 2002; Kleinman & Entin, 2002; Smart & Saxon, 2016; Urtel, 2008; Wolff et al., 2014). The specific parameters and methods of data collection are designed with the goal of controlling as many variables as possible. Ethics board clearance has been received for all data collection processes involved in the study.

Between the academic years of 2016-17 and 2018-19, the author taught the same 15-week mandatory professional communications course (COMM course) in a fully online format and in a format with a face-to-face component. Until 2017, a fully face-to-face version of the course was in place; it was replaced with a hybrid version of two hours face-to-face and one hour online in 2018. The author will, for the purpose of this comparative study, mostly combine the fully face-to-face course version and the hybrid version into "face-to-face component"; there are two instances when hybrid and fully face-to-face will be looked at separately. The COMM course was taught to Business students enrolled in diploma programs in the College's School of Business, with the majority of students being in the field of accounting. Students can be considered somewhat advanced in their studies since they commonly take the course in second year/first term or first year/second term of their two-year diploma. Fully online and out-of-sequence students are most commonly taking the COMM course online.

In both the online and face-to-face-component versions of the course, the same learning outcomes were tested, and the same course texts, assignments, schedule, content, and course set-up were used. A student survey (see Appendix A) was conducted at the end of each term, collecting both demographic data as well as student feedback on the chosen course design features. Out of a total of 232 students that completed the course over the three given academic years, 164 students—or 70% of students—filled out the survey. Of those 164 students, 83 took the course online, and 81 took it face-to-face-component. Of the total of 232 students in the course, 119 took the course online, and 113 took it face-to-face-component.

With many sections of the COMM course being taught each term, the grade breakdown was standardized across sections for the sake of course consistency: 60% of the course consisted of professional writing assignments of various lengths and levels of difficulty (e.g., email, letter, report, resume). The rest of the course grade was made up of discretionary marks (which the author used for discussions and quizzes) and an oral presentation.

Descriptive statistics as well as chi-square and ANOVA methods were used to study comparative educational outcomes by measuring student achievement (final grades) and key factors

of student achievement in the online and face-to-face-component versions of the COMM course. Data was transformed when necessary to meet the ANOVA statistical assumptions. The significance level was set at $\alpha = 0.05$ for all chi-square and ANOVA tests.

Limitations

70% of students enrolled in the COMM course ended up filling out the voluntary student survey, which is an overall satisfactory and useful survey response rate. However, students who filled out the survey on average had stronger grades than students who did not fill out the survey. Students who filled out the survey had an average final grade of 71.41% compared to the average of 52.42% for students who did not fill out the survey. 24% of failing students as compared to 84% of passing students filled out the survey. This means that demographic data on weaker students is less represented than that on stronger students.

Results

Final Grades

Figure 1 provides an overview of the distribution of final grades in the COMM course by delivery format. Table 1 complements Figure 1 by providing exact numerical values of grade means and medians.

Figure 1
Distribution of Grades by Delivery Format

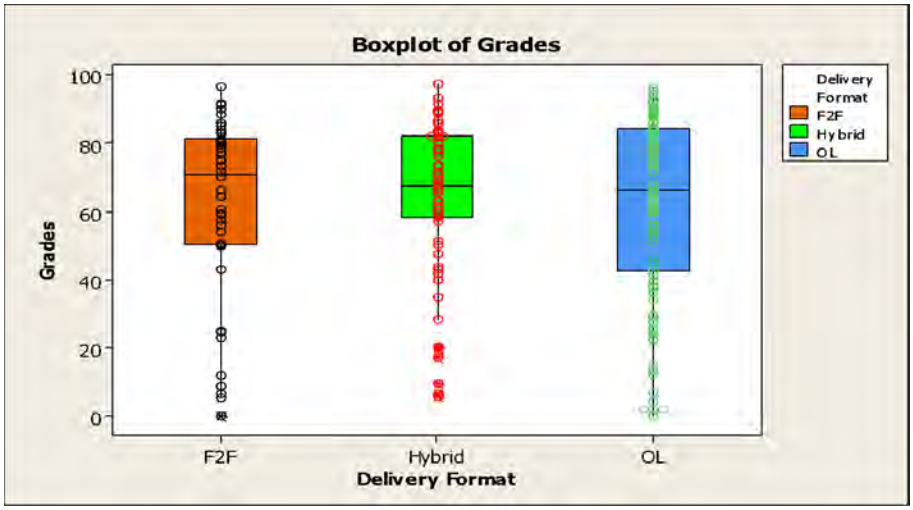


Figure 1 shows the interquartile range of grade medians in the three delivery formats – with the median connect lines (see Table 1 for median grades in percentages). Overlayed dotplots show the sample size and distribution of grades. The interquartile ranges of the three delivery formats overlap, with the interquartile range for online grades being larger than the interquartile ranges for face-to-face and hybrid grades. This means that while all three delivery formats show similar grades in the 50% interquartile grade range, online grades have a slightly larger spread. Also, the distribution of grades in the face-to-face and online delivery formats is skewed to the left (i.e., towards the lower grades) while the hybrid delivery format has more lower grade outliers.

Table 1
Distribution of Grade Means and Medians by Delivery Format

Course Type	Mean Grade (%)	Median Grade (%)
Online	62.18	66.08
Face-to-Face	61.4	70.79
Hybrid	64.5	67.45
Face-to-Face-Component	63.32	68.04
All	62.74	67.49

ANOVA tests (summarized in Table 2) show that delivery format did not have a statistically significant effect on final grades. Final grade means were not significantly different in the different delivery formats (see Table 1 for grade means in percentages).

Table 2
Final Grades by Delivery Format

Delivery Format	*F*-Value	*df*	*p*-Value
Online, Face-to-Face-Component	0.12	1	0.732
Online, Face-to-Face, Hybrid	0.27	2	0.765

$N = 231$

Course Attrition

Understood at the level of individual courses, attrition is commonly defined as a delay or departure by a student from a course prior to completion of course requirements and achievement of a final grade. Based on withdrawal dates, there are different attrition rates. In this study, the attrition rate includes only those students who withdrew after the add/drop deadline.

A chi-square test shows insufficient evidence for an association between delivery format and attrition (Chi-Sq = 0.721, $df = 1$, $p = 0.396$; $n = 258$). The attrition rate was similar across the different delivery formats: on average, 11.19% of online students withdrew after the add/drop deadline as compared to 8.06% of face-to-face-component students.

Course Failure

Course failure refers to those students who completed the course but achieved a failing grade (< 50%). As summarized in Table 3, chi-square tests do not show sufficient evidence of an association between delivery format and course failure. It should be noted, though, that the course

failure rate (see last column of Table 3) was 6.8% lower for face-to-face-component students than it was for online students.

Table 3
Course Failure by Delivery Format

Delivery Format	Chi-Sq	*df*	*p*-Value	Failure Rate
Online, Face-to-Face-Component	1.511	1	0.219	Online: 26.27% Face-to-Face-Component: 19.47%
Online, Face-to-Face, Hybrid	1.550	2	0.461	Online: 26.27% Face-to-Face: 20.45% Hybrid: 18.84%

N = 231

Comparing native and non-native English-speaking students in particular, the author also found insufficient evidence for an association between native/non-native English speakers and course failure (Chi-Sq = 0.731, *df* = 1, *p* = 0.392). However, a separation into online and face-to-face-component students among the non-native English speakers shows that online non-native English speakers were about five times more likely than face-to-face-component non-native English speakers to fail the course (a chi-square test could not be conducted due to low numbers).

Factors of Student Achievement

Association of Delivery Format and Demographic Factors

Chi-square tests (summarized in Table 4) show significant evidence for an association between delivery format and each of the chosen demographic factors. The survey provided in Appendix A specifies the choices students had for each demographic factor. Table 5 complements Table 4 by providing numerical values to explain associations.

Table 4
Delivery Format and Demographic Factors

Demographic Factor	Chi-Sq	*df*	*p*-Value
Gender	8.703	1	0.003
Age	36.681	4	< 0.001
Employment Hours	56.312	3	< 0.001
Full-/Part-Time	7.419	1	0.006
Direct/Indirect Entry	14.605	1	< 0.001
Education	14.992	3	0.002
Native Language (English/non-English)	42.897	1	< 0.001

N = 164

Table 5

Numerical Values for Delivery Format and Demographic Factors

Demographic Factor	Online Students (%)	Face-to Face Component Students (%)
Gender[5]	71.95% female 28.05% male	49.38% female 50.62% male
Age	66.27% were 25+ years	24.69% were 25+ years
Employment Hours	65.86% worked 21+ hours	11.11% worked 21+ hours
Full-Time/Part-Time	14.46% were part-time students (⅔ female)	2.5% were part-time students
Direct/Indirect Entry	86.75% entered course/program of study indirectly	60.49% entered course/program of study indirectly
Education	28.92% completed previous college degree	6.17% completed previous college degree
Native Language (English/non-English)	92.87% were native English speakers	45.68% were native English speakers

A chi-square analysis with the response variable "employment hours" and explanatory variable "gender" also shows evidence of an association (Chi-Sq = 8.854, $df = 3$, $p = 0.031$). A larger percentage of female students work more than 21 hours: 46.67% of females as compared to 25% of males. This data, along with the above gender data, suggests that female online students make up the largest fraction of students working 21+ hours.

Moreover, a chi-square test shows sufficient evidence for an association between the explanatory variable "student status" (domestic, international) and the response variable "education" (Chi-Sq = 6.700, $df = 1$, $p = 0.010$). A larger percentage of international students have a university degree: 27% of international students as compared to 10% of domestic students. A separate chi-square test shows an association between the explanatory variable "gender" and the response variable "education" (Chi-Sq = 9.593, $df = 3$, $p = 0.022$). About 3 times as many females have a college degree than males (24.74% of females vs. 7.81% of males). The overall education data suggests that female online students make up the largest fraction of students with a previous college degree.

[5] Out of the 164 students who completed the survey, one student identified as non-binary; all other students identified as female or male. For statistical purposes, the one student identifying non-binary needed to be excluded from the analysis.

Effects of Demographic Factors on Student Performance

The ANOVA method was used to evaluate the effects of demographic factors on final course grades in both delivery formats and possible interactions between factors.[6] No statistically significant evidence for an interaction between factors was found. However, as summarized in Table 6, the factors of gender, age, and education were significant indicators of student achievement. In these cases, a Tukey test was used to establish which specific group means were significantly different; relevant results are summarized in Table 7.

Table 6

Significant Demographic Indicators of Student Achievement

Indicator	*df*	*F*	*p*
Age	4	3.66	0.007
Gender	1	4.95	0.027
Education	3	9.15	< 0.001

N=161

Table 7

Overview of Tukey Test Results

Factors	Tukey Test Results
Gender	Female students had significantly higher grades than male students.
Age	Students 40+ years and over had significantly higher grades than students 20 years and younger.
Gender and Age	Female students 40 years and over had significantly higher grades than male students 20-24 years.
Education	Students with a college/university degree had significantly higher grades than students with a high school diploma only.
Education and Native Language	Non-native English speakers with a university degree had significantly higher grades than native and non-native English speakers with a high school diploma only.

[6] Data was transformed (Box-Cox) to meet the ANOVA statistical assumptions. Final grades in the COMM course were cubed.

Effects of Writing Proficiency on Student Performance

Writing proficiency was measured in the form of final grades in the College's developmental English course (i.e., WRIT course), which is a prerequisite for the COMM course. Students can place out of the WRIT course if they achieve a high enough score (≥ C+) at the writing entrance exam; in this case, they directly enroll into the COMM course (students with an equivalent external credit can also directly enroll). 74% of the students registered in the COMM course had taken the WRIT course; 25% had placed out of WRIT; and 1% had an equivalent external credit. Online students were more likely to place out of the WRIT course (32.48%) than face-to-face-component students (17.7%).

Writing Proficiency, Course Failure, and Delivery Format. Chi-square tests (summarized in Table 8) show significant evidence of an association between students failing or passing the COMM course (response variable) and their final grades in the WRIT course (explanatory variable). Students with a final grade < B (i.e., < 70%) in the WRIT course had a significantly larger failure rate in the COMM course than students with a final grade ≥ B and students placing out of WRIT. This significant difference in failure rate applies regardless of delivery format. However, students who achieved a grade < B in the WRIT course had a 20% higher failure rate in the online version of the COMM course than they did in the face-to-face-component version.

Table 8

Course Failure and WRIT Performance

Pass/Fail COMM course and WRIT Grades	Chi-Sq	*df*	*p*	Failure Rate Students with WRIT Grade < B	Failure Rate Students with WRIT Grade ≥ B	Failure Rate Students Placing Out of WRIT
All Students	42.350	2	< 0.001	56.86%	14.88%	10.53%
Online Students Failing	24.212	2	< 0.001	68.18%	19.3%	13.51%
Face-to-Face-Component Students Failing	20.991	2	< 0.001	48.28%	10.94%	5%

N = 229. Failure rates were calculated as shown in Appendix B.

Writing Proficiency and Final Grades. Figure 2 shows a boxplot of COMM course final grades by WRIT course final grades. Both the COMM course grade medians (see median connect lines) and COMM course grade means (see black circles) are shown for each category of WRIT grades. The COMM course grade means decrease with decreasing WRIT course grades (the grade "P" represents students who placed out of WRIT). The decrease in means is most pronounced between B and C+, and so is the decrease in medians (see Table 9 for the numerical values of the mean and median grade percentages). The interquartile ranges of COMM course grades have a larger spread (i.e., more variability) for WRIT course grades C, C+ and especially D than they do for the other WRIT course grades. The interquartile ranges for WRIT course grades C, C+ and D also are the only ones that extend into the failing course grade range.

Figure 2

Distribution of COMM Course Grades by WRIT Course Grades

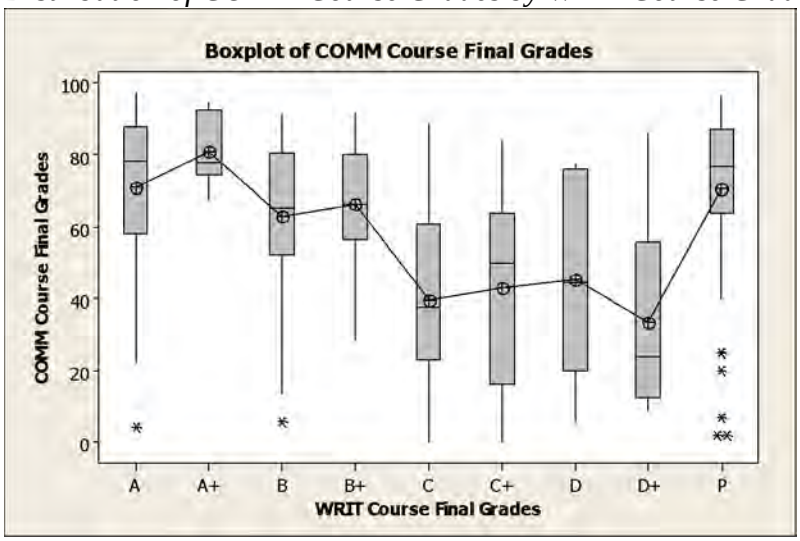


Table 9

COMM Course Grade Medians and Means by WRIT Course Grades

Mean: COMM Course Grades (%)	Median: COMM Course Grades (%)	WRIT Course Grades
80.94	77.8	A+
70.86	77.99	A
66.3	66.16	B+
62.79	65.28	B
42.82	49.73	C+
39.27	37.49	C
38.92	25.96	D
70.58	76.74	P

A one-factor ANOVA test[7] establishes final WRIT grades as a significant factor for performance (final grades) in the COMM course ($F = 8.45$, $df = 7$, $p < 0.001$; $n = 228$). Tukey test

[7] Data was transformed (Box-Cox) to meet the ANOVA statistical assumptions. Final grades in the COMM course were cubed. The same data transformation was applied in the subsequent two-factor ANOVA analysis.

results (summarized in Table 10) show that students with a grade ≥ 80% in the WRIT course or placing out of WRIT had a significantly higher grade in the COMM course than students with a grade < 70% in the WRIT course.

Table 10
Tukey Test Result: COMM course Grade vs. WRIT Course Grade

WRIT Grade	*n*	Mean Cubed	Grouping
A+	7	550296	A
P	56	441707	A
A	53	441550	A
B+	29	339990	A B
B	32	321783	A B
C+	21	168278	B
D	13	156616	B
C	17	132820	B

Means that do not share a letter are significantly different.

A two-factor ANOVA analysis indicates that there was no significant interaction between final WRIT grades and delivery format in the COMM course (F = 1.14, *df* = 7, *p* = 0.342). Online and face-to-face component students in the COMM course do not show statistically significant differences in their final grades in relation to their WRIT scores (this includes both passing and failing students).

Student Feedback on Course Design Features

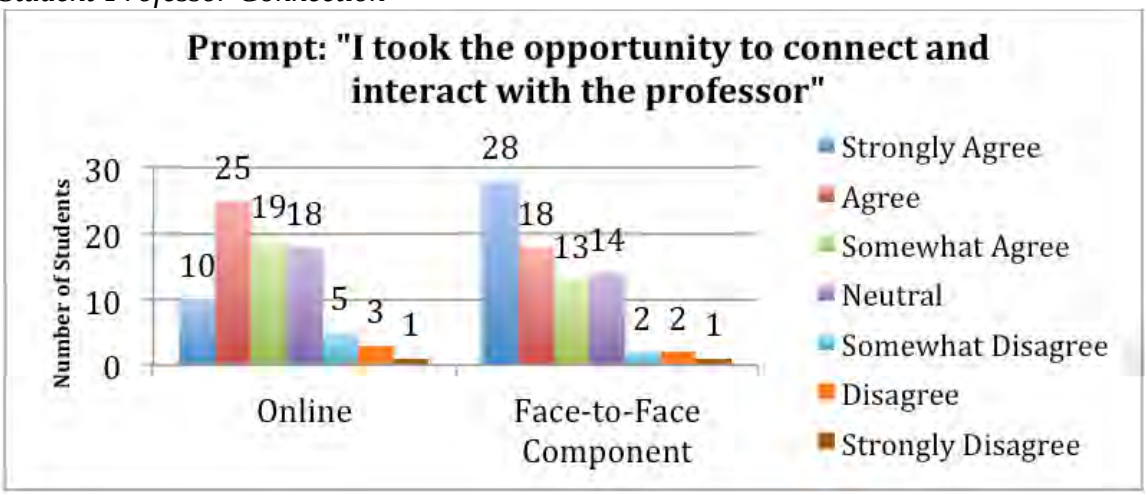
A chi-square test did not show evidence of an association between delivery format and student satisfaction with the given course delivery format (Chi-Sq = 3.509, *df* = 6, *p* = 0.743). 88.89% of online students, 93.94% of face-to-face students, and 89.74% of hybrid students showed satisfaction with the delivery format in which they took the course.

Further chi-square tests also did not indicate an association between delivery format and students' perceived clarity of course material and usefulness of professor feedback. However, there was sufficient evidence of an association between delivery format and students' perceived connection with the professor (Chi-Sq = 12.382, *df* = 4, *p* = 0.015). As Figure 3 shows, face-to-face-component students more strongly sought opportunities to connect and interact with the professor than their online counterparts.[8]

[8] Similar to this finding at the single course level, a series of studies conducted by researchers at the CCRC (2013a) and involving an observation of 23 community college courses found that a student-professor connection was felt to be weaker by online students than it was by face-to-face students.

Figure 3

Student-Professor Connection



Discussion

In terms of overall student performance, the results of this observational study both build on and complicate results from other comparative studies of online and face-to-face course delivery. In the COMM course, online students showed equal satisfaction with the course's delivery format than their face-to-face-component counterparts. Online and face-to-face-component students also performed mostly at par. Students passing the COMM course earned similar grades in the different delivery formats and were similarly likely to successfully complete the course. Chi-square and ANOVA tests did not show statistically significant differences (the course completion rate was 6.8% lower for online students). These findings do not concur with a number of comparative studies that show that online students are significantly less likely to successfully complete courses and to earn similar grades than their face-to-face counterparts (see literature review). In the following, possible reasons for this discrepancy in findings will be discussed.

Advancement in Course of Study

The COMM course was taught to Business students at a point when they can be considered somewhat advanced in their studies; they do not take the course as they begin their studies. Xu and Jaggars' (2011) Washington State study, while overall showing that online students are less likely to complete courses and earn similar grades than their face-to-face counterparts, also identifies advancement in a student's course of study as a factor for improved online course completion. Xu and Jaggars (2011) attribute this improvement to a strengthened e-learning aptitude for those students persisting with online courses and a switch to entirely face-to-face courses for those students doing poorly online. The e-learning and switching effects would have taken place to some extent when online students took the COMM course. For example, 95.45% of students who took the prerequisite WRIT course online also took the COMM course online. These students would have built up a certain e-learning aptitude in the WRIT course. Two students who took the WRIT course online switched to a face-to-face-component format in the COMM course.

Course Type

The COMM course chosen for this study is not only a somewhat more advanced course but also a mandatory course. Looking at course type as an online retention risk factor, Wladis et al. (2014) found that students taking a mandatory course online perform roughly at par with their face-to-face counterparts, while students taking a lower-level elective course online on average perform worse. Wladis et al.'s study suggests that course type is a factor of student achievement. The author's own findings support Wladis et al.'s to the extent that course retention and completion in the mandatory COMM course did not show statistically significant differences between the online and face-to-face-component delivery formats.

Academic/Writing Preparation

Students commonly take the COMM course after having completed a prerequisite developmental English course (WRIT course). The advantage of academic preparation in the WRIT course may help to further explain the equal performance in the two delivery formats in the COMM course. ANOVA tests show that while students who scored a grade ≥ 80% in the WRIT course or placed out of WRIT on average had significantly higher grades in the COMM course than students with a grade < 70% in the WRIT course, there are no significant differences for students in the face-to-face-component and the online versions of the COMM course.

Chi-square tests show that while all students with a grade < B in the WRIT course had a statistically significant larger failure rate in the COMM course than students with a ≥ B grade, online students had a significantly higher failure rate (68%) than their face-to-face-component counterparts (48%). This result indicates that it may be recommendable for students with a score <B in the WRIT course to take the COMM course in a face-to-face-component delivery format rather than in a fully online delivery format. While the failure rates are high for both online and face-to-face-component students scoring below a B in the WRIT course, students in a face-to-face-component version of the COMM course still have a significantly higher pass rate.

Overall, the results presented here indicate that performance in a developmental English course is a factor for performance in a more advanced course involving a variety of communication skills. Hence, performance in a developmental English course should be included as a variable in strategies that aim at improving student retention and finding the most suitable learning situations for at-risk students.

Delivery Format: Fully Online Vs. Mix of Online and Face-to-Face

The following is a breakdown of registration into the COMM course by delivery format provided by the Business School (COMM course students are Business students):

- Students registered in a fully online program are registered into the online section of the course.
- Students registered in an in-class program are registered into an in-class section of the course. Students can request to switch in the online section, which rarely ever happens.
- Out-of-sequence students (e.g., course retake) are frequently registered into the online section due to scheduling conflicts.

The above breakdown shows that the online COMM course version is made up largely of fully online students.

As discussed in the introduction to this paper, James et al. (2016) and Shea and Bidjerano (2017, 2018) separated between fully online students and students taking a blend of online and face-to-face-component courses in their larger-scale studies of online student performance at community colleges across the U.S. Both studies show that taking all courses online correlates with decreased student performance and retention whereas taking a blend of online and face-to-face courses does not. The finding arrived at in the COMM course study does not concur. Students in the COMM course performed equally in the two delivery formats, with students taking the course online being in the majority fully online students.

This discrepancy in findings may be explained to some extent by the difference in scale in the studies (small and course-level versus large and cross-course), as well as by the COMM course's specific course type (mandatory), course status (somewhat advanced), and writing preparation (WRIT course). Institutional variables may also figure into the overall success of fully online students. These include student online readiness assessments, online orientation programs, program-specific supports and materials, and other online support services (e.g., technical) that were available to students taking the COMM course.

Demographic Factors

The demographic data collected and analyzed in this study aligns with findings arrived at in similar studies of online and face-to-face courses discussed in this paper's literature review. Just as online students, on average, are more mature, work longer hours, and are more likely to be enrolled part-time than face-to-face students, they are also more likely to have entered their present course of study indirectly and are more likely to have already completed a college degree. They are, in summary, more likely to be nontraditional students than their face-to-face-component counterparts. They are also more likely to be female. The factors of gender, age, and education were significant indicators of student achievement. Female students, more mature students, and students who had previously completed a postsecondary degree had significantly higher final course grades.

Employment

As the literature review provided in this paper shows, the author could not retrieve employment data on postsecondary students in Canada over the age of 29, on college students only, and on college students enrolled online. In addition, the author's review of research on the effects of employment on student performance—which suggests a negative correlation when students work 20+ hours—found that studies tend to focus on so-called traditional-age students in the age range of 17-24. This limits a full comparison of the findings from the COMM course to existing findings on student employment.

Approximately 65% of students who took the COMM course and filled out the survey were employed. This percentage is significantly higher than the Ontario student employment average of around 46% in the academic years from 2016-19 (Statistics Canada, 2019b). Making a distinction between online and face-to-face-component COMM course students can help explain the difference in percentages: 84% of online students were employed as compared to 46% of face-to-face-component students (the latter percentage is the same as the Ontario average). Online students were more likely to be enrolled part-time than their face-to-face-component counterparts, which helps

explain the higher employment rate for online students, though only to some extent since the majority of online students (85.54%) were still enrolled full-time.

In regard to student performance, the author did not find that employment hours had a statistically significant effect on final grades in either of the delivery formats; the 20-hour threshold observed in other studies was not confirmed in the author's study. One explanation for this difference in findings could be that the author's study included not only traditional-age students (as other studies did) but also nontraditional-age students. The latter may be impacted differently (less negatively) in their academic performance by employment than traditional-age students.

Conclusion

Online course offerings increase opportunities of student access to education. For many students who, for a variety of reasons, are unable to attend classes face-to-face, online education promises an educational pathway. The evidence reviewed and findings presented in this paper suggest that for certain student demographics and course types, fully online courses indeed produce learning outcomes and student achievements that are on par with those in face-to-face-component courses. In this sense, the author agrees with Higher Education Quality Council of Ontario authors Carey and Trick (2013) that provincial governmental funding should be targeted at students benefiting from online instruction. These students should have "online learning opportunities available to them" which "serve students' learning needs" (Carey & Trick, 2013, p. 2). Though, the author's research also seconds Carey and Trick's (2013) caution that "there is no evidence that all of the learning outcomes expected of postsecondary students in Ontario can be achieved solely by online learning" (p. 2). Online learning does not work for all students and in any educational situation or context.

The author agrees with the reviewed literature that educational institutions need to continue their efforts at identifying at-risk students and finding the most suitable learning situations for them. In terms of online instruction, student online readiness assessments, online orientation programs, and online support services are crucial. These venues can help encourage at-risk students to enroll in a delivery format that has a face-to-face component or to make use of the online learning supports available to them. Importantly, online course choice should be foremost a student choice, that is, a choice driven by student need, both pedagogically and demographically, and met by well-designed and specific pedagogical considerations. The latter involves equipping not only students but also faculty with the tools needed for an ever-changing online delivery landscape.

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Appendix A

Survey

1. What is your age?
   - o 19 years and under
   - o 20-24 years old
   - o 25-29 years old
   - o 30-39 years old
   - o 40 and over

2. What is your gender?
   - o Female
   - o Male
   - o Transgender
   - o Other: _____

3. Please specify your status as a student.
   - o Domestic (Canadian citizen or permanent resident)
   - o International (Visa)
   - o Other: _____

4. What is your first or native language?
   - o English
   - o French
   - o Spanish
   - o Portuguese
   - o Arabic
   - o Persian
   - o Mandarin
   - o Cantonese
   - o Hindi
   - o Urdu
   - o Korean
   - o Other: _____

5. Education: What is the highest degree or level of schooling you have completed?
   - o Some high school, no diploma
   - o High school graduate, diploma or equivalent
   - o Trade/technical/vocational training
   - o College degree
   - o Bachelor's degree
   - o Master's degree
   - o Professional degree (e.g., MD, DDS, JD)
   - o Doctorate degree
   - o Other: _____

6. Are you a full-time or part-time student?
   - o Full-time
   - o Part-time
   - o Continuing education
   - o Other: _____

7. Did you start your college studies right after completing high school?
   - o Yes, I started my studies right after high school.
   - o No, I did not start my studies right after high school.

If you answered this question with "No", what did you primarily do before starting your current college studies?
   - o Work
   - o Study at another institution
   - o Study at Fanshawe
   - o Provide child or other care
   - o Other:_____

8. What term are you currently in?
   - o First year, first term
   - o First year, second term
   - o Second year, first term
   - o Second year, second term
   - o Other:_____

9. Are you currently employed while studying?
   - o Yes, I am currently employed.
   - o No, I am not currently employed.

If you have answered "Yes", how many hours per week do you work on average?
   - o Between one and twenty hours
   - o Between twenty-one and forty hours
   - o Over forty hours

10. At registration, did you have a choice to take this course face-to-face or online?
   1. Yes, I had a choice.
   2. No, I did not have choice between face-to-face and online.
   3. Additional Comments:_____

11 If you answered the above question with "Yes, I had a choice," why did you decide to take this course in the delivery format you did? (You can choose more than one answer.)
   1. Preference for face-to-face contact with professor and students
   2. Preference for highly interactive learning
   3. Preference for more teacher-directed learning
   4. Need for flexibility (time, location, etc.)
   5. Preference for self-directed learning
   6. Preference for technology-mediated learning
   7. Other: _____

12. Using the following scale, select **the degree to which you agree or disagree with** by placing an **X** in the appropriate box:

	Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree
Course material was helpful							
Quizzes were helpful							
Written assignments were helpful							
Discussions were helpful							
Course site news/ announcements were helpful							
Use of course site calendar was helpful							
Professor connection and presence was helpful							

Please take a moment to write down any additional comments regarding the course tools used in this course. Please suggest improvements, if applicable.

13. Using the following scale, select the **degree to which you prefer** the type of course delivery by placing an **X** in the appropriate box:

	Most preferred	Somewhat prefer	Neutral	Somewhat do NOT prefer	Least preferred
Fully face-to-face					
Some face-to-face and some online (hybrid)					
Fully online					

14. Using the following scale, select the degree to which you agree or disagree with this statement: **"I was satisfied with taking this course in the format I did."** Place an X in the appropriate box.

Strongly agree	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	Strongly disagree

15. Using the following scale, select the degree to which you agree or disagree with each statement based on your experience in this course by placing an X in the appropriate box:

	Strongly agree	Agree	Somewhat agree	Neutral	Some-what disagree	Disagree	Strongly disagree
Course materials were clear and well-organized.							
Instructions were clear and well-organized.							
I was able to navigate the course content with ease.							
Rubrics and/or grading scheme breakdown information were helpful preparing my assignments.							
Rubrics and/or grading scheme breakdown information provided clear professor feedback.							
I took the opportunity to connect and interact with the professor.							
When needed, my professor was accessible to me in this course.							

16. If you have taken or are taking a fully online course, please use the following scale to select the degree of difficulty of your experience in the fully online course(s) in comparison to the face-to-face course(s) you have taken or are taking:

	Much less difficult	Less difficult	Somewhat less difficult	About the same	Somewhat more difficult	More difficult	Much more difficult
Time management							
Connection with professor							
Learning course material							
Attending class							
Applying consistent effort							
Achieving satisfactory grade							

Appendix B

Pass/Fail COMM course*	WRIT Grade < B	WRIT Grade ≥ B	WRIT Place Out
Pass	P1	P2	P3
Fail	F1	F2	F3
Total	T1	T2	T3
Failure Rate	F1÷T1	F2÷T2	F3÷T3

Note: Three separate tables were used for *N*=all students, *N*=online students only, *N*=face-to-face-component students only