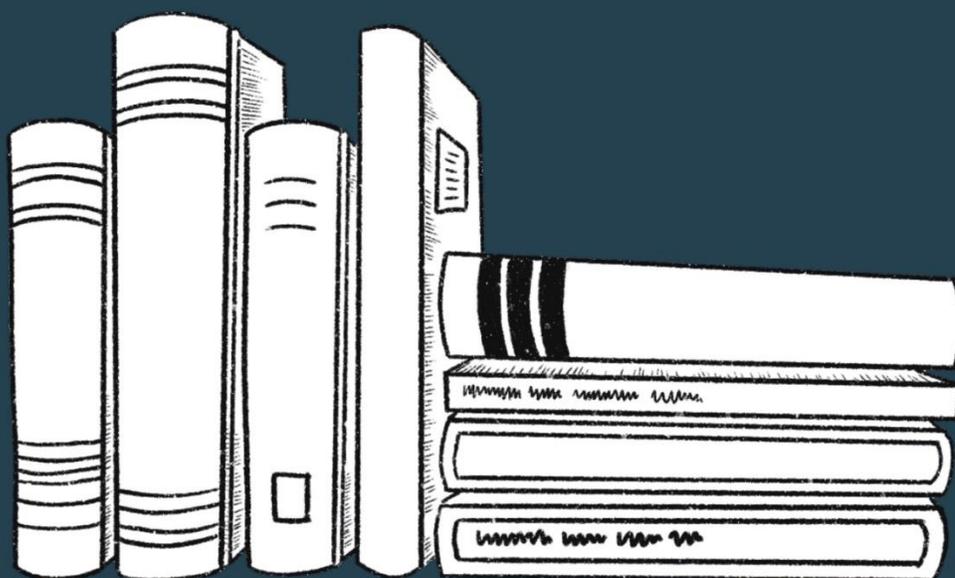


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Ontario Learning During the COVID-19 Pandemic: Experiences of Ontario First-year Postsecondary Students in 2020–21

Jeffrey Napierala, Natalie Pilla,
Jackie Pichette & Julia Colyar

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The Higher Education Quality Council of Ontario

88 Queens Quay West, Suite 2500
Toronto, ON
Canada, M5J 0B6

Phone: (416) 212-3893

Fax: (416) 212-3899

Web: www.heqco.ca

E-mail: info@heqco.ca

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Executive Summary

The transition from high school to postsecondary education (PSE) is often complicated. Students making that transition in the fall of 2020 did so with the added complication of school closures and remote learning due to the COVID-19 pandemic — in both their secondary and postsecondary studies. These students were constrained in their ability to interact with or integrate into the PSE community, which previous research shows is key for retention and graduation.

Knowing that disruptions to high school learning will continue to affect future cohorts of PSE students, HEQCO set out to understand and learn from students who entered Ontario PSE from high school in fall 2020. What academic challenges did they encounter? What aspects of the PSE environment enabled their success? We conducted an online survey of 565 students who completed a full year of studies across 22 Ontario colleges and 19 Ontario universities in the 2020-21 school year.

Most respondents completed all first-year PSE courses online and encountered a range of challenges in this context. Outside their virtual classrooms, many struggled to make friends and maintain their mental health. In their courses, students overwhelmingly felt the fully online environment had a negative effect on their learning. Students enrolled in science, technology, engineering or math (STEM) and students with lower first-year grade point averages reported negative impacts of the virtual environment to an even greater degree.

Many of the students we surveyed, and STEM students in particular, felt a lack of adequate preparation for PSE, reporting gaps in their secondary learning and recollection. A large group of respondents struggled to stay focused during classes, communicate with educators and their peers, understand new content and stay on top of their course work. And a number reported gaps in time management and organizational skills. All of this contributed to low overall satisfaction with first-year postsecondary experiences (just 7% of respondents felt “extremely” satisfied, which is low compared to prior satisfaction surveys).

Despite voicing these challenges and low satisfaction, many students, particularly lower-income students, did express an openness or even a preference for having some online or hybrid courses as part of their programs in the future. This openness is encouraging, especially considering the investment the Ontario government and postsecondary institutions have made into virtual learning prior to and throughout the pandemic.

Considering our survey findings, HEQCO recommends Ontario colleges and universities:

- Develop students’ skills needed for effective online learning, like time management and organization, through curricular and co-curricular programming. Institutions should also explore strategies to address gaps in K-12 learning, potentially through expanded bridging programming. STEM students in particular may benefit from a review of foundational concepts missed or not retained due to pandemic-related learning disruptions in high school.
- Integrate Universal Design for Learning (UDL) principles in all courses, as well as the delivery of services and, where possible, co-curricular activities. Survey respondents highlighted UDL-aligned practices as being key to their success.

- Extend options for online and hybrid learning in a post-pandemic context. Opportunities to select courses in multiple formats empowers students to make decisions that best support their learning and accommodate competing priorities.
- Collect additional data to monitor ongoing COVID-19 impacts on student success. Institutions should gather and analyze persistence and retention data to understand the extent to which pandemic-related challenges have interrupted student success.

Providing enhanced opportunities for skills development, academic preparation and means of engagement can help improve student satisfaction and success over the long term.

Introduction

In March 2020, the Government of Ontario declared a state of emergency to mitigate the spread of COVID-19 in the province. In the days that followed, Ontario's colleges and universities closed their physical campuses and carried out the remainder of the semester and much of the following year online. Many postsecondary institutions shifted their grading policies, allowing students to adjust their course schedules and grading options (e.g., credit/no-credit) late into the academic term without financial or academic penalty (Friesen, 2020; Fung, 2020; Georgian College, 2020). At the same time, the Ontario Ministry of Education (MoE) established new policies that ensured secondary students' final grades could not be lower than those earned before school shutdowns (Gallagher-Mackay et al. 2021; Lecce, 2020; Miller, 2020). The MoE also temporarily waived community service hours and the Ontario Secondary School Literacy Test (OSSLT) requirements so that Grade 12 students could stay on track for graduation (Gallagher-MacKay et al, 2021).

Despite these efforts to stabilize students' educational experiences, the pandemic's disruption created new challenges and magnified many existing barriers for students at all levels, including those navigating the already complex transition into postsecondary. This report shares findings from a survey of 565 Ontario students who began a college or university program in the first wave of the pandemic — matriculating into PSE in the fall of 2020 after graduating from secondary school in the spring of 2020. The goal of this report is to examine the academic challenges students encountered in their transition into colleges and universities and the factors that enabled success.

Background

The pandemic caused governments around the world to close physical schools and adapt education policies in the spring of 2020 (UNESCO, 2022). Educational researchers have since documented learning losses (Dorn et al, 2020; Hargreaves, 2021), challenges with mental and physical health (Prowse et al, 2021; Patterson et al, 2021; Subramanian, 2021), financial instability (Cameron et al, 2021), a lack of available academic and social supports (Mann, 2020) and other challenges, such as a lack of motivation and focus (Dorn et al, 2020; Besser et al, 2020; Aristovnik et al, 2020). Many researchers have also noted the pandemic's differential impacts on students with disabilities and those from low-income and first-generation backgrounds, particularly with respect to internet connectivity and access to online learning devices (Keller et al, 2020; Cameron et al; Aucejo et al, 2020; Day et al, 2021). Researchers anticipate these impacts will have long-term consequences, including delays in postsecondary graduation timelines and with students' entry into the labour market (Aucejo et al, 2020; Dorn et al, 2020).

Ontario-specific research findings on pandemic impacts align with global reports. A study of students enrolled at 14 universities across Canada found that the pandemic negatively impacted students' mental and physical health, as well as their academic experiences (Linden et al, 2021). The most significant stressors for students were uncertainty around the timeline of pandemic, concerns about online classes, the health of friends and family and loneliness. Previously, HEQCO conducted an accessibility-focused survey of postsecondary students who completed the winter 2020 semester at an Ontario college or university. The survey asked

respondents how their experience of remote learning compared to their in-person and online learning experiences, pre-pandemic. About 70% of the respondents reported that they had trouble focusing once courses moved online, and about half had difficulty staying on top of readings and assignments. Students with self-reported disabilities were more likely to report these challenges. Students also experienced difficulty navigating online learning platforms and accessing resources such as social and academic supports (Pichette, Brumwell, & Rizk, 2020). News media articles have since documented students' uncertainty and frustration with ongoing campus closures and related challenges as the pandemic moves into a third year (Alhmidi, 2022).

To date, most research into the pandemic's educational impacts has focused on K-12 schools or postsecondary settings (i.e., it has examined impacts on students attending secondary schools, colleges or universities when courses shifted to virtual environments). This report focuses on students who transitioned into postsecondary from secondary settings in fall 2020 — the first cohort of students to matriculate into PSE in the pandemic. Pre-pandemic research suggests this is a pivotal point in a student's educational journey (Schaeper, 2019; Finnie et al, 2012; Tinto, 1993).

Tinto's well-known model of student departure (1975, 1993) suggests student persistence during and after postsecondary transitions hinges on integration into formal and informal academic and social systems. Students who successfully transition into postsecondary and persist tend to perform well academically, have positive interactions with faculty, participate in extracurricular activities and engage with peers. Our study explores the challenges incoming PSE students encountered in the context of the pandemic, the supports that aided students in their transition, and opportunities to create a smoother transition for future cohorts. As the pandemic continues to disrupt educational experiences, this research should inform secondary and postsecondary institutions' plans as they work to enhance students' preparation for and transitions into postsecondary settings.

Methodology

HEQCO conducted an online survey of 565 students who entered PSE directly from high school in fall 2020 and completed a full year of studies at an Ontario PSE institution in the 2020-21 school year. HEQCO staff developed the survey and Academica Group administered it in July 2021 and gathered responses from students at 22 colleges and 19 universities.

Though the sample is not representative of the first-year student population, HEQCO applied weights to the data to ensure results are representative of 18- to 19-year-old¹ PSE students in Ontario with respect to institution type and gender. We also conducted statistical tests such that the bivariate findings we discuss in the body of this report achieved a standard level of statistical significance² unless otherwise stated.³

This report does not make direct comparisons before and after the onset of the COVID-19 pandemic. Without benchmarking data, we cannot establish a causal relationship between the pandemic and students' academic experiences. While some of our survey questions did specifically ask students about the pandemic and its effects on their learning outcomes and

¹ We applied these weights because 92% of students in our sample fall in this age range.

² We conduct tests where alpha, or the chance that the null hypothesis of no effect will be rejected when it is actually true, is 0.05.

³ See Appendix A for additional sample demographics and methodological details.

experiences, we remind readers that this data reflects students' perceptions measured at one point in time.

Sample Characteristics

Table 1 below displays key characteristics of the sample used in our analysis. Approximately one-third of the weighted sample attended an Ontario college/polytechnic institution and the rest attended universities. Overall, 29% of students said their main field of study was science, technology, engineering or math (STEM) and 71% said it was business, humanities, health, arts, social science or education (BHASE).⁴ STEM students were less concentrated at colleges — just 17% of all college students were enrolled in STEM fields compared to 36% of all university students. We also asked students to provide their “best estimate” of their family’s total household income in 2020: 32% of students reported less than \$50,000, 33% reported between \$50,000 and \$100,000 and 34% reported more than \$100,000.⁵ For convenience, we refer to these income levels as lower, middle and higher, respectively.

Table 1: Key Characteristics of the Sample

Institution Type (N=565)	
College or Polytechnic	32.9%
University	67.1%
Main Field of Study (N=503)	
STEM	29.2%
BHASE	70.8%
Total Household Income in 2020 (N=465)	
Lower Income: less than \$50,000	32.3%
Middle Income: \$50,000 to \$100,000	33.4%
Higher Income: more than \$100,000	34.2%

Findings

The pandemic and consequent shift to online learning shaped the academic and social experiences of the students we surveyed. For many students, the context magnified or introduced personal challenges outside of the virtual classroom. For example, 72% of students we surveyed reported challenges making new friends or maintaining their mental health. Fifty-six percent reported challenges with both.

⁴ It was not possible to classify 62 students' main fields of study into STEM or BHASE categories, and consequently, we treat them as missing for the analysis.

⁵ For this question, 100 students (or 18% of the total sample) preferred not to give a household income estimate, which may affect the accuracy of results using this measure.

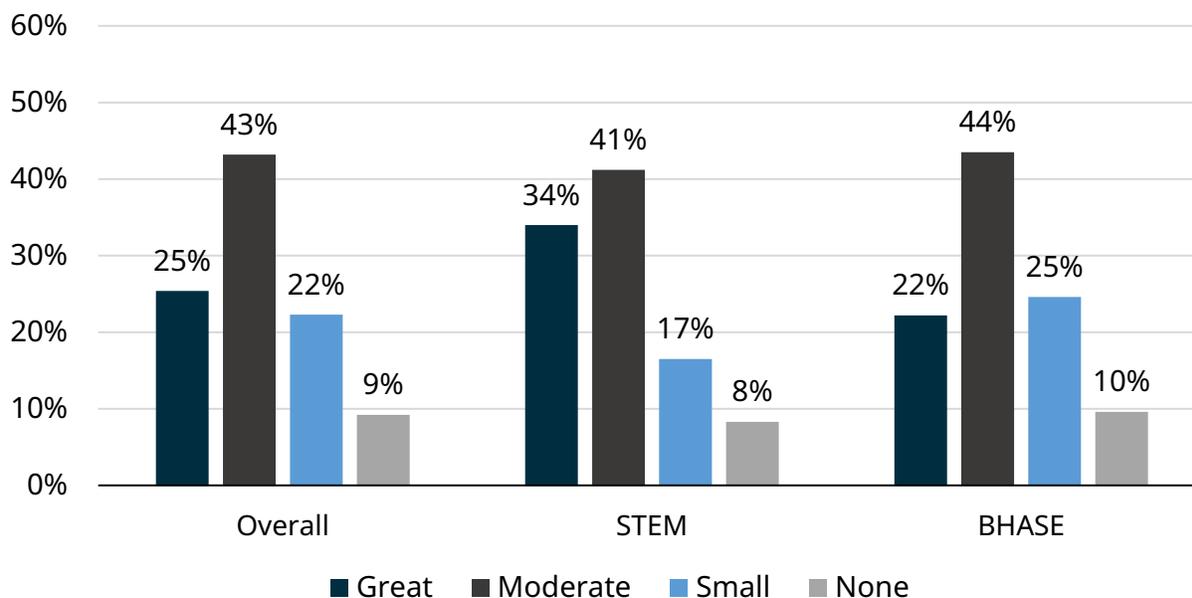
Students from low-income backgrounds disproportionately reported negative health and difficult financial circumstances because of the pandemic. Respondents with lower household income were three times more likely than students from higher-income households to report that an illness in their family was a main challenge to their academic success (21% vs. 7%). They were also almost four times more likely to report that a loss of income in their household was a challenge (34% vs. 9%). These findings echo other research documenting equity gaps exacerbated by the pandemic (Aristovnik et al, 2020; Mann, 2020).

Below, we provide an overview of findings specifically focused on students' experiences learning in virtual classrooms. Eighty-three percent of the students we survey indicated all of their first-year postsecondary courses were fully online. Just 16% reported that "Most" were online, leaving only 1% that had "Some" or "No" courses online.

Negative Impacts of Online Learning

The vast majority (91%) of students we surveyed indicated that taking all or most of their classes online negatively affected their learning. Figure 1 below shows that one-fourth of students indicated a "Great" negative impact. STEM students were significantly more likely than BHASE students to indicate greater negative impacts.⁶ This may be due to reduced opportunities for labs and other applied learning experiences that support and enhance STEM programs (Perets et al, 2020).

Figure 1: Negative Effect of Online Delivery of Courses on Students' Learning in PSE, by Field of Study



Overall n = 565, Field of study N = 508; Survey Question 4.2

Students' negative perceptions about online learning are also related to their academic performance in high school. Those who reported difficulties in high school were twice as likely to

⁶ This holds true even after controlling for institution type. See Appendix A for details.

report that online learning due to COVID-19 negatively affected their first year at PSE (84% vs. 42%).

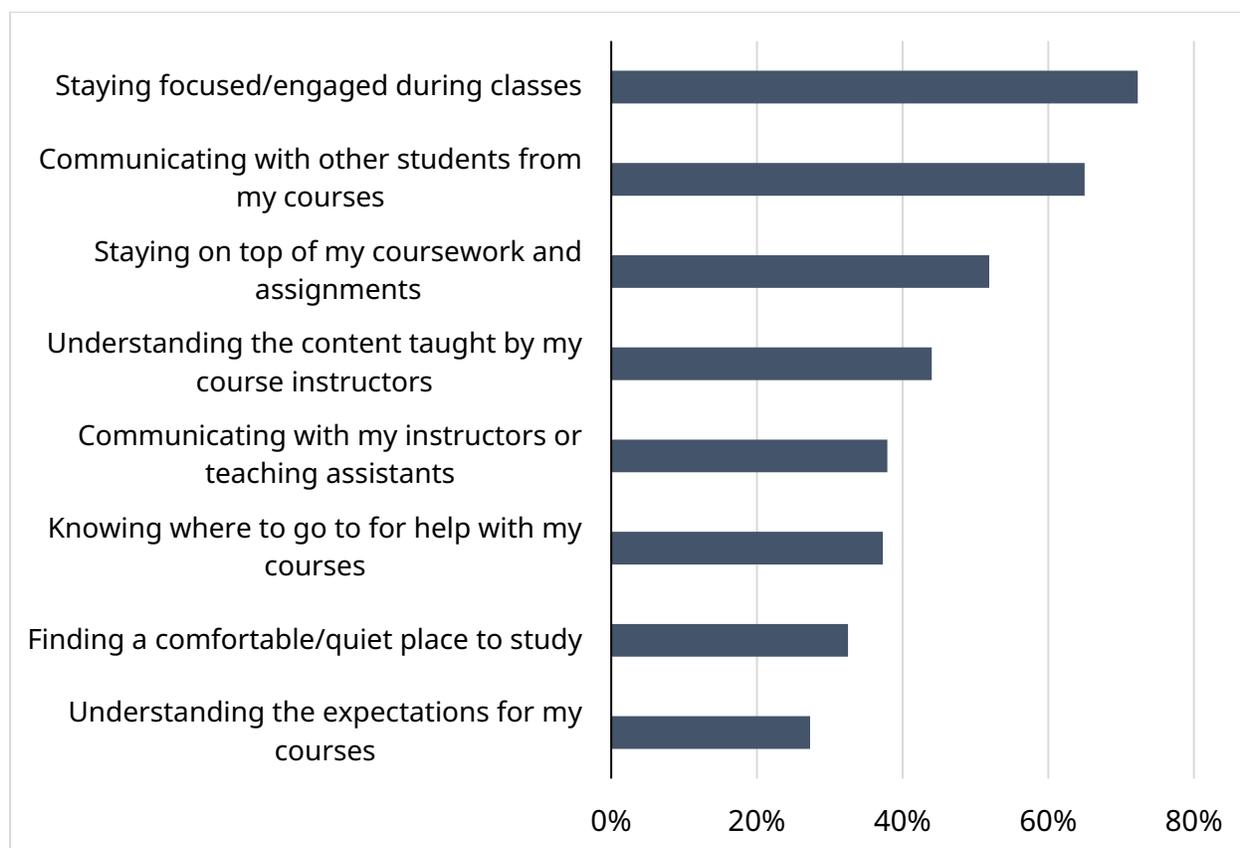
The overwhelming negative perception students voiced about online learning is significantly related to some of the skill gaps students identified. For example, 40% of students indicated challenges with time management and organizational skills. These skills are key to success in a remote environment (Day et al, 2021; Pichette et al, 2020). Most students who entered college and university from high school during the 2020-21 academic year were relatively new to online learning. The graduation requirement to complete two online learning courses during high school had not yet been operationalized (Ontario, 2019) and emergency remote learning towards the end of their final year of high school was uneven and inconsistent (Gallagher-Mackay, 2021; Coates, 2020). While these students may be considered ‘digital natives’ in the sense that they have grown up in a digital age where the internet and technology seem ubiquitous, online learning requires skills and habits over and above the ability to use technology, including organization, independence and commitment (Coates & Holroyd, 2020).

Academic Challenges in Online Courses

A student’s first year at a PSE institution is often full of new challenges, many of which were exacerbated by the pandemic. When we asked students about specific challenges to their academic success, we heard that understanding and recalling content covered in high school was a common issue. In total, 45% of first-year PSE students reported challenges with understanding course content. This was especially prevalent among STEM students — 52% forgot content covered in high school and/or did not learn relevant content in the first place. These results align with research in the U.S., which has called attention to learning gaps that may have resulted from pandemic disruptions in secondary schools, particularly in the areas of math and science (Mann, 2020; Dorn et al, 2020). Given the extended duration of restrictions on in-person learning in Ontario, current secondary students have experienced even longer and likely more pronounced learning disruptions than those who participated in this survey. These students may need additional support as they move into PSE.

The main challenges identified by students were not content-related. Students highlighted concerns relating to individual skills and aspects of the learning environment. For example, 72% of students reported difficulty staying focused or engaged during classes. More than 50% of students found it difficult to stay on top of their coursework (despite nearly 70% of university students and 82% of college students indicating that they understood the expectations for their courses). Students also identified communication challenges: 65% of students reported difficulties communicating with other students from their courses, and 35% reported difficulties communicating with their instructors and/or teaching assistants.

Figure 2: Main Challenges to Students' Academic Success Encountered in Courses⁷



When asked about the features that enabled their success in the face of the challenges outlined above, over three-quarters of respondents (78%) indicated having recorded lectures was “Extremely” or “Very” helpful. Some features of course assessments were also helpful for students. Open-book exams were viewed as particularly helpful (70% “Extremely” or “Very” helpful); so was having multiple low-stakes assessments (64%) and multiple options to complete assessments (59%). Like other research focused on educational experiences in the pandemic, these results align with Universal Design for Learning (UDL) principles (Daniels et al, 2021; Pichette et al, 2020). UDL aims to reduce barriers and optimize learning among diverse groups of students by providing multiple means of engagement, representation, action and expression (CAST, 2021).

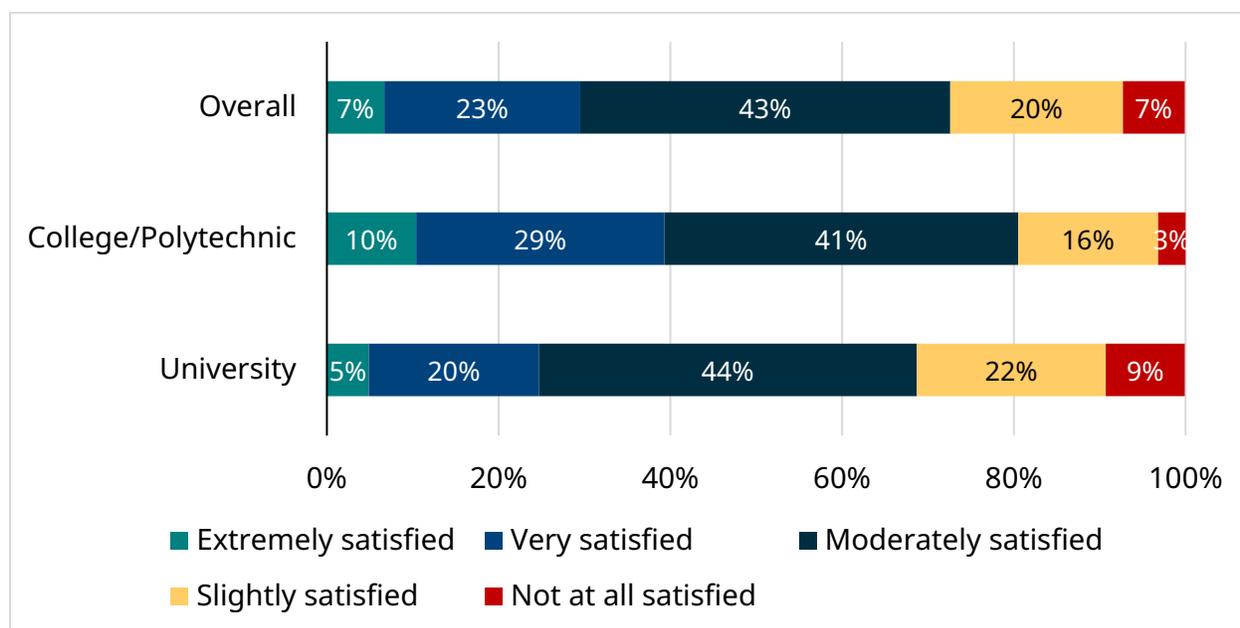
Low Satisfaction with First-year Experiences

Given students’ perceptions that a fully online learning environment negatively affected their experiences and presented new challenges, it is not surprising that they reported low overall satisfaction with their first year of PSE. Just 7% of survey respondents said they were “Extremely” satisfied — the same proportion who said they were “Not at all satisfied.” Only 23% said they were “Very” satisfied.

⁷ We provide the full list of challenges to academic success that students encountered in their courses in Appendix C. Only those students who indicated that they were not fully prepared for PSE were allowed to select reasons.

While we do not have a previous, direct comparison for these results, we can look to other surveys as a baseline; namely, the recent National Survey of Student Engagement (NSSE) (2017 and 2020) and the Canadian University Survey Consortium (CUSC, 2016). Both NSSE and CUSC find higher levels of student satisfaction than our survey. The NSSE surveys found that approximately 52% of Ontario university and college students rated their entire educational experience as “Good” and 26% rated it as “Excellent” (National Survey of Student Engagement, 2017; National Survey of Student Engagement, 2020). The 2020 NSSE was administered between February and May of 2020, so some respondents would have completed the survey while the pandemic was unfolding. However, these students would have experienced most of the academic year without disruption. The 2016 CUSC survey of first-year students found that roughly 64% of students felt that their university experiences met their expectations while 23% of respondents felt that their university experiences exceeded their expectations (Canadian University Survey Consortium, 2016).

Figure 3: Satisfaction with Overall Learning Experience at PSE, by Institution Type



N = 565, Survey Question 3.1

The lower overall satisfaction in our sample is associated with negative effects of online learning. Students who were less satisfied reported greater negative impacts of online learning. More specifically, for students who reported there was no negative impact due to online learning, 72% were “Extremely” satisfied compared to 13% of students who reported “Great” negative effects of online learning. Students reporting the most negative, or “Great,” effects of online learning were over 12 times more likely to say that they were “Slightly” or “Not at all satisfied” compared to students who reported no negative effects of online learning.

This serves as a reminder that most students entering PSE in 2020 had no choice but to learn online due to pandemic restrictions. Students with the most adverse reactions to online learning pulled overall satisfaction results down significantly. These may have been students with gaps in the skills needed to excel in an online environment, or students who crave the kind of interaction and engagement that PSE learning contexts typically offer — student clubs, sports,

on-campus jobs, service learning and events. At the same time, students who felt fewer negative effects from online learning appear to have been quite satisfied with their first-year experience.

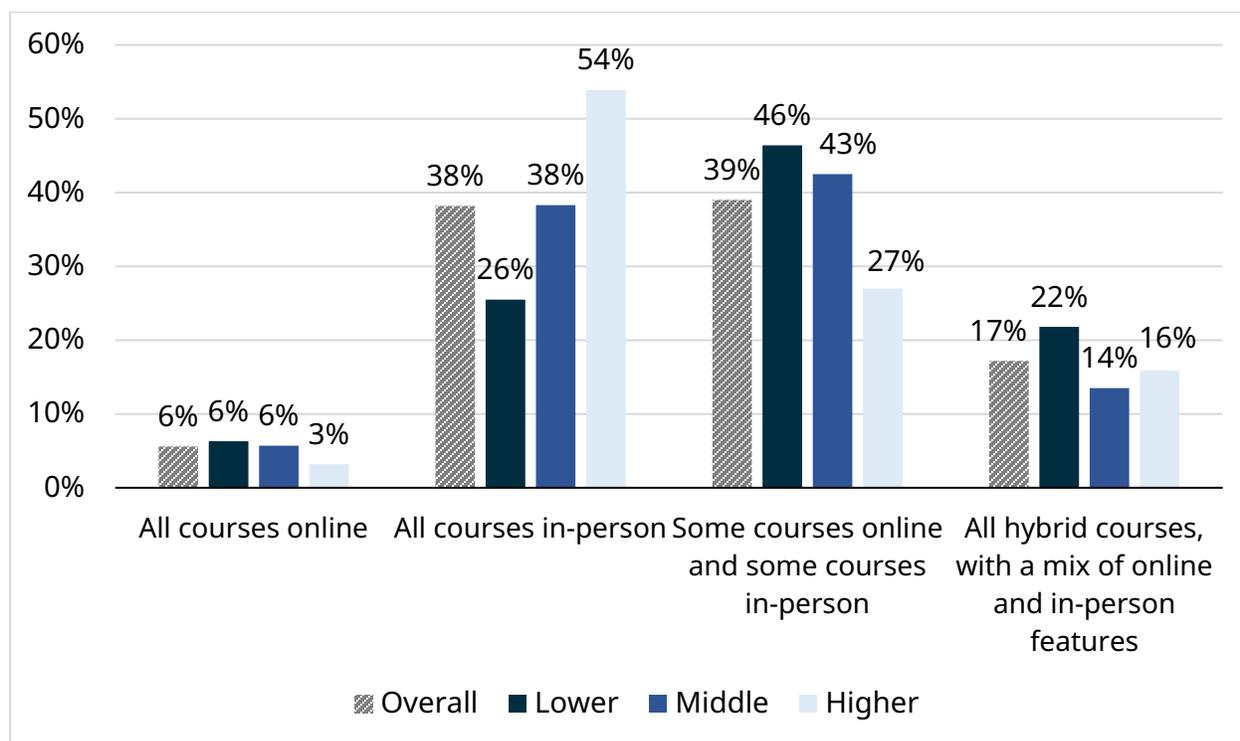
Evolving Learning Preferences

We asked students to consider their preferred learning environment after pandemic-related restrictions are lifted. The vast majority of students in our sample would not choose to take courses solely online — only 5% would want to do so, if offered, compared to 39% who would prefer courses to be fully in-person. The remainder of students prefer a mix of online and in-person course offerings (38% chose “Some online and some in-person”) or “hybrid” courses, with a mix of both online and in-person features (18% chose “Mix of online and in-person features”).

In other words, despite the low satisfaction noted above, a significant number of students expressed an openness to incorporate online learning into their PSE experiences. This is encouraging, given the investments Ontario has made to expand availability of online learning programs (Ontario, 2021). This finding also aligns with a recent survey of over 1,400 American students, where a majority (73%) “agreed that they would like to take some fully online courses in the future” and “a slightly smaller number of students, 68%, indicated they would be interested in taking courses offering a combination of in-person and online instruction” (McKenzie, 2021).

When we break our survey results down by self-reported family income, we see the distribution of preferences shifts. Those from lower-income households prefer a mixture of online and in-person courses (and features) over having all classes held exclusively in-person. Students with more affluent backgrounds in our sample tend to prefer in-person classes. These results may reflect a preference for flexibility among students from lower-income backgrounds, who may benefit from the option of taking some online or hybrid courses as they balance multiple priorities, such as a job, family responsibilities and their studies (Smith & Gottheil, 2011). The results also remind us that one-size does not fit all. In a post-pandemic (or endemic) world, we would likely see an overall increase in satisfaction if students of all backgrounds had the opportunity to select course formats (online, hybrid, in-person) that worked best for them.

Figure 4: Preferred Course Delivery Method After the COVID-19 Pandemic Ends, by Household Income



N = 464; Survey Question 4.2

Recommendations

It is not unusual for students transitioning from secondary into postsecondary education to struggle. Typically, students who successfully integrate into the academic environment, interacting with faculty and engaging with peers, have been most likely to overcome the challenges inherent in this transition (Tinto, 1993). However, the pandemic has upended the context of this transition. Among the students we surveyed, opportunities for engagement and academic integration were constrained or absent during their first year of postsecondary, which could impact their odds of persisting and graduating. The pandemic's move to emergency remote and online learning has introduced a range of new factors needing analysis — now and in the future. For years to come, postsecondary institutions will need to adapt and address the learning gaps created by pandemic disruptions. At the same time, Ontario's postsecondary institutions must also take advantage of new insights and opportunities to improve student outcomes brought to light during the COVID-era.

In light of the findings presented above, we offer the following recommendations to Ontario colleges and universities:

Develop skills needed for effective online learning and expand bridging programming.

A significant number of students (40%) highlighted a lack of important transferable skills, like time management and organization, and difficulties communicating and connecting in the remote environment. Given these findings, we encourage Ontario colleges and universities to consider opportunities to address skill gaps, and in particular, gaps in skills needed to learn online effectively, such as organization, time management, effective virtual communication and self-efficacy, with curricular and co-curricular programming.

Many of the students we surveyed also experienced content-related academic challenges. Students enrolled in STEM programs were most likely to raise issues of learning gaps, such as understanding and recalling content covered in high school. Institutions should explore opportunities to revisit foundational concepts, particularly for incoming STEM students who may have missed or not retained important material due to pandemic-related learning disruptions in high school. One strategy may include expanding existing bridging programs, typically offered to support access among underrepresented groups.

Integrate Universal Design for Learning (UDL) principles in all courses, the delivery of services and, where possible, co-curricular activities.

The top academic issue students highlighted was staying focused and engaged during classes. Institutions can help address this and other challenges — those introduced by the pandemic and pre-existing — by introducing UDL principles across the curriculum and co-curriculum. UDL seeks to reduce and remove learning barriers and support learner variability. HEQCO has recommended that the UDL framework be adopted across Ontario institutions (Pichette et. al. 2020; Chatoor, 2021) and our survey results reaffirm the importance of this recommendation.

Extend options for online and hybrid learning in a post-pandemic context.

The vast majority of students who took our survey (99%) reported taking most or all their courses online, and most (90%) felt this negatively affected their first-year learning experience. That said, many students, particularly lower-income students, expressed openness or even a

preference for having some fully online or hybrid courses as part of their programs. Offering students some flexibility to select courses in multiple formats empowers them to make decisions that best support their learning and accommodate competing priorities like part-time work or family responsibilities. Expanding the availability of online learning options may also improve access for students in underserved communities. Ontario's colleges and universities and government have invested heavily in online education over the past decade and as a response to the pandemic. Institutions should be encouraged by students' openness to online learning and should consider options to extend or expand high-quality online learning experiences after pandemic restrictions are eased.

Collect additional data to monitor ongoing COVID-19 impacts on student success.

Findings from this survey offer a snapshot of student experiences. As these students and subsequent cohorts move through postsecondary programs, it will be important for institutions and government to understand their pathways and outcomes. In particular, colleges and universities should gather and analyze persistence and retention data to understand the extent to which the challenges identified above have interrupted or reshaped student success.

Acting on these recommendations will not only facilitate student success, but we suspect it will also improve student satisfaction. Our survey revealed relatively low satisfaction when compared with similar pre- and early-pandemic surveys; this is concerning given the relationship between early student engagement, retention and graduation. Ensuring students have access to skill development and bridging programs, offering multiple means of engagement and offering flexibility to select from online, in-person and hybrid courses are all steps colleges and universities can take to improve student satisfaction and success as we look to pandemic recovery and beyond.

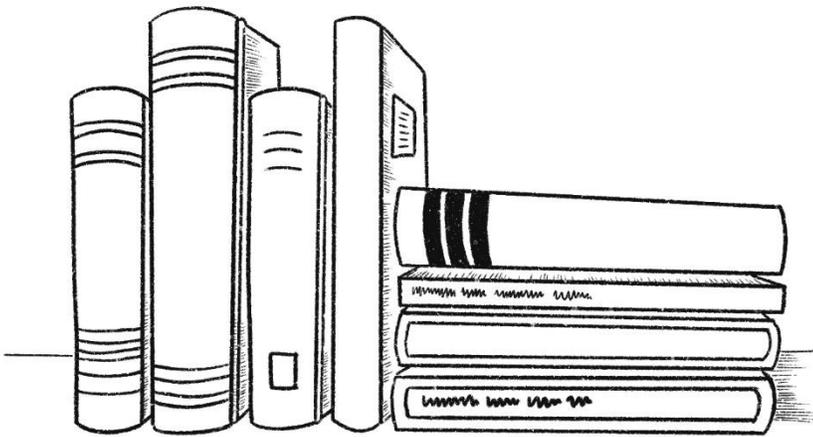
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Appendix

Appendix A: Methodology and Sample Demographics

We used a variety of survey quotas for gender, PSE institution race and family/household income to help ensure a diverse range of students were included in the final sample. Despite our best efforts, however, few international and part-time students were surveyed. To maximize sample sizes for results in the test, we used pairwise deletion, or excluded missing cases are only for variables used in each individual table.

We computed poststratification weights so that the weighted sample is representative of the population of enrolled Ontario PSE students aged 19 or under by gender and institution type. Because quotas were also use for these characteristics, adjustments were generally small. We took auxiliary data from Postsecondary Students Information System (PSIS) in 2019/20, which is the most recent data currently available.

Table A1: Additional Characteristics of the Sample

Age (N=565)	
18 or younger	38.9%
19	53.2%
20	4.8%
21 or older	3.2%
Gender (N=565)	
Woman	52.9%
Man	45.7%
Another Gender/NR	1.4%
Race (N=551)	
White Only	42.9%
South Asian Only	17.4%
E. or S.E. Asian	17.2%
Another Race/Multiple Races	22.5%

We conducted tests for statistical significance for all results discussed in the text of the report. The type of test we conducted depended on the level of measurement of the independent and dependent variables. We used the chi-square test for independence when the dependent variable was nominal, the Wilcoxon Mann-Whitney test, when the dependent variable was ordinal and the independent variable had two levels, and the Kruskal-Wallis test when the dependent variable was ordinal, and the independent variable had more than two levels.

For differences between STEM and BHASE fields of study, we used an additional statistical test on the difference using weighted logistic regression models to ensure significance still existed after accounting for institution type. These models included a categorical institution type variable along with a categorical variables for STEM and Other (unclassified) field of study as predictors. We then assessed statistical significance based on the STEM regression coefficient. Only results that passed this additional test were included in the text.

Appendix B: Survey Questions

Below are the exact survey questions provided to respondents for the questions used in this report:⁸

Survey Question 2.1: Coming out of high school, how prepared were you academically for college/university?

- a) Not at all prepared
- b) Slightly prepared
- c) Moderately prepared
- d) Very prepared
- e) Fully prepared

Survey Question 2.3: During your final year of high school, did the shift to online learning in response to the COVID-19 pandemic negatively affect your academic preparation for college/university?

- a) Yes, to a great extent
- b) Yes, to a moderate extent
- c) Yes, to a small extent
- d) No

Survey Question 2.2: Is there a reason you were not fully prepared academically for college/university? (Select all that apply)

- a) I did not take enough high school courses relevant to my college/university program
- b) I did not adequately understand content covered by my relevant high school courses
- c) My relevant high school courses did not cover content that my college/university instructors expected me to know
- d) I did not remember content covered by my relevant high school courses
- e) I lacked math skills
- f) I lacked English language skills
- g) I lacked time management/organizational skills
- h) I lacked digital literacy skills (familiarity with computers, online resources, videoconferencing software)
- i) I was not fully prepared academically for college/university for another reason, please specify

Survey Question 4.2: Which delivery method would you choose for the courses you take after the COVID-19 pandemic ends?

- a) All courses online
- b) All courses in-person
- c) Some courses online and some courses in-person
- d) All hybrid courses, with a mix of online and in-person features for every course

⁸ Additional survey questions asked to respondents are available through the authors

Survey Question 3.1: How satisfied were you with your overall learning experience at college/university this past school year?

- a) Extremely satisfied
- b) Very satisfied
- c) Moderately satisfied
- d) Slightly satisfied
- e) Not at all satisfied

Survey Question 4.1: During this past school year, did the online delivery of your courses in response to the COVID-19 pandemic negatively affect your learning in college/university?

- a) Yes, to a great extent
- b) Yes, to a moderate extent
- c) Yes, to a small extent
- d) No

Survey Question 8.0: What were the main challenges to your academic success that you encountered outside your courses? (Select all that apply)

- a) Making new friends
- b) Staying connected with family and friends
- c) Maintaining my physical health
- d) Maintaining my mental health
- e) Accessing physical health and wellness services (e.g., doctor, physiotherapist, massage therapist, gyms, etc.)
- f) Accessing mental health and wellness services (e.g., therapist, support group, wellness workshops, etc.)
- g) Balancing time for school with other personal responsibilities (e.g., job, volunteering, caregiving, etc.)
- h) Dealing with a loss of income in my family household
- i) Dealing with an illness in my family household
- j) Other challenge(s), please specify
- k) I did not encounter any challenges outside my courses

Survey Question 6.0: What were the main challenges to your academic success that you encountered in your courses? (Select all that apply)

- a) Staying focused/engaged during classes
- b) Staying on top of my coursework and assignments
- c) Staying motivated
- d) Completing assessments with remote proctoring (e.g., being monitored by a webcam)
- e) Understanding the content taught by my course instructors
- f) Understanding the expectations for my courses
- g) Finding and accessing my course materials and information
- h) Accessing internet and technology
- i) Navigating the online/videoconferencing platforms and resources used in my courses
- j) Participating in my courses from a different time zone
- k) Finding a comfortable/quiet place to study

- l) Communicating with my instructors or teaching assistants (e.g., to receive feedback and ask about course content, assessments, deadlines, etc.)
- m) Communicating with other students from my courses
- n) Receiving academic accommodations (e.g., extra time on assessments, assistive technology, alternative formats of materials, etc.)
- o) Knowing where to go for help with my courses
- p) Other challenge(s), please specify
- q) I did not encounter any challenges in my courses

Survey Question 4.2: Which delivery method would you choose for the courses you take after the COVID-19 pandemic ends?

- a) All courses online
- b) All courses in-person
- c) Some courses online and some courses in-person
- d) All hybrid courses, with a mix of online and in-person features for every course

Survey Question 5.0: How helpful did you find the following course features for your academic success this past school year?

	Not at all helpful	Slightly helpful	Moderately helpful	Very helpful	Extremely helpful	Not applicable
Asynchronous course delivery and participation (e.g., I could watch a pre-recorded lecture or participate in course activities when it was convenient)	<input type="checkbox"/>					
Synchronous/live lectures where I could participate in real-time	<input type="checkbox"/>					
Multiple low-stakes course assessments (e.g., quizzes, reading responses)	<input type="checkbox"/>					
“Open book” exams	<input type="checkbox"/>					
Multiple options to complete an assessment (e.g., my instructor provided a choice between completing a test, presentation, paper, project etc. for a course assessment)	<input type="checkbox"/>					

A variety of different learning activities and teaching strategies during lectures (e.g., virtual breakout rooms, presentation slides, groupwork, etc.)	<input type="checkbox"/>					
Multiple options for communicating with the course instructor (e.g., online office hours, message boards, emails, video chat, phone)	<input type="checkbox"/>					
Personalized feedback from course instructors and/or teaching assistants	<input type="checkbox"/>					

Survey Question 7.4: Do you think you would have been more academically successful if you had used your college/university's academic support services more often this past school year?

- a) Yes
- b) No

Appendix C: Tables of Results

Table A2: Negative Effect of Online Delivery of Courses on Students' Learning in PSE, by Field of Study

Extent of negative effect on learning	Overall	STEM	BHASE
Great	25.4%	34.0%	22.2%
Moderate	43.2%	41.2%	43.5%
Small	22.3%	16.5%	24.6%
None	9.2%	8.3%	9.6%
n	565	503	

Table A3: Main Challenges to Students' Academic Success

Challenges within Courses	Overall
Staying focused/engaged during classes	72.3%
Communicating with other students from my courses	65%
Staying on top of my coursework and assignments	51.9%
Understanding the content taught by my course instructors	44%
Communicating with my instructors or teaching assistants	37.9%
Knowing where to go to for help with my courses	37.3%
Finding a comfortable/quiet place to study	32.5%
Understanding the expectations for my courses	27.3%
Completing assessments with remote proctoring	23.9%
Navigating the online/videoconferencing platforms and resources used in my courses	22.5%
Receiving academic accommodations	17.7%
Finding and accessing my course materials and information	16.7%
Accessing internet and technology	13.6%
n	548

Table A4: Satisfaction with Overall Learning Experience by PSE, by Institution Type

Level of Satisfaction	Overall	Institution Type	
		College	University
Extremely satisfied	6.7%	10.4%	4.9%
Very satisfied	22.8%	28.9%	19.8%
Moderately satisfied	43.1%	41.2%	44.0%
Slightly satisfied	20.1%	16.3%	22.0%
Not at all satisfied	7.2%	3.2%	9.2%
n	565	162	403

Table A5: Preferred Course Delivery Method after the COVID-19 Pandemic Ends, by Household Income

Course Delivery Preference	Overall	Household Income		
		Lower	Middle	Higher
All online	5.0%	6.3%	5.7%	3.2%
All in-person	39.0%	25.5%	38.3%	53.9%
Some online and some in-person	37.7%	46.4%	42.5%	27.0%
Mix of online and in-person features	18.3%	21.8%	13.5%	15.9%
n	564	464		