OUSA

Ontario Undergraduate Student Alliance

POLICY PAPER

Technology Enabled Learning

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ABOUT OUSA

OUSA represents the interests of 150,000 professional and undergraduate, full-time and part-time university students at eight student associations across Ontario. Our vision is for an accessible, affordable, accountable, and high quality post-secondary education in Ontario. To achieve this vision we've come together to develop solutions to challenges facing higher education, build broad consensus for our policy options, and lobby government to implement them.

The member institutions and home office of the Ontario Undergraduate Student Alliance operate on the ancestral and traditional territories of the Attawandaron (Neutral), Haudenosaunee, Huron-Wendat, Leni-Lunaape, Anishnawbek, and Mississauga peoples.

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THE PROBLEM

Inadequate Foundations
For students to thrive in post-secondary education and be prepared to succeed in the workforce, having adequate digital literacy skills is essential. However, there are several existing gaps that create challenges. At the institutional and provincial level, there are varying definitions and understandings of digital literacy, and without a standard definition, it becomes difficult to ensure some consistency in skill level and expectations across sectors and in PSE. In addition, there is little data available on the current status of digital literacy in Ontario. Post-secondary students worry that at the K-12 level, students are not being provided with the adequate foundation they need in digital literacy, and that this ultimately impacts their post-secondary expedience. Issues such as limited access to proper internet connection and limited opportunities to effectively engage with technology based educational experiences, are some contributing factors. Marginalized groups and communities, are also faced with barriers that may impact digital literacy foundations. Within institutions, faculty members may also see challenges in adapting to new technology and digital tools, and often require additional supports to implement such tools into their curriculum. Without a strong foundation in digital literacy, students will struggle to succeed academically and in the workforce.

Outdated Digital Infrastructure & Classroom Technology
To provide students with the best educational experience, universities have had to respond to technological changes by adapting accordingly, including updating digital infrastructure and classroom technology. The effectiveness of classroom and educational technology, however, depends on its usability and implementation. Tools that are either outdated or new, but difficult to navigate, become ineffective when faculty and students cannot use them. When universities are unable to make necessary updates, or strain their existing digital infrastructures in order to quickly adapt, cost and stability become issues too. There is also a lack of support, both financial and non-financial, for post-secondary institutions to keep up with technological updates. Students worry that the tools they use in PSE may be outdated by the time they enter the workforce and are concerned that available systems and tools, like Learning Management Systems, are not meeting the unique needs of institutions, faculty, and students.

Gaps in Online Learning
Online learning has opened up new possibilities for how students can learn. In many ways, online learning has had a positive impact on PSE in Ontario, including expanding access to education, giving students flexibility, and reaching remote communities. However, there are drawbacks and gaps that must be addressed. Currently, there is no quality assurance framework specific to online courses and many students have expressed dissatisfaction with the quality of online courses they have taken. Issues largely stem from a lack oversight and expectations. On the other hand, students know that online courses are incredibly valuable but worry that many such courses are automatically perceived to be of lower quality, which compromises their legitimacy. In addition, students worry about several costs associated with online learning, this includes "out of province fees" that institutions charge students who are taking an online course at an institution outside of the province they currently reside in, which may actually hinder accessibility to online learning.

Underutilized Open Educational Resources
Over the last several years, Open Educational Resources, including open textbooks, videos, and quizzes, have become popular both nationally and within the province. These tools provide flexibility for instructors and cost-savings for students, yet, they are often left underutilized due to misconceptions and unawareness. Students are excited about the potential of OERs, but worry that eCampus Ontario's Open Textbook Library is not meeting current demands. The rising cost of educational materials continues to create financial barriers and hinder academic performance; many students admit that they cannot afford the required texts for a course and omit purchasing the materials. There is also little data available on the use and impact of OERs, with no standardized reporting structure to measure usage across institutions. Institutions and the provincial government have also failed to adequately incentivize faculty to develop

OERs and provide limited opportunities for professional development opportunities and training, which would encourage the adoption and development of OERs. Currently, Ontario institutions also lack the infrastructure capacity needed to support OER development, leaving little motivation for faculty to pursue the development of OERs.

Limited Open Data & Digital Tools Awareness
Open data is a can provide a great amount of insight for students and the PSE sector, while also holding institutions accountable, but students worry about the lack of availability and access to university data such as research reports and information on student needs. At this time, there is no provincial mandate that would require institutions to release such data publicly. There is also concern that about the limited knowledge and use of tools like "badging", which could help bridge the gap between students and employers by providing a method to easily and effectively articulate experience and skills.

RECOMMENDATIONS

Strengthen Digital Literacy
Students want to see the provincial government set several standards to improve foundations of digital literacy. The provincial government should adopt the Brookfield Institute's definition of digital literacy, which is: "the ability to use technological tools to solve problems, underpinned by the ability to critically understand digital content and tools. This can include the more advanced ability to create new technological tools, products, and services". The provincial government should also collect and report data on the status of digital literacy in PSE and encourage the use of student assessment programs to evaluate digital competency levels on campuses by their own institutions. MTCU should also work with the Ministry of Education to integrate concepts of digital literacy in K-12 and early PSE transition programs, as well as in any areas related to reporting on or preparing students for the workforce. In addition, the provincial government should conduct consultations with marginalized groups and communities when developing resources for TEL workshops and programs, specifically to address barrier issues these groups and communities face. Students also recommend that the provincial government also introduce targeted programming, like workshops and educational sessions, for these particular groups and communities. The government should also support faculty by working with groups like eCampus Ontario to create digital literacy resources and training as well, while also providing grants to faculty for achieving successful integration of technology in courses.

Develop a Digital Infrastructure Plan & Support Technology in Classrooms
As part of a larger provincial strategy for technology enabled learning, existing provincial committees should be tasked to determine the necessary digital infrastructure for PSE, working with the MTCU, in a similar manner to the committee developed by the Ministry of Education in partnership with the Ontario Software Acquisition Program Advisory Committee. MTCU should also provide funding for institutions who are currently without the sufficient funding they need to upgrade existing infrastructure, while providing incentives for all other institutions as well. In partnership with the Ministry of Economic Development, Job Creation, and Trade, MTCU should work with institutions to invest in technology-centric learning methods relevant to current and future industry standards, as well as dedicate funding to subsidize the cost of TEL. The Higher Education Quality Council should also review current classroom technologies to gauge their effectiveness and publish their findings. Working with eCampus Ontario, MTCU should develop a plan to encourage the use of open-source LMSs at institutions and dedicate resources to ensure the software is conductive to student success.

Maintain Affordable & Quality Online Learning
To address gaps and issues in online learning, there are several steps the he provincial government should take, including tasking groups like eCampus Ontario and Contact North to conduct consultations with faculty and experts to develop a quality framework to be used for online courses. The Ontario University Council on Quality Assurance should also expand IQAPs requirements to include online courses and online learning in the Final Assessment Report it publishes. Additionally, students want to ensure that online courses are not perceived in a negative light and that financial barriers are removed. Dispelling myths around the lack of quality in online learning and eliminating administrative fees for online courses are some of the recommendations made by students. In partnership with open institutions in Canada,

MTCU should work to eliminate additional fees placed on out of province students and work with eCampus Ontario to produce research on emerging practices in online education geared at reducing educational costs for students.

Invest in Open Educational Resources
Ontario students have saved significant costs through the development of open educational resources and students want to see sustained and substantial investments in OERs and organizations like eCampus Ontario. The provincial government should provide envelop funding to support the expansion of eCampus Ontario's open textbook library and eCampuse Ontario should continue to work with faculty to review OERs and create a quality assurance process. MTCU should invest in the development of OERs that can apply to the largest introductory courses and promote OERs through collaborations with the Ontario College and University Library Association and members of Campus Store Canada, and provide faculty with adequate information on OERs as well as provide incentives for successful adoption and usage. There is also value in gathering more information on OERs and in turn, using this information to strengthen open education. Students want to see eCampus Ontario collect data and report on institutional and user satisfaction, as well as produce an Ontario specific toolkit for faculty that would effectively support their needs. OERs should also be included as a teaching and quality metric in Ontario's Strategic Mandate Agreements. OCULA should also be tasked with aiding faculty in OER facilitation and development, and grants should be provided to support OER development and use on university campuses.

Expand Open Data Initiatives & Utilize Badging
Expanding Open Data in Ontario's PSE can significantly improve oversight, communication, and access to information. As such, students believe that MTCU should mandate that universities release data publicly and task HEQCO with expanding their Open Data Inventory database, while providing envelope funding to do so. Many post-secondary institutions have also slowly but steadily begun to adopt badging, but students want to see a larger commitment and investment in this practical and efficient tool. Students recommend that eCampus Ontario should establish a badging framework and develop a centralized platform to house badges achieved by students. MTCU should also work with employers, institutions, and students to develop a platform for badges and communicate the value of skills articulation for employment.

INTRODUCTION

Advancements in technology have driven industries in every sector to re-examine how they operate, and the higher education sector is no different. While students who graduated even five to ten years ago may not have used the internet regularly throughout their primary and secondary schooling, today's undergraduate and professional student bodies have grown up with technology engrained as a key aspect of their education. Students today expect their post-secondary institutions to be equipped with state-of-the-art technologies that not only contribute to, but also enhance their educational experience.

Technology has an opportunity to help transform higher education in Ontario, but only if post-secondary institutions get ahead of the curve. While online courses have proven themselves to be a key complement of a student's post-secondary education, online education is continuing to grow and has the opportunity to improve.[1] New concepts such as badging provide an opportunity to improve skills recognition and articulation, while the expansion of previously existing Open Education initiatives will continue to improve on the affordability of post-secondary education. Simply put, the adoption of technology in post-secondary education will allow our sector to progress.

It is important that technology in the classroom is not just used for the sake of "modernizing" the educational experience. Any technologies that are implemented must help improve the educational experience for Ontario's students. From improving the digital literacy of Ontario's population to bridging the skills articulation gap, investments in appropriate areas will ensure that Ontario's students are better prepared to enter the workforce following graduation.

In addition to ensuring that investments in educational technologies help improve the educational experience for the province's undergraduate and professional students, it is essential for our post-secondary institutions to be properly equipped to implement these advancements. Unfortunately, this is not currently the case. Across Canada universities are struggling to provide their students with digital learning opportunities, with less than half of Canadian universities having a developed strategy for the adoption of educational technologies.[2] In order to appropriately adapt to today's technological environment, government needs to invest in infrastructure to help support Ontario's publicly-assisted institutions, and our institutions need to develop strategies as to how they will transition into the digital age.

Vickie Cook, a professor at the University of Illinois in Springfield, stated "universities must pay more attention to students' digital learning methods in high school to get their head around new ways of student-learning."[3] Technology-enabled learning opportunities are not only an opportunity to evolve as an institution, but they are essential to continuing to adapt as future generations of students grow up with digital technologies throughout their childhood. With other sectors slowly adapting new technologies, it is time for Ontario's post-secondary institutions to follow suit. By doing so, our institutions will be ensuring that they continue to enhance the educational experience for undergraduate and professional students across the province.

The purpose of this policy paper is to capture students' concerns about the current state of technology enabled learning at Ontario's publicly-assisted post-secondary institutions.

This paper will offer a series of recommendations that are representative of the principles and concerns of Ontario's undergraduate students. These recommendations will be aimed at the Ontario government and other sector stakeholders, with a respect for evidence-based policy maintained throughout. This paper will highlight and advocate for the following overarching goals: creating a digitally literate population,

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[1] Reed Sheard, "The Role of Technology in the Great Higher Education Transformation," *Forbes,* April 19, 2018, https://www.forbes.com/sites/forbestechcouncil/2018/04/19/the-role-of-technology-in-the-great-higher-education-transformation/#69cf05801396.

[2] Olivia Bowden, "Canadian universities struggling to offer digital learning to tech-savvy Generation Z," *Financial Post,* September 7, 2016, https://business.financialpost.com/executive/smart-shift/canadian-universities-struggling-to-offer-digital-learning-to-tech-savvy-generation-z.

[3] Ibid.

improving infrastructure and classroom technology, improving online courses, expanding Open Education across the province, and developing a comprehensive badging framework.

It is our hope that these evidence-based policy recommendations are seriously considered by the provincial government and that we can work together to improve the accessibility, affordability, quality, and accountability of the university sector for students across Ontario.

DIGITAL LITERACY

DEFINITION

Principle: There should be an understanding and standardized definition of digital literacy in Ontario's post-secondary education system.

Concern: Not all post-secondary institutions have a concrete definition and understanding of digital literacy.

Concern: The definition of digital literacy varies from institution to institution.

Recommendation: The provincial government should adopt the Brookfield Institute's working definition of digital literacy as being: "The ability to use technological tools to solve problems, underpinned by the ability to critically understand digital content and tools. This can include the more advanced ability to create new technological tools, products, and services".

A post-secondary education is intended to prepare its graduates for the workforce and the world around them. As the world continues to advance through technological advancement and innovation, it is clear that digital literacy plays a fundamental role in 21st-century life. [4] The ability for post-secondary education graduates to feel and be prepared by their education, and the capacity to navigate the technological sphere is essential. There is a considerable amount of research to suggest that technological development has the potential to benefit the economy, the workforce, and the quality of life of an individual.[5] As the workforce and social sphere becomes increasingly more digital, the next generation of innovators must be educated to obtain digital literacy at the post-secondary level and earlier.

The purpose of adopting a working definition is to provide standardized terminology that is both comprehensive and flexible. Considering the ever-changing nature of the technological realm, the definition must be adaptable to new changes in the sphere. The Brookfield Institute (BI) working definition encompasses the concepts of using technological tools to solve problems, as well as the individual possessing the ability to understand their application to the real world. The BI definition includes, but does not limit or require, the ability to create technological tools. This last component of the definition ties in to the theme of digital literacy, as well as promoting digital competencies and the ability for post-secondary students to develop technological products and services.

Without a standardized definition, institutions are unable to conceptualize the importance of digital literacy. In turn, it remains to be a topic absent from most campuses and the importance of digital skills are not clearly expressed to post-secondary students. A clear step towards increasing the amount of attention paid to digital literacy in the post-secondary sector is introducing a standardized definition. A clear definition allows for a consistent understanding of the goal and provides individual institutions with a standard to strive towards. The provincial government adopting a standardized definition of "digital literacy" would allow for clear objectives to be set. For example, an institution provided with a definition

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[4] Annalise Huynh, Nisa Malli , *Levelling Up: The Quest for Digital Literacy*. (Brookfield institute for innovation and entrepreneurship. June 2018.) 1.
[5] Ibid.

of digital literacy would then be able to evaluate their own campus, assessing the status of digital literacy and incorporating learning objectives in to strategic documents and or course material.

DIGITAL LITERACY DATA COLLECTION

Principle: Data regarding the current status of digital literacy among students at the post-secondary level should be available to assess the status of student's technological competencies.

Concern: There is a lack of data published on the current status of digital literacy at the post-secondary level.

Concern: Many institutions have yet to engage in data collection on the current status of digital literacy.

Recommendation: The Ministry of Training, Colleges and Universities should engage in mandatory data collection on the current status of digital literacy at the post-secondary level through existing sector partners, such as eCampus Ontario or the Higher Education Quality Council of Ontario.

Recommendation: The Ministry of Training, Colleges, and Universities should encourage the use of student assessment programs by universities and their respective student populations in order for the university to evaluate the digital competency levels on that campus.

Recommendation: The Ministry of Training, Colleges and Universities should publicly report the collected data on digital literacy in an accessible manner.

Even though digital literacy is becoming recognized as an essential component of succeeding in the modern economy, there is a lack of information on the current state of digital literacy in Ontario. According to the Brookfield Institute study: _Levelling Up – The Quest for Digital Literacy_, there remains a demand for information on where digital literacy presently stands and where the opportunities for improvement lie.[6] Data collection on the current digital literacy rates in post-secondary education is needed, and would allow individuals within the sector to consider how to improve them.

For MTCU to gather information and data on digital literacy at the post-secondary level, they should engage partners like eCampus Ontario, as they are committed to "Lead in research, development and sharing of exemplary practices in online and other forms of technology-enabled learning".[7] The Provincial Government should engage partners with pre-existing means to collect and research data on this topic. Another sector partner capable of performing data collection and reporting on this issue is HEQCO. This is because of the council's commitment to evaluating the PSE sector, and in turn publishing the evaluation to be publicly available and utilized by the Ministry of Training, Colleges, and Universities.
With the information gathered through data collection and research, barriers to becoming digitally literate and opportunities to improve technological competencies would be identified. Additionally, any data collected by the provincial government or an institution should be published in an accessible manner.

In addition to province-wide research and data collection, MTCU should encourage the use of assessment programs by universities and their respective student populations in order to evaluate the digital competency levels on that campus. This is a unique process in which students complete an assessment program designed to target their specific digital literacy and competency levels, and allows for the user to understand potential opportunities for personal development. Assessment tools also provide the institution with an opportunity to inform program development. A strong example of an assessment program is the Digital Competency Profile (DCP), a freely accessible tool designed to evaluate what technologies are present within a person's life and the associated level of comfort with those

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[6] Annalise Huynh, Nisa Malli, _Levelling Up: The Quest for Digital Literacy_. (Brookfield institute for innovation and entrepreneurship: June 2018.) 14.
[7] eCampusOntario. _Committed to the Evolution of Teaching and Learning_. https://www.ecampusontario.ca/about/ mandate.

technologies.[8] The Digital Competency Profile (DCP) is intended to then be utilized by the individual or the associated organization in planning for further development.[9] This recommendation takes data collection one step further, allowing for individual institutions and their respective student populations to understand their specific digital literacy levels, and how the institution can improve.

The report prepared by the Provincial Government's Highly Skilled Workforce Expert Panel; *Building the Workforce of Tomorrow: A Shared Responsibility* published in June of 2016 states that in order to succeed in the fast-paced global economy, Ontario's workforce must be equipped with the skills necessary to meet the needs of the modern job market.[10] The panel was tasked with creating a strategic plan to assist in the province's workforce ability to adjust to the demands of a technology-driven knowledge economy.[11] "During its tenure, the Panel was to assess how well the workforce was positioned to meet the needs of Ontario's economy and recommend an integrated approach for the government to bridge education, training and skills development with the demands of an evolving economic landscape".[12] However, the report does not include the concepts of digital literacy or students developing digital competencies that will enable their ability to succeed in a technology-driven knowledge economy. According to the Educational Informatics Lab General Technology Competency and Use (GTCU) Framework, the permeation of digital technology in all aspects of daily life has resulted in people being forced to constantly adapt to its developments.[13] The technological world is ever-changing, and the workforce is developing right alongside it. Post-secondary education as a sector must be able to remain consistent with the rapidly developing technological sphere, in order to adequately prepare its graduates.

DIGITAL FOUNDATIONS

Principle: Students should begin post-secondary education prepared, having been provided with the skills necessary to succeed in K-12.

Concern: Students in Ontario are entering post-secondary with varying levels of digital literacy.

Concern: K-12 education currently does not provide an adequate foundation for the digital skills that are becoming foundation and essential for success in the workforce.

Recommendation: The Ministry of Training, Colleges and Universities should work with the Ministry of Education to integrate concepts of digital literacy into both early post-secondary education, and within the K-12 curriculum.

Recommendation: The Ministry of Training, Colleges and Universities should include concepts of digital literacy and competencies in any reporting or planning in regard to preparing students for the workforce.

In order to ensure that students departing from the Ontario education system are prepared to enter post-secondary education or the workforce, the skills necessary to succeed must be introduced in primary and secondary education. The Ministry of Training, Colleges, and Universities should collaborate with the Ministry of Education in order to ensure concepts of digital literacy are woven in to the K-12 curriculum. This would ensure that a strong digital foundation is provided to students before post-secondary.

The Digital Competency Profile, developed out of the Educational Informatics Lab General Technology Competency and Use (GTCU) Framework, rests on the consideration that there are certain digital

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[8] Digital Competency Profiler. *Your technological competency*. https://dcp.eilab.ca/
[9] Ibid.
[10] Sean Conway, et al. *Building the Workforce of Tomorrow*. (The Premier's Highly Skilled Workforce Expert Panel. 2016). 40.
[11] Ibid, 70.
[12] Ibid.
[13]Desjardins, Francois J, Roland vanOostveen, Elizabeth Childs and Todd Blayone. *General Technology Competency and Use (GTCU) Framework* (University of Ontario Institute of Technology. 2015).

competencies that are both foundation and essential to achieving a successful career in the modern economy.[14] These digital competencies that have become increasingly important for academic and professional success must be addressed and cultivated at an early age. According to the Brookfield Institute's study *Levelling Up;* in British Columbia, the provincial government invested $6 million to launch coding curriculum from Kindergarten-Grade 9.[15] The courses will continue in the final three years of secondary education, but will be optional.[16] The British Columbia's Applied Design, Skills, and Technologies curriculum includes high school courses in web development, computer programing, media design, robotics, manufacturing, digital communications, and coding for manufacturing.[17] It is curricula like British Columbia's Applied Design, Skills, and Technologies that enables students from a young age to prepare for the expectations of the modern workforce. In partnership with the Ministry of Education, the Ministry of Training, Colleges and Universities should encourage the development of a strong digital foundation for all students in Ontario, and use an understanding of the curriculum to build a strategy for post-secondary education that continues that education.

In 2016, The Premier's Highly Skilled Workforce Expert Panel submitted a report to the Premier entitled "Building the Workforce of Tomorrow". The report sought to bridge development, education, and training together in to one strategy intended to provide a strategy for adjusting to a technology driven economy.[18] If the Ministry of Training, Colleges, and Universities prepares a similar report or conducts research on

MARGINALIZED AND UNDERREPRESENTED COMMUNITIES

Principle: Underrepresented and marginalized groups of students, including mature students, low income students, and rural and northern students, should not be prevented from achieving digital literacy to the same degree as other students in Ontario.

Concern: Students from many underrepresented and marginalized groups often face financial and non-financial barriers that lead to a lower level of digital literacy.

Concern: Factors such as limited access to proper internet connection and educational experience in K-12 education impact the ability of different students to become digitally literate.

Recommendation: The provincial government should conduct meaningful consultation with marginalized and underrepresented groups and communities when developing resources for technology enabled learning such as: workshops, learning camps, and modules to encourage tech enabled learning.

Recommendation: The Ministry of Training, Colleges, and Universities should introduce targeted programming to ensure that a standard of digital literacy required is met for all students, regardless of location, background, or socio-economic status.

Recommendation: The Ministry of Training, Colleges, and Universities should ensure targeted programming is specific to the different needs of different underrepresented and marginalized groups.

Currently, there is a fragmented level of digital education in Ontario. Despite attempts and research to reinforce the infrastructure of the digital literacy platform of Canada, the level of digital literacy remains uneven.[19] Prior to post-secondary education, only 3.4% of the student population are enrolled in mathematics and computer science. This statistic is even lower for marginalized communities, specifically within women and students of colour. While more students are being enrolled in workshops across the

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[14] Pichette, Jackie and Roland Van Oostveen. "Assessing Digital Comptenecy of Postsecondary Students, Instructors, and Staff in Rural, Remote Northern Ontario." (Ontario, Higher Education Quality Council of Ontario).

[15] Annalise Huynh, Nisa Malli , *Levelling Up: The Quest for Digital Literacy*. (Brookfield institute for innovation and entrepreneurship. June 2018.) 19.

[16] Ibid.

[17] Annalise Huynh, Nisa Malli , *Levelling Up: The Quest for Digital Literacy*. (Brookfield institute for innovation and entrepreneurship. June 2018.) 20.

[18] Sean Conway, et al. *Building the Workforce of Tomorrow*. (The Premier's Highly Skilled Workforce Expert Panel. 2016). 70.

[19] Ibid, 26.

province, the divide in levels of digital literacy increase when enrolling in post-secondary. Students in major urban centres are able to readily access programs that fortify their digital learning, comparatively to students that are unable to access these essential resources to strengthen their learning. It is evident that there is a pertinent need to create a training program for all post-secondary students that would teach fundamental digital literacy skills. Incorporating this as a mandatory program across all Ontario Post-Secondary Institution would ensure that all students have a fundamental understanding of basic digital literacy skills. Ensuring that this program was enlisted into all Ontario Universities would ensure that barriers would not prevent students from succeeding after post-secondary.[20]

Different marginalized and underrepresented groups face varying issues that impact their access to achieving digital literacy. For example, students from rural areas of Canada have a lack of access to adequate internet speeds, creating a complex framework for the Ontario government to tackle. Partnering with organizations such as the Higher Education Quality Council of Ontario (HECQO) to research how to combat these different challenges that students face, programs can be created to ensure that these issues are considered when attempting to improve the level of digital literacy for all Ontario students [21]. Historically, marginalized and underrepresented students have been excluded in all fields, in particular STEM focused fields. To combat this complex issue, these programs would specifically support these students in strengthening their skills related to the STEM field along with providing the adequate tools to succeed. By accounting for other factors such as socioeconomic background, gender, race and geographical location when creating these programs, marginalized and underrepresented students are more likely to succeed. Currently there are programs in place such as "Let's Talk Science" that considers the barriers that these students face while simultaneously encouraging the improvement of digital literacy. Following these existing models and taking these issues into account would help mitigate the various challenges that come with bridging the current digital divide.

The Ontario government should work to create targeted programming to create a formidable foundation that supports the goal of an inclusive and equitable tech environment. Targeted programming considers the various barriers that marginalized groups face to ensure that students are able to succeed in the work force. According to the article *Levelling Up the Quest for Digital Literacy*, "the lack of access is deeply intertwined with income/wealth, geography and other socioeconomic factors" (44). Targeted programming mitigates the various challenges and works collaboratively to ensure that individual learners don't face digital inequality prior to coming into post-secondary. With financial barriers being one of the most prevalent issues in regard to digital inequality, organizations such as the Canadian Radio-Television and Telecommunication Commissions (CRTC) has declared broadband internet access a basic service. The CRTC report notes non-profit internet providers such as Toronto Free Net are essential networks in providing low income households with affordable internet access. With accessibility being the greatest concern in regard to the digital divide, the Ontario government should work to structure an educational environment that accounts for the need for flexible framework and considers the severity of the challenges of students that are marginalized[22].

FACULTY AND EDUCATION MODEL

Principle: Faculty should possess basic digital skills to ensure that they can adequately foster digital literacy amongst their students.

Principle: Institutions that focus on technology and digital skills in the classroom prepare students with more adequate skills for civic and social participation along with integrated skills for the work force.

Concern: Faculty in post-secondary often require additional support in how to infuse technology into the curriculum.

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[20] Ibid, 42.
[21] Tea Hadziristic, *The State of Digital Literacy. (* Brookfield Institute of Innovation and Entrepreneurship, 37)
[22] Annalise Huynh, Nisa Malli: Levelling Up: The Quest for Digital Literacy (Brookfield Institute for innovation and entrepreneurship. June 2019.) 44

Recommendation: The Ministry of Training, Colleges and Universities, should partner with agencies such as eCampus Ontario to create resources and trainings through an online platform of modules on the basics of digital literacy to help faculty develop fundamental digital skills.

Faculty education is an essential aspect in ensuring that the level of digital literacy across Ontario is met. Professors teaching digital content are taking an integrated approach in learning but are burdened by the lack of training and infrastructure necessary to teach students essential skills. Teachers are unable to adapt to the rapidly evolving digital environment and require professional development and forward-thinking policies to be able to focus on mastery. [23]

Understanding and applying these digital skills in the education sector are critical components of building a broader technological capacity. Organization such as the Social Sciences and Humanities Research Council (SSHRC) hold initiatives to equip teachers to be confident in their technological skills and are able to better integrate technology into their education model. [24] The SSHRC initiatives revamp current frameworks and transform them to implement hands on training that involves computing, coding and online collaboration within the classroom.[25] Studies found that when properly trained, teachers did use these innovative ways of using technology approximately twice a week in the classroom space[26]. These programs exemplify the importance of having properly supported faculty, when supporting the development of student digital literacy.

Undergraduate teachers would benefit from the creation of a standardized online program that teaches foundational digital literacy skills through the use of online modules. Having both a standardized faculty education model that is readily accessible ensures that all students receive an equitable tech learning environment within the classroom. This form of essential training and integrated learning approach ensures that faculty are well equipped to provide the foundational tools necessary for students to succeed both in post-secondary education and forward. It is vital that one of the most formidable and reliable resources students have (faculty) equipped to provide the tools necessary to implement these skills in the classroom. Teachers will be able to have transferable skills to work to create innovative learning experiences that best fit their teaching model.

INFRASTRUCTURE

INFRASTRUCTURE

Principle: Institutions should have an information technologies system capable of handling the addition of more technology-enabled learning in classrooms.

Concern: Increases in the quantity of technological equipment or the addition of more advanced instruments required for tech-enabled learning puts greater strain on post-secondary institutions' digital infrastructure.

Concern: Digital and technological infrastructure on university campuses is often outdated or lacks the capacity to accommodate innovative pedagogy dependent on digital tools.

Recommendation: The Ministry of Training, Colleges and Universities should task the relevant pre-existing committees to determine necessary technology and digital infrastructure for post-secondary institutions in a manner similar to the partnership between the Ministry of Education and the Ontario Software Acquisition Program Advisory Committee.

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[23] Ibid, 43
[24] Ibid, 26
[25] Ibid, 26
[26] Tea Hadziristic, *The State of Digital Literacy)* Brookfield Institute of Innovation and Entrepreneurship, 34)

Recommendation: The Ministry of Training, Colleges and Universities should create and continue funding opportunities for post-secondary institutions that lack the funds to upgrade their existing digital infrastructure and provide further incentives for institutions that already are.

The effectiveness of technology in the classroom is dependent on its capability to operate accordingly and easily. As technology advances, the power consumption and system requirements for its use rises. Although many campus spaces include computers and printers, these tools are relatively basic and simple to configure. In the search for more novel ways to engage students, university campuses should ensure they can power the technology that will lead to meaningful learning outcomes.

Virtual reality, for example, can be used as a powerful tool to supplement students' learning. Rather than using a cadaver, medical students can utilize virtual reality to examine different bodily structures.[27] The problem however, lies in an institution's ability to accommodate these systems. There is a financial expense associated with upgrading to innovative technologies such as virtual reality. Post-secondary institutions that wish to implement such technologies may also find themselves forced to upgrade their computers, incurring additional costs. The mandate of the Ontario Software Acquisition Program Advisory Committee (OSAPAC) is to "[r]eview software titles... that meet the indicated needs of all Ontario publicly funded schools and forward the resulting recommendations for province-wide licenses to the Ministry of Education."[28] The Ministry of Training, Colleges and Universities should create or work with a group similar to OSAPAC to assist in determining what technologies are valuable in post-secondary classrooms. The benefit of such a group would be to inform governmental organizations about cutting-edge technologies that can improve pedagogy. The group should extend beyond OSAPAC's mandate and advise the government on both software and hardware technologies that improve students' learning outcomes.

The Ontario government should assist post-secondary institutions with the costs of improving their technological infrastructure. This can be achieved through subsidies for improvements to an institution's information technologies system, in addition to new technological investments. A robust ICT system enables faculty to use more taxing technologies in the classroom. These technologies allow for students to gain new skills and have near hands-on experience in their chosen field - even before graduation. The Ministry of Training, Colleges and Universities should monitor innovative technological advancements for post-secondary institutions and provide envelope funding to support institutions' retrofits to accommodate these technologies. Institutions that have shown initiative in upgrading their infrastructure should receive special incentives in recognition of their innovation. The government should give additional consideration for institutions that serve rural and northern communities that lack robust technological infrastructures. The lack of infrastructure in these communities make it difficult for students to obtain the same level of experience from technology-enabled as their peers in urban communities. Th Ontario government should refer to OUSA's "Rural & Northern Students" policy paper for additional guidance and recommendations.[29]

CLASSROOM TECHNOLOGY

INNOVATIVE CLASSROOM TECHNOLOGY

Principle: Technology use in post-secondary classrooms can provide students with valuable experiential learning opportunities, enable more diverse pedagogical styles for a means of achieving learning outcomes not possible in a traditional classroom environment.

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[27] Baker, Mitzi,"*How VR is Revolutionizing the Way Future Doctors are Learning About Our Bodies,"University of California San Francisco News Center,* September 18 2017.

[28] OSAPAC/CCPALO. n.d. Mandate. https://www.osapac.ca/about-us/mandate/.

[29] Grenke, Kraymr, Jacob Wihlidal, Petek Yurt, and Marc Gurrisi. Policy Paper: Rural & Northern Students. Toronto: Ontario Undergraduate Student Alliance, 2016.

Concern: Post-secondary institutions have difficulty building and improving upon the digital learning methods that students use in secondary school.

Concern: There are challenges that need to be overcome with respect to technology use in classroom, such as cost and keeping these technologies up-to-date. The technology used in classrooms is expensive to maintain and keep up-to-date and might no longer reflect the technology used in the workplace, particularly in tech-heavy sectors.

Concern: Increased technology use may create financial or accessibility barriers to learning for students.

Recommendation: The Ministry of Training, Colleges and Universities and the Ministry of Economic Development, Job Creation and Trade should work with post-secondary institutions to invest in innovative, technology-centric learning methods relevant to current and future industry standards.

Recommendation: The Ministry of Training, Colleges and Universities should dedicate funding to subsidize the cost of technology-enabled learning at post-secondary institutions.

Recommendation: The Higher Education Quality Council of Ontario should review current progressive technologies use in post-secondary classrooms to gauge its effectiveness.

Technology use in classrooms has extended beyond simple word processing programs and spreadsheets. Today, some universities have begun to adopt new, cutting edge technologies like virtual reality and mixed reality technologies to teach students in novel ways. These technologies should go beyond the typical classroom equipment like projectors, and should instead be equipment that has yet to be widely-used in classrooms but is also capable of enhancing students' learning experience. With virtual reality, for example, instructors can create three-dimensional models of historical monuments and simulate crime scenes to demonstrate the process of gathering evidence for a murder trial.[30] The appeal of technologies like virtual reality is its ability to create immersive learning environments within the confines of the classroom.

Post-secondary institutions should encourage the use of more educational technologies in classrooms, and in doing so, recognize that there are numerous methods to teach effectively. An example of innovating teaching methods that utilize technology is transforming traditional lectures into a game-like experience. Studies have shown that serious educational games can be more effective than the conventional lecture methods.[31] Students are able to acquire the skills they need without stepping outside of the classroom and apply it several times over the course of a semester. Innovative classroom technologies remove limitations on how instructors should teach, and instead open up possibilities for more effective and creative pedagogy.

One advantage of tech-enabled learning is its flexibility in when, where, and how students can engage with their studies. In pure online courses, students are generally given flexibility in how they access the lecture materials provided they follow course deadlines. However, in some online courses, the experience can be very individualistic, with students only interacting with their computer or smartphone, rather than with other students. A Stanford University study conducted in 2008 found that certain classroom technologies like virtual reality have the ability to create a "collaborative immersive environment" (CVE) where students reap the benefits of both a technologically-innovative online course and an in-class lecture.[32] In these CVEs, researchers found that a student who had either human or virtual co-learners "[remembered] more factual material than when studying alone" and "benefits of co-learners could conceivably be harnessed in VEs."[33]

[30] Cannon, Tom, *How Virtual Reality could transform Higher Education,* Red Brick Media Group, August 30 2017, https://www.redbrickresearch.com/2017/08/30/how-virtual-reality-could-transform-higher-education/.
[31] Chandross, David, *How playful design is transforming university education, The Conversation,* July 26, 2018, https://theconversation.com/how-playful-design-is-transforming-university-education-99503.
[32] Bailenson, Jeremy N., Nick Yee, Jim Blascovich, Andrew C. Beall, Nicole Lundblad, and Michael Jin, "The use of Immersive Virtual Reality in the Learning Sciences: Digital Transformations of Teachers, Students, and Social Context." *Journal of the Learning Sciences 17 (1): 102-141. doi:10.1080/10508400701793141* 107-108.
[33] Ibid.

It is vital for technology in the classroom to be cutting-edge and accurately represent the same systems that will be used in the workforce. Although virtual reality systems are good hands-on training for active careers like emergency response, it is equally important that students are able to become acquainted with the technology used in careers with less physical labour like finance or accounting. Being familiar with new technology allows for a seamless transition from education to work and gives graduates the ability to adapt to changes in their field. This is particularly true in software-heavy sectors. For example, The Globe and Mail suggests that "[t]he speed at which cybersecurity risks are proliferating is outpacing educators' ability to develop up-to-date curriculums," indicating that post-secondary institutions should strive to keep their classroom technology current.[34] Failure to do so limits graduates' ability to adapt and succeed in the workplace. Post-secondary institutions should regularly examine the standard software for any given industry and offer training in those programs for its students.

In order to maximize learning outcomes and provide an equitable learning experience, it is important to ensure that this new technology is accessible for students. Students already have difficulty with the affordability of post-secondary education, so it is imperative that the introduction of these new technologies do not result in costs being passed down to students. Institutions should be able to invest in the acquisition of these resources on behalf of students as a way to enhance students' learning and keep cutting-edge technology available for students of all socio-economic statuses. There are, however, accessibility considerations to be made as well. Not all students will be able to utilize technologies like mixed reality systems due to their physical disability. For example, a student with impaired vision might not be able to reap the benefits of a virtual reality headset in the same way that other students are able to. Although new technologies are powerful tools, it is imperative that all students' needs are considered. If a student is unable to use the technology provided, institutions should work with them to find alternate learning and assessment methods.

Before the provincial government can attempt to introduce more complex technologies into post-secondary classrooms, it must first determine whether students are familiar with a basic level of technology before leaving high school and whether institutions are prepared to accommodate. Secondary school students use technology quite frequently in class, "but a 2015 report by Universities Canada found that less than half of Canadian universities have a strategy to adopt digital technologies."[35] Post-secondary institutions must continue their efforts to build a robust digital strategy that can incorporate new technologies like virtual reality while the provincial government continues efforts to improve digital literacy in students from K-12. The Higher Education Quality Council of Ontario (HEQCO) should develop its own digital strategy in order to help post-secondary institutions refine their own. HEQCO should conduct a research study at post-secondary institutions to determine whether the current level of technology use in classrooms improves students' ability to perform in the workplace. The study could be done via electronic surveys sent to recent post-secondary graduates. Alumni could answer a series of questions to determine what technologies are being used, if they are similar to those used in the workplace, and if the use of those technologies in the classroom resulted in improved performance in their career. Criteria may include whether the software is outdated in an employee's field or if the technology in the classroom did not contribute significantly to preparing students for the workforce. If the findings are unsatisfactory, HECQO can make a recommendation to the Ministry of Training, Colleges and Universities to reevaluate what technologies are being implemented, and how it can improve.

LEARNING MANAGEMENT SYSTEMS

Principle: Learning management systems (LMS) are valuable tools for delivering educational content to post-secondary students.

Principle: Post-secondary institutions should implement open-source LMSs, which are free to utilize.

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[34] Reynolds, Jennifer, *How Canada can close the cybersecurity talent gap, The Globe and Mail,* July 29 2018, https://www.theglobeandmail.com/business/commentary/article-how-canada-can-close-the-cybersecurity-talent-gap/.
[35] Bowden, Olivia, "*Canadian universities struggling to offer digital learning to tech-savvy Generation Z," The Financial Post,* September 7 2016, https://business.financialpost.com/executive/smart-shift/canadian-universities-struggling-to-offer-digital-learning-to-tech-savvy-generation-z.

Principle: Open-source LMSs allow institutions to customize the software to a greater degree than proprietary systems.

Concern: There is little competition in the LMS market, which limits institutions' ability to find a system that meets their unique needs.

Recommendation: The Ministry of Training, Colleges and Universities should, through eCampus Ontario, encourage the use open-source LMSs and dedicate resources to ensuring the software is conducive to student success.

Learning management systems (LMSs) are "web-based application[s] for managing course communication, collaboration, administration, tracking, and reporting,"[36] and have become prevalent both in the secondary and post-secondary education systems. The utility of LMSs comes from the ability for students to manage several classes in one central location, and from the ability for instructors to manage hundreds of students over several courses.

As of 2016, three companies (Blackboard, Moodle, and Canvas) comprised 79% of the LMS market in the US.[37] In Ontario, three LMSs, WebCT, Desire2Learn, and Moodle comprised 72% of the market in 2010.[38]This lack of competition is worrisome for post-secondary institutions. Software, by its nature, must be constantly adapting to meet the needs of its customers. As pedagogical tools change and advance, LMS systems must adapt. LMS providers may fail to accommodate the needs of post-secondary institutions and lead to inefficient learning for students. Given that there are only a few LMS providers, universities and colleges have little choice in picking an effective LMS. Post-secondary institutions may find their technology-enabled learning plans limited by their LMS due to a lack of innovation.

The Ministry of Training, Colleges and Universities should consider an alternative to the private LMS market. eCampus Ontario should be tasked by the government to consider supporting the use of open-source LMS for post-secondary institutions. Open-source LMSs such as Moodle are available under a public license and "[give] the user the rights to use, to change, to study, to create and to distribute the results, free of charge, to anyone and for any purpose."[39] In 2010, 68% of Ontario LMSs were proprietary, and only 32% were open-source. In the same year, 53% of all LMSs in Canada were proprietary and 47% were open source.[40] If the government and post-secondary institutions choose to incorporate more open-source LMSs, it gives the institution the freedom to adapt the system to their unique needs. Proprietary LMSs are expensive to use for institutions, costing anywhere from $15 to $100 per user annually.[41] Although open-source LMSs do not have direct costs, the cost of running servers for the software still applies. Not only are open-source LMSs more cost-effective, but its modular nature means that an institution can tailor it directly to the needs of its faculty and students. Instead of paying a third-party developer to make these customizations, it streamlines the process and reduces costs.

A learning management system is only as effective as the person using it. Without proper training, faculty are unable to use LMSs to their full extent.
If a new, open-source LMS is used, faculty should be provided training to demonstrate the software's potential uses. If the Ministry of Training, Colleges and Universities, through eCampus Ontario, takes a

[36] University of Toronto Scarborough. n.d. *What is a Learning Management System?*
https://www.utsc.utoronto.ca/technology/what-learning-management-system.
[37] Feldstein, Michael, "*Canvas Surpasses Blackboard Learn in US Market Share,"* e-Literate, July 8 2018,
https://mfeldstein.com/canvas-surpasses-blackboard-learn-in-us-market-share/.
[38] Contact North, "Learning Management Systems in
Ontario – Who's Using What?" Contact North, 2012, https://teachonline.ca/sites/default/files/contactNorth/files/pdf/trends-and-directions/lms_series_-_module_1.pdf
[39] Dobre, Iuliana. "Learning Management Systems for higher education – an overview of available options for Higher Education Organizations." The 6th International Conference Edu World. 2014. New York: Elsevier, 2015.
[40] Contact North, "Learning Management Systems in Ontario – Who's Using What?" Contact North, 2012,
https://teachonline.ca/sites/default/files/contactNorth/files/pdf/trends-and-directions/lms_series_-_module_1.pdf
[41] Yupangco, Jim, "Open Source Vs. Proprietary LMS: Assessing Return On Investment," eLearning Industry, January 13, 2018,
https://elearningindustry.com/assessing-return-on-investment-open-source-vs-proprietary-lms

more direct approach to the distribution of LMSs, they should take every reasonable step, such as open-source LMS training to ensure that the software is reaching its full potential. This improves students' learning outcomes as well as ensures that valuable tax dollars are being used to their full extent.

FACULTY INCENTIVES: CLASSROOM TECHNOLOGY

Principle: Faculty are responsible for determining what resources are utilized in their courses.

Concern: Faculty may face barriers such as significant time investments preventing the adoption of new technologies in the classroom.

Concern: Financial constraints may prevent the broad adoption of new technologies in the classroom

Recommendation: The Ministry of Training, Colleges and Universities should, after consultation with the Ontario Confederation of University Faculty Associations and Council of Ontario Universities, provide appropriate grants for successful integration of technology in courses.

Given the research and class management responsibilities of professors, changing the structure of a university class to include more technology could be a substantial undertaking. Faculty would have to conduct research into the appropriate tools, find funding for its integration, and incorporate it into their curriculum. This process takes time from their existing responsibilities. The Ministry of Training, Colleges and Universities, through eCampus Ontario and in consultation with post-secondary institutions should determine criteria for a successful integration of technology and provide grants to institutions for faculty innovating in this area. These grants would provide faculty with incentive to innovate in their course offerings. The type of technology that is deserving of a grant is at the discretion of the committee, however it is essential that the technology results in improved learning outcomes. This grant would be an investment for the continued success and prosperity of new graduates. The benefits of digitally-literate graduates have a significant positive impact on the economy.

DATA COLLECTION: CLASSROOM TECHNOLOGY

Principle: Technology use in classroom has become more commonplace in the past decade, in the post-secondary education sectors.

Principle: Data surrounding the use of technology in the classroom should be available for the purposes of improving its us.

Concern: There are few studies that focus on the benefits of technology use in classrooms, particularly in the long term.

Recommendation: The Higher Education Quality Council should evaluate the value of technology use in classrooms and publish those findings.

In order to accurately gauge the effectiveness of the government's efforts in encouraging tech-enabled learning, more data needs to be collected to quantify its benefits. Such data could include studies on the academic success of students who had tech-enabled learning in their K-12 classrooms versus their peers who did not have the same opportunity. There are many opportunities for this research to be undertaken in the university setting.

To ensure that all students are able to gradually develop their digital and technological skills as they continue their education, data must be collected from the beginning of their post-secondary education through to recent graduates. The Ministry of Training, Colleges and Universities should provide information on the use of technology in the post-secondary system. The Higher Education Quality Council of Ontario (HEQCO) should use that to indicate the level of progress made in adoption of technology. For instance, they could conduct a study on the success of students who had high levels of tech-enabled learning during their undergraduate education compared to those who did not. HEQCO could also

examine the proportion of students who had tech-enabled learning both in high school and in post-secondary. This information could be used to give policy recommendations to the Ministry of Training Colleges and Universities.

The ability to have studies at the start of beginning universities and colleges prior to and after leaving universities and colleges means that it will be possible to track students' growth in digital literacy and technological competency. Digital literacy has the potential to make students more employable, so it is vital that post-secondary institutions do their best to encourage it.[42]

ONLINE COURSES

QUALITY & CREDIBILITY

Principle: Students should expect to achieve the same learning outcomes in an online course as they would with a traditional course.

Principle: Online courses should be viewed as a credible form of educational delivery.

Concern: Many students who have taken online courses have expressed dissatisfaction with the quality of online courses.

Concern: Currently there is no quality assurance framework specific to online courses, which has led to students perceiving that they have not obtained the same learning outcomes as those who have taken these courses in class.

Concern: A presumption that academic integrity is compromised in online courses can lead faculty and students to question their legitimacy.

Recommendation: The provincial government should task eCampus Ontario and Contact North with consulting experts and faculty with developing a framework for the development of quality online courses.

Recommendation: Ontario University Council on Quality Assurance (OUCQA) should expand Institutional Quality Assurance Processes (IQAPs) requirements to include program delivery criteria for online courses.

Recommendation: The provincial government should mandate that an assessment of online learning be included in OUCQA's Final Assessment Report.

Recommendation: The provincial government should develop materials to displace myths around the quality and legitimacy of online and technology-enabled courses through partnerships with stakeholders like eCampus Ontario.

Online courses enhance the accessibility of post-secondary education, allowing students to take courses in the case that they cannot be physically present on campus, and can accommodate schedules of part-time students and students who may be working or taking care of dependents. It is important that students, regardless of what platform they take classes through, should be receiving a high-quality learning experience. In OUSA's Ontario Post-Secondary Student Survey, it was reported that 60% of respondents took an online course, however, less than 50% of respondents who have taken an online course responded that they would take an online course again in the future, indicating overall dissatisfaction with the

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[42] Knight, Sara, "Digital literacy can boost employability and improve student experience," The Guardian, December 15, 2011, Digital literacy can boost employability and improve student experience, https://www.theguardian.com/higher-education-network/blog/2011/dec/15/digital-literacy-employability-student-experience

quality of online courses.[43] Furthermore, according to the Canadian Digital Learning Research Association's 2017 survey on online and distance education in Canadian post-secondary institutions, 55% of respondents perceived online courses to be on lesser value.[44] This insights sheds light on some of the issues surrounding online courses and student experience. Students cited lower quality and overall dissatisfaction with online courses.

This perception damages an opportunity which provides students with an accessible alternative to traditional courses. A recent study by a team of American and Israeli researchers concluded that students in online courses are less likely to engage in academic misconduct than those in physical classrooms. In a survey of 2475 students, the researchers concluded that "online courses are not a predominant factor in the prediction of misbehaviour," debunking the argument that these types of courses reduce the quality and legitimacy of a post-secondary credential.[45]

Currently, the Ontario Universities Council of Quality Assessment (OUCQA) has developed a Quality Assurance Framework in which Universities must implement their own Institutional Quality Assurance Processes (IQAPs), outlining the specific goals of the University, and must adhere to province wide degree level expectations. OUCQA develops IQAP criteria as well as approves the individual IQAPs when they are developed.[46] However, the current framework does not formally assess the quality of online courses. As a result, there is limited regulation and oversight on the quality many students who have taken online courses have received what they feel to be an inferior learning experience.

In order to combat this, OUCQA should expand its current IQAPs requirement to include program delivery to include the delivery of online courses. In doing so, this will allow institutions to remain autonomous in program delivery while having a quality measurement framework to adhere to. OUCQA completes Quality Assurance Audits for Ontario institutions every eight years to ensure that institutions are making progress towards and adhering to their IQAPs. Post-audit, Quality Council will produce an audit report.[47] Moving forward, OUCQA should mandate that the evaluation of online learning must be included in the final reports.

Employers have also started to shift their thoughts on the quality and value of online courses. While a decade ago some may have cautioned students from taking online courses, those perceptions are shifting.[48] With the strong regulations around Canada's post-secondary institutions, questions should no longer be raised about the quality of education a student is receiving. With Ontario's publicly funded system, checks and balances exist which ensure that students are taking high-quality courses, whether they are online or in-person, and it is essential that our post-secondary institutions work to dispel the stigma that still surrounds online learning.[49] Government funded organizations can play a key role in this.

In an effort to convince students, faculty, and the general public, that online courses are legitimate forms of learning, eCampus Ontario and Contact North should collaborate with faculty who specialize in online course delivery to develop a framework for the creation of high-quality online courses. Additionally, eCampus Ontario should develop materials for Ontario's publicly funded universities which help displace the idea that online courses lead to plagiarism, in turn reducing the quality of post-secondary education. These agencies will not only help improve the reputation of Ontario's institutions, but they will open an avenue to accessible course delivery that some students, and faculty, still believe is of lower quality.

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[43] Ontario Undergraduate Student Alliance, *Quality: Results from the 2015 Ontario Post-Secondary Student Survey*. (Toronto, Ontario Undergraduate Student Alliance, 2017), 12.
[44] Canadian Digital Learning Research Association: Data for 2017. (Canada, Canadian Digital Learning Research Association, 2017) Accessed from https://onlinelearningsurveycanada.ca/data-appendix-2/ on November 2nd 2018.
[45] Cait Etherington, "New Study Finds Cheating is Less Prevalent Online than on Campus," *eLearning Inside,* October 4, 2018, https://news.elearninginside.com/new-study-finds-cheating-is-less-prevalent-online-than-on-campus/.
[46] Ontario Universities Council on Quality Assurance, *Quality Assurance Framework.* (Toronto, Ontario Universities Council on Quality Assurance, 2017), 2-3.
[47] Ibid, 27-28.
[48] Dana Lawrence, "How employers view an online education," *The Globe and Mail,* November 15, 2017, https://www.theglobeandmail.com/report-on-business/how-employers-view-an-online-education/article36984380/
[49] Ibid.

OPEN ONLINE COURSES AS A MECHANISM OF AFFORDABILITY

Principle: Courses in the post-secondary education system should be affordable for students and uncostly for the institution.

Concern: Online courses can provide additional financial barriers to the overall cost of an undergraduate or professional degree, including additional administrative fees and increased fees to out of province students.

Recommendation: The Ministry of Training, Colleges and Universities should work with the Council of Ontario Universities to examine and eliminate additional administrative fees charged to students for online courses taken at their institution.

Recommendation: The Ministry of Training, Colleges and Universities should partner with open institutions in Canada and their jurisdiction's governments, such as Athabasca University and the Province of Alberta, in order to eliminate additional fees including those applied to out of province students.

Recommendation: The Ministry of Training, Colleges and Universities should task eCampus Ontario with researching and reporting emerging practices in online education geared towards reducing the cost of education for post-secondary students.

All willing and qualified students should have access to an affordable post-secondary education. Online courses and technology-enabled learning opportunities provide post-secondary institutions with an opportunity to help reduce the cost of education for post-secondary students.

In order to continue to increase the affordability of post-secondary education, government investment around technology-enabled learning should consider the finances of post-secondary students. The vast majority of online courses in Ontario cost the same as courses held in the traditional face-to-face, in-classroom courses. However, this is not always the case since Laurier University for example charges a $31 'miscellaneous fee' for online course administration.[50]

In addition to administrative fees charged to students to take online courses at their universities, a student can face prohibitive costs if they choose to pursue a course at an open university. For example, Athabasca University in Alberta provides a vast calendar of open courses, but many students cannot access them because of costs. If MTCU partners with open institutions and the responsible Ministries in their jurisdictions to remove the additional out of province fees, these courses would become more affordable for students to enroll in.

To further find opportunities to promote affordable online learning opportunities for students, MTCU should task eCampus Ontario with examining and reporting emerging trends in online education. Considering the rapid development of technology in education, this focus can be crucial to Ontario's ability to remain on the cutting edge of online education.

OPEN EDUCATIONAL RESOURCES

FACULTY FOCUS

Principle: Course instructors should have the academic freedom to choose the educational resources utilized in their courses.

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[50] Wilfrid Laurier University, Students. "Miscellaneous Fees". https://students.wlu.ca/registration-and-finances/tuition-and-fees/fees-breakdown/miscellaneous-fees.html#ctie

Principle: Course instructors should have access to a wide variety of open resources to choose from.

Concern: OERs available to course instructors in Ontario are often left underutilized due to a lack of awareness and/or misconceptions regarding efficacy and quality of OERs.

Concern: eCampus Ontario's OER library does not meet the current demand of Ontario's institutions.

Recommendation: The provincial government should work with faculty stakeholders in Ontario, including but not limited to the Council of Ontario Universities (COU) and Ontario Conferderation of University Faculty Associations, to incorporate accurate and up-to-date information on OERs for faculty orientation across institutions.

Recommendation: The provincial government should provide envelope funding to support the expansion of eCampus Ontario's library to increase capacity and diversity of texts that encompasses all disciplines.

One aspect of institutional differentiation lies within the methods of teaching faculty use. Taking this into account, professors should have the autonomy over how they teach a course which includes the resources that they choose to teach and test with. In doing so, professors should have a wide variety of high-quality resources to choose from including those that are online. Faculty should be aware of publicly available resources through active promotion done by the provincial government.

In 2016, BCcampus conducted a research study to gain further knowledge on how faculty at British Columbian post-secondary institutions utilized OERs. In this study, the three main barriers cited by professors included: finding resources in their subject area, finding high quality resources and knowing where to find resources.[51] Within this study 59% of respondents classified that OERs were comparable, slightly better or significantly better than traditional materials with a significantly higher rating from faculty who used OERs in their classroom. A key part of this study included that the quality of the OER mattered less than its effective use indicating a need for greater awareness of how to use OERs.[52] Currently eCampusOntario houses a publicly accessible library of 268 texts which currently lacks diversity and size giving faculty little choice and autonomy over which course they use.[53]

In order to minimize misconceptions surrounding OER quality and existence, the provincial government should work with the Council of Ontario Universities and Ontario Confederation of University Faculty Associations to provide up to date information about OERs to faculty. This should include up to date information about creative commons and open licensing which allows course instructors to modify and utilize the text as they choose[54] allowing them ultimate autonomy and academic freedom. This allows professors to update and work with students to update missing or outdated content enhancing the quality of education students are receiving.

To address the lack of diversity in current OERs the Ministry of Training, Colleges and Universities should provide envelope funding across all disciplines in order to develop a greater scale and scope of these resources. In doing so, this gives faculty further autonomy over how they choose to instruct courses while also allowing students greater accessibility and affordability for their course resources.

PROMOTION AND AWARENESS

Principle: Students and faculty should be aware of the availability of OERs in Ontario.

[51] Jhangiani, R, Rebecca Pitt, Christina Hendricks, Jessie Key and Clint Lalonde, *Exploring Faculty use of Open Educational Resources at British Columbia Post-Secondary Institutions* (Victoria: BCcampus, 2016), 8-10.
[52] Ibid, 16-18.
[53] eCampus Ontario, *Browse the Collection*. (Toronto: eCampus Ontario, 2018) Accessed September 26th 2018. https://openlibrary.ecampusontario.ca/
[54] Bowness, S. *The Open Educational Resources Movement is Redefining the Concept of Online Textbooks.* (Canada: University Affairs, April 4, 2017)

Concern: Many students and faculty, and administration across the province remain unaware of OERs and Ontario's Open Textbook Library.

Concern: Faculty remain unaware of ancillary resources (quizzes, videos, etc.) provided through eCampusOntario beyond textbooks.

Recommendation: The provincial government should, through collaboration with eCampusOntario, develop a more robust promotional strategy for greater OER awareness including the promotion of ancillary resources.

Recommendation: The provincial government should work with the Ontario College and University Library Association in order to promote OERs to faculties when they are choosing course texts.

Recommendation: The provincial government should work with the Ontario members of Campus Store Canada to promote the use of OERs to faculty when choosing their course material.

In order to facilitate use of OERs it is essential students are first aware of the existence of OERs so that they are able to access online texts as well as influence course instructors to utilize these resources. Faculty must be made aware of the existence of these resources as well as effective ways to utilize them to maintain and enhance instructional and course quality. In doing so, this pushes for greater awareness and knowledge of how to utilize OERs and also allows for students and course instructors to advocate for their further use.

eCampus Ontario is host to Ontario's open textbook library. In eCampus Ontario's report on online learning, it was revealed that only 24% of undergraduate students were aware of eCampusOntario and its services indicating a lack of awareness among undergraduate students.[55] Furthermore, Contact North revealed that a majority of Faculty in Ontario remain unaware or disinterested in OERs ultimately eliminating potential for use.[56]

In order to promote awareness to students and faculty, the Ministry of Training, Colleges, and Universities should work with eCampusOntario to develop a greater promotional strategy to promote the use of OERs to various audiences through a variety of channels. This could include promotion to prospective students through the Ontario University Fair, as well as promotion to faculty members through professional development conferences. In order to continue promoting OERs to professors the provincial government should mandate that MTCU works with Campus Stores Canada as well as the Ontario College and University Library Association to provide positive information and to promote the use and benefits of using OERs when helping faculty choose course text.

RESOURCE QUALITY ASSURANCE

Principle: All educational resources, regardless of format, should be of high quality.

Concern: A perception that OERs are of lower quality than traditional educational resources acts as a barrier to OER adoption, development, and adaptation.

Recommendation: The provincial government should increase funding allocated to eCampusOntario to work with faculty members to peer review existing OERs with a focus on quality assurance.

Recommendation: The provincial government should, through eCampusOntario, establish a quality assurance process to review OERs as they are developed.

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[55] eCampus Ontario, *Market Research Report: Drivers and Barriers to Online Learning in Ontario*. (Toronto: eCampus Ontario, 2017) 20
[56] Contact North, *OER Opportunities for Ontario*. (Ontario, Contact North, 2014). 14.

Learning resources can include textbooks, videos, seminars and testing mechanisms, all of which have a significant impact on student learning and achievement. These should all be of high quality regardless of format to ensure students have an effective post-secondary experience.

In many cases, peer reviews can act as a quality indicator for utilizing a specific course text. OERs currently have a less structured and less rigorous peer review process compared to commercial textbooks which can often lead to greater misconceptions surrounding quality. [57] In BCcampus' 2016 Survey, it was identified that perceived quality was the second largest barrier to utilizing an OER in the classroom and was one of the most significant enabling factors for OER use is that the resource is from a reputable producer.[58]

To reduce misconceptions surrounding OER quality, the government should work to increase funding to eCampusOntario to incentivize faculty to review existing and new OERs. In increasing peer reviews, it is hopeful that course instructors and faculty will be more likely to choose an OER and that the OER itself is of higher quality. To further ensure quality, MTCU should work with eCampus Ontario to develop and establish a quality assurance process that addresses the loose structure in online text development, to make these texts more appealing to faculty and meet the need for a high-quality text.

DATA COLLECTION TO IMPROVE USER EXPERIENCE

Principle: OERs should be implemented with the purpose of enhancing the teaching and learning experience at post-secondary institutions.

Concern: There is currently little centralized data regarding the impacts of OERs on the teaching and learning experience in Ontario.

Concern: There is currently no standardized reporting structure for institutions to measure the usage, successes, such as the financial impact, and failures of OERs.

Recommendation: The provincial government should mandate that institutions report data regarding both students and faculty members' experiences with OERs.

Recommendation: The provincial government should task eCampusOntario with the collection, analysis and publication of institutional user satisfaction data.

OERs should both enhance the affordability and accessibility of courses, and should complement and enhance teaching and learning at post secondary institutions. Furthermore, in order to ensure that faculty can institute a smooth implementation of OERs in the classroom, information and data on OERs use should be readily available and accessible to the public. Positive data can also act as a catalyst for more institutions to move to the utilization of OERs.

In BCcampus' study on faculty use of OERs, some of the top listed barriers to not being able to use OERs include: difficulty finding relevant and quality resources as well as not having enough time to look/try to adapt OERs.[59] With little data currently existing on the use of OERs, many professors have to develop the course with no guidance or guarantee that these resources will improve the academic experience. This can make it difficult for faculty and institutions to recognize the value of OERs. With the lack of centralized data, it is difficult for developers of OERs to understand the needs of faculty and students in developing their content. Currently there is little centralized data surrounding OER use, especially Ontario specific data which can act as a barrier to adoption.

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[57] Bates, T, *Guidelines for Reviewing an Open Textbook.* (Contact North, 2015).

[58] Jhangiani, R, Rebecca Pitt, Christina Hendricks, Jessie Key and Clint Lalonde, *Exploring Faculty use of Open Educational Resources at British Columbia Post-Secondary Institutions* (Victoria: BCcampus, 2016), 19

[59] Jhangiani, R, Rebecca Pitt, Christina Hendricks, Jessie Key and Clint Lalonde, *Exploring Faculty use of Open Educational Resources at British Columbia Post-Secondary Institutions* (Victoria: BCcampus, 2016), 19

In BCcampus' 2016 study, it was found that 66% of respondents report that their institution either did not have or they were unaware of institutional policy surrounding OER use[60]. Beyond little institutional policy, there is no standardized structure to report data including usage, satisfaction and financial impact of OERs making reporting and collection both difficult.

In order to increase data collection, the provincial government should mandate that all institutions report data on their usage of OERs to be collected and centralized in order to help enhance and encourage the use of OERs in the classroom. In order to centralize this data where it can be easily accessed, the government should task eCampus Ontario with collecting and analyzing this data. The amount of available data and information especially through the credible channels of eCampus Ontario and MTCU, should help in the adoption of OERs in the classroom with proven methods for effectiveness.

In order to increase the number of universities that report their usage experience with OERs the provincial government should require that intuitions report data on OER usage. In order to house this data, the provincial government should designate eCampus Ontario to manage and host the collected data mentioned previously in order to have the data easily accessible.

FACULTY INCENTIVIZATION

Principle: Faculty members across Ontario should be recognized by their institutions for their work pertaining to the development of OERs.

Concern: Post-secondary institutions are not adequately incentivizing faculty to commit to the development of OERs at their institutions.

Concern: There are limited incentives provided by the government for faculty members to pursue OER development.

Recommendation: The province should work with the Ontario Confederation of University Faculty Association (OCUFA) to develop proper meaningful incentives geared towards faculty for OER development.

Recommendation: The province should work with the Council of Ontario Universities to develop a best practice system for incentivising OER development.

Faculty should be recognized for their academic work which regardless of publishing platform. Currently, universities do not recognize the authorship of open educational resources the same as they do for commercial textbooks. According to a study done by BCcampus in 2016, 66% of respondents reported that either their institution did not have policy on OER use and development or that they were unaware that one existed.[61] According to a survey conducted by OCUFA, faculty are interested in utilizing and developing OERs, however would like to be fairly compensated to do so.[62]

In order to further incentivize faculty to develop OERs, MTCU should work with OCUFA to help build an recognition system and rewards for faculty developing OERs that they would find most effective. In particular a form of recognition could be the authorship of OERs should be a contribution to a professor's tenure track. To complement this, MTCU should work with COU to develop a best practice sharing system for faculty incentives that members can in their own institutions. Some of these incentives could include prestigious teaching awards, sector recognition as well as positive institutional and professor specific endorsements. Lastly, the government should also work with eCampusOntario to provide further incentives for faculty who develop OERs including but not limited to author funding.

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[60] Ibid, 27-28.
[61] Ibid, 27-28.
[62] Ontario Confederation of University Faculty Associations. *Faculty interested in Possibilities of Open Textbook Library*. (Toronto, Ontario: Ontario Confederation of University Faculty Association, August 2017) Accessed September 26 2018 from https://ocufa.on.ca/blog-posts/faculty-interested-possibilities-open-textbook-library/

AFFORDABLE EDUCATIONAL RESOURCES

Principle: Students should not be significantly financially burdened by high textbook and learning resources costs.

Principle: Initial investments into OERs should be targeted towards subject areas and courses that have high enrolment numbers.

Principle: Post-secondary education in Ontario should be made as affordable as possible for all students.

Concern: The rising cost of educational materials, such as textbooks, create an increasingly larger financial barrier for students pursuing post-secondary education.

Concern: Students often choose to not purchase textbooks, as a way to save money during their studies, ultimately hindering their learning experience.

Recommendation: The creation and development of OERs should be included in Ontario's Strategic Mandate Agreements as a metric for effective pedagogy and faculty innovation, linking performance-based funding to increasing financial access to education.

Recommendation: The provincial government should invest in the development of OERs that can applied through an interdisciplinary approach to the largest introductory courses taken by students in the province, similar to the implementation of British Columbia's 'Open Education Resource' Project.

There are several costs associated with post-secondary education, which given the substantial time commitment of post-secondary education it is difficult for students to generate additional income. A mechanism to improve affordability of post-secondary education is Ontario would be through lowering and even eliminating textbook costs. Given that the use of OERs is currently new to Ontario, an effective strategy for their introduction in the classroom is necessary.

As tuition continues to rise, and public funding declines, costs of university are consistently becoming more unaffordable as the cost of education has individual student.[63] In addition to high fees, Maclean's Magazine reports that students in Ontario are paying an average just shy of $800 for course texts each academic year.[64] In many cases students are buying multiple texts as well as ancillary resources such as cases and online access codes needed to do assignments. It has been recognized that two thirds of students have not obtained course materials for their classes due to high costs.[65]

In order to encourage more institutions to adopt OERs, the government should include the use and development of OERs as part of each institutional strategic mandate agreements. In doing so, institutions that utilize OERs should receive performance-based funding as a pedagogical tool as well as a method of faculty innovation.

In effectively creating strategy to rollout and enhance the use of OERs in Ontario, funding for OER development and use should be targeted towards popular subject areas with high enrollment within the province in order to financially benefit the most students possible. This is a strategy similar to British Columbia's Open Education Resource Project which was launched in 2012 and targeted the most popular entry level courses which has been shown as successful, having saved students between $8,878,322 –

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[63] Aitchison, Colin, and Martyna Siekanowicz. *Educated Investments: Creating Opportunities for Student Success.* (Toronto: Ontario Undergraduate Student Alliance, 2018) 12-13.

[64] Brown, Mark, *What Canadian University Students can expect to Pay for Textbooks.* (Toronto: MacLeans Magazine, December 2017)

[65] Ministry of Training, Colleges and Universities. *Ontario Making College and University more Affordable with Free Online Textbooks.* (Toronto, Ontario: Government of Ontario, June 2017) Accessed September 13th 2018 from https://news.ontario.ca/maesd/en/2017/06/ontario-making-college-and-university-more-affordable-with-free-online-textbooks.html

$9,293,318.[66] Furthermore, in doing so, this allows more students to experience and become aware of OERs earlier in their university experience which can lead to them being able to advocate to course instructors to use them in future courses.

FACULTY SUPPORT: UTILIZATION & DEVELOPMENT

Principle: All post-secondary institutions should be equipped to support the development, adoption and review of OERs.

Principle: Every post-secondary institution should be able to effectively communicate to faculty how to develop and adopt OERs.

Principle: Faculty should feel comfortable with and should be able to effectively use OERs.

Concern: Faculty members who have expressed a willingness to develop OERs lack the administrative support from their institution to begin the process of developing OERs.

Concern: Switching to new course resources can be overwhelming to faculty.

Concern: Many institutions across Ontario currently lack the infrastructure capacity to support faculty who are interested in developing, adopting and reviewing OERs.

Recommendation: The Ministry of Training, Colleges and Universities should task eCampusOntario with the creation of an Ontario-specific toolkit that faculty members can use as an initial resource for the creation, adaptation, and development of OERs on their campuses.

Recommendation: The provincial government should work with Ontario College and University Library Association (OCULA) to provide assistance to faculty through library administration related to the facilitation and development of OERs.

Recommendation: The Ministry of Training, Colleges and Universities should provide access to grant funding for institutions to fund OER specific coordinators, in institution's libraries, mandated to work towards supporting OER development and use on university campuses.

Given that OERs are a fairly new concept to Ontario, it is essential that faculty are given guidance on how to utilize them. While there are province wide supports that exist through eCampusOntario, faculty members do not necessarily have direct support in a close geographical proximity when it comes to utilizing OERs. In OCUFA's survey surrounding the use of OERs among faculties, faculty felt that they did not have enough time to adopt an online text into their classroom.[67] As recognized in BCcampuses 2016 study the OER is not necessarily as effective as the ways in which they are being utilized.[68] A study conducted at the University of Georgia, showed that students that used OERs in the classroom were achieving better results. Overall student grades were shown to rise between 5.5% to 7.73%. A key component of this study was that students were able to receive course resources right away, which was achievable through OERs as they provided no additional financial burden on students and are completely accessible online. [69]

The Learning Portal College Libraries Ontario has started the development of "toolkits" which is an online resource which provides information to help faculty and library staff understand how to better

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[66] BCcampus, *Open Textbook Stats.* (Victoria: BCcampus) Accessed on September 13th from https://open.bccampus.ca/open-textbook-stats/

[67] Ontario Confederation of University Faculty Associations. *Faculty interested in Possibilities of Open Textbook Library.* (Toronto, Ontario: Ontario Confederation of University Faculty Association, August 2017) Accessed September 26 2018 from https://ocufa.on.ca/blog-posts/faculty-interested-possibilities-open-textbook-library/

[68] Jhangiani, R, Rebecca Pitt, Christina Hendricks, Jessie Key and Clint Lalonde, *Exploring Faculty use of Open Educational Resources at British Columbia Post-Secondary Institutions* (Victoria: BCcampus, 2016), 17.

[69] Mackenzie, Lindsay. *Free Digital Textbooks vs. Commercial Textbooks.* (Inside Higher Ed, July 2018) 1.

understand, utilize and engage with OERs in their institution.[70] In order to help faculty adapt to OERs, the government should task eCampus Ontario to create and release already created faculty specific toolkits which help ease faculty into using OERs.

In order to assist faculty in utilizing and adopting OERs, MTCU should further work with OCULA to work with its members in order to be able to further assist faculty in finding and effective use of OERs as well as identifying areas for further development. Furthermore, MTCU should provide grant funding for OER institution specific coordinators to work towards supporting OER development as well as faculty interested in development. In order to further support this, the government should provide financial and infrastructural support to help aid the process of developing OERs.

OPEN DATA

ACCESSIBILITY AND ACCOUNTABILITY

Principle: Various types of university data should be available and accessible for the public to consult.

Principle: Prospective students should have all available information such as learning outcomes and enrollment data when choosing a post-secondary institution to attend.

Principle: University data should be accessible to aid fiscal oversight and accountability of University operations while giving institutions the ability to participate in best practice sharing.

Principle: Open University Data can encourage the production of innovations that improve the university experience.

Concern: University data such as research reports, spending reports and information on student needs is often unavailable or difficult to access.

Concern: Currently there are no requirements for institutions to release their data publicly.

Recommendation: The Ministry of Training, Colleges and Universities should mandate that Universities release data publicly.

Recommendation: The Ministry of Training, Colleges and Universities should task HEQCO with expanding their Open Data Inventory database to improve public access and accountability.

Recommendation: The provincial government should provide envelope funding for HEQUO to expand their Open University database.

Open data can provide a great deal of insight while also holding post-secondary institutions accountable. OUSA believes making data such as admission requirements, costs, available bursaries and grants, living arrangement of students, campus accessibility, support serves as well as employment outcomes openly available would stand to benefit post-secondary students. Upon entering university, students should have all available data such as learning outcomes and enrollment in order to make an informed decision when choosing a post-secondary institution.[71] Furthermore University data can aid fiscal oversight and accountability while also sharing best practices with other institutions.[72]

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[70] TheLeariningPortal College Libraries Ontario. Welcome to the OER Toolkit. (Ontario, TheLeariningPortal College Libraries Ontario) Accessed on November 2nd 2018 from TheLeariningPortal College Libraries Ontario.
[71] Castro, Daniel. *How Open is University Data?* (Government Tech, February 2015) Accessed September 25th from http://www.govtech.com/data/How-Open-Is-University-Data.html
[72] Ibid.

Lastly, the release of university data to the public could lead to potential innovations being made to benefit both students and the post-secondary institutions as a whole.[73] As it currently stands there is little centralized open data regarding post-secondary institutions, nor are there structures to release university data publicly. While some open information is housed by HEQCO[74], other is housed by the council of Ontario Universities through COU's Common University Data Ontario[75], and other is found on the Government of Ontario's open data directory.[76]

To increase accessibility, the government should mandate universities release applicable data openly. To house this data in an accessible manner, the government should task HEQCO with centralizing all existing data into their current library. Furthermore, the government should provide envelope funding to collect more information and to expand open data projects focussed on post-secondary education in Ontario.

BADGING

BADGING

> **Principle:** Students should be encouraged to develop both their academic and non-academic skills to better prepare them for the workforce and to contribute to the community.
>
> **Principle:** There is a skills articulation gap amongst students to communicate their skills not captured on a transcript or resume.
>
> **Principle:** Employers should endorse and recognize badges to for improved recognition of all skills including human skills, which may be developed through technology-enabled learning opportunities.
>
> **Principle:** Badging should be accessible to everyone.
>
> **Concern:** Badging is not yet widely acknowledged by employers or post-secondary education institutions in Ontario.
>
> **Concern:** There is a lack of data on the regulation of badging and how to most effectively utilize them.
>
> **Recommendation:** The provincial government, through eCampus Ontario, should establish a badging framework.
>
> **Recommendation:** The provincial government should consult employers, post-secondary institutions, and students in developing skills competencies for badges, as well as further communicating the value of skills articulation for employment.
>
> **Recommendation:** eCampus Ontario should develop a centralized platform to house badges achieved by students enrolled at Ontario's publicly funded universities.

Globally, post-secondary institutions have started to adopt the concept of badging as a way to address what OUSA believes to be a skills articulation gap that many graduates face. Badging provides an opportunity to bridge the gap between employers and recent graduates by providing a method which serves as a supplementary alternative to aid in the recognition of talents, characteristics, and skills

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[73] Ibid.

[74] Higher Education Quality Council of Ontario. *Open Data* (Toronto, Higher Education Quality council of Ontario) Accessed September 25th from http://www.heqco.ca/en-ca/About%20Us/Pages/OpenData.aspx

[75] Council of Ontario Universities, *Common University Data Ontario* (Toronto, Council of Ontario Universities) Accessed September 25th 2018 from http://cou.on.ca/numbers/cudo/

[76] Government of Ontario. *Data Catalouge* (Ontario, Government of Ontario) retrieved September 25th 2018 from https://www.ontario.ca/search/data-catalogue

developed during post-secondary studies.[77] Badges provide students and recent graduates an avenue to articulate and highlight skills they have acquired or developed, which is relevant for both employees and employers. Successful implementation of badging can be nurturing to learning in general, including technology enabled learning because its' ability to raise students' motivation and engagement. In understanding the importance of badging, it is also important to understand that the successful implementation of badging which is designed to raise students' motivation, should be challenging, useful, flexible and voluntary[78].

Digital badging provides a unique opportunity to improve on other skills-articulation programs that exist across the province, such as co-curricular records. If uptake were to happen across the province, badging would provide the opportunity for employers and post-secondary institutions to both receive and provide a transparent and quality-assured medium to articulate skills that students develop during their studies; a stark alternative from self-identified skills in a co-curricular record.[79] There are a couple of notable mentions regarding current implementation of digital badging which help us navigate these new waters.

One example of the implementation of badging in current post-secondary education and professional development is at Humber College's Continuing Education Program. This program has adopted micro-crediting recognized through digital badges. For example, they utilize a digital badge to represent certification in AUTODESK REVIT - a building information modelling 2D/3D software program. Three levels of this digital badge are available to obtain, and to stack for the stackable credential: REVIT Foundations, REVIT Intermediate Skills, and REVIT Advanced Skills. This digital badge is a representation of skills used by professionals in fields such as architecture, design, MEP (Mechanical, Electrical and Plumbing) and engineering fields.[80] Not only does this digital badge recognize breadth, it recognizes depth within a skill.

One other example of a successful implementation of badging comes from 2017 when the National Forum brought together 15 teams constituted of specialists from universities, technology institutes and colleges to collaborate on the development of digital badges in specialist areas where they have significant, recognized expertise[81]. This consultation-centered research found that there are a few things that must be included in a "Badge package". It is evident that some institutions see promising prospects of digital badging and there are exemplary implementations in Ontario and other jurisdictions.

However, due to the relatively recent uptake of badging in the province of Ontario, employers, students, and post-secondary institutions have a long way to go before badging becomes a viable skills articulation tool within the province. Firstly, employers and educators have doubts regarding the value of badging and the credibility of badges.[82] That is, badging is not widely acknowledged by employers or post-secondary education due to inconsistent metrics. There is a lack of data on the regulation of badging and how to most effectively utilize them.[83] Secondly, some research shows there is a lack of transparency and proof to show employers that new graduates possess non-academic skills in addition to their academic skills.[84] To get to a point where employers can be assured that there is a credible form of recognition for the skills developed during post-secondary studies, a formal badging framework must be developed by the government. As such, the provincial government should develop a formalized framework through consultation with all sector stakeholders, including students, post-secondary institutions, and employers. Additionally, post-secondary badges should be centralized, and the development of a platform housed by eCampusOntario would allow for consistency between institutions, providing the credibility required for

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[77] "Benefits of Open Badges," Open Badges, eCampusOntario, accessed September 29, 2018, https://www.ecampusontario.ca/open-badges/
[78] Ibid
[79] Elizabeth Rees-Johnstone, "How Everyone Benefits from Badging: A Guide to Mainstreaming Digital Credentials," *The Evolllution: A Destiny Solutiosn ILlumination*https://evolllution.com/programming/credentials/how-everyone-benefits-from-badging-a-guide-to-mainstreaming-digital-credentials/
[80] https://appliedtechnology.humber.ca/explore/continuingeducation/micro-credentials/revit.html
[81] Donnelly, R., Maguire, T., & Lowry, C. Making Digital Badging Work: Lessons from an Irish HE Context (2017)
[82] Brauer, Sanna, and Pirkko Siklander. "Competence-based Assessment and Digital Badging as Guidance in Vocational Teacher Education." (2017)
[83] Ibid
[84] Raish, Victoria, and Emily Rimland. "Employer Perceptions of Critical Information Literacy Skills and Digital Badges." *College & Research Libraries* (2016), p:87-113

employers to feel confident that badges provided by students genuinely provide insight into the skills that they developed during their post-secondary studies.

POLICY STATEMENT

Whereas: There should be an understanding and standardized definition of "digital literacy" in Ontario's post-secondary education system.

Whereas: Data regarding the current status of digital literacy among students at the post-secondary level should be available to assess the current status of student's technological competencies.

Whereas: Students should begin post-secondary education prepared, having been provided with the skills necessary to succeed in K-12.

Whereas: Underrepresented and marginalized groups of students, including mature students, low income students, and rural and northern students, should not be prevented from achieving digital literacy to the same degree as other students in Ontario.

Whereas: Faculty should possess basic digital skills to ensure that they can adequately foster digital literacy amongst their students.

Whereas: Institutions that focus on technology and digital skills in the classroom prepare students with more adequate skills for civic and social participation along with integrated skills for the work force.

Whereas: Institutions should have an information technologies system capable of handling the addition of more technology-enabled learning in classrooms.

Whereas: Technology use in post-secondary classrooms can provide students with valuable experiential learning opportunities, enable more diverse pedagogical styles for a means of achieving learning outcomes not possible in a traditional classroom environment.

Whereas: Learning management systems (LMS) are valuable tools for delivering educational content to post-secondary students.

Whereas: Post-secondary institutions should implement open-source LMSs, which are free to utilize.

Whereas: Open-source LMSs allow institutions to customize the software to a greater degree than proprietary systems.

Whereas: Faculty are responsible for determining what resources are utilized in their courses. Technology use in classroom has become more commonplace in the past decade, in the post-secondary education sectors.

Whereas: Data surrounding the use of technology in the classroom should be available for the purposes of improving its us.

Whereas: Students should expect to achieve the same learning outcomes in an online course as they would with a traditional course.

Whereas: Online courses should be viewed as a credible form of educational delivery

Whereas: Courses in the post-secondary education system should be affordable for students and uncostly for the institution.

Whereas: Course instructors should have the academic freedom to choose the educational resources utilized in their courses.

Whereas: Course instructors should have access to a wide variety of open resources to choose from.

Whereas: Students and faculty should be aware of the availability of OERs in Ontario.

Whereas: All educational resources, regardless of format, should be of high quality.

Whereas: OERs should be implemented with the purpose of enhancing the teaching and learning experience at post-secondary institutions.

Whereas: Faculty members across Ontario should be recognized by their institutions for their work pertaining to the development of OERs

Whereas: Students should not be significantly financially burdened by high textbook and learning resources costs.

Whereas: Initial investments into OERs should be targeted towards subject areas and courses that have high enrolment numbers.

Whereas: Post-secondary education in Ontario should be made as affordable as possible for all students

Whereas: All post-secondary institutions should be equipped to support the development, adoption and review of OERs.

Whereas: Every post-secondary institution should be able to effectively communicate to faculty how to develop and adopt OERs.

Whereas: Faculty should feel comfortable with and should be able to effectively use OERs.

Whereas: Various types of university data should be available and accessible for the public to consult.

Whereas: Prospective students should have all available information such as learning outcomes and enrollment data when choosing a post-secondary institution to attend.

Whereas: University data should be accessible to aid fiscal oversight and accountability of University operations while giving institutions the ability to participate in best practice sharing.

Whereas: Open University Data can encourage the production of innovations that improve the university experience.

Whereas: Students should be encouraged to develop both their academic and non-academic skills to better prepare them for the workforce and to contribute to the community

Whereas: There is a skills articulation gap amongst students to communicate their skills not captured on a transcript or resume.

Whereas: Employers should endorse and recognize badges to for improved recognition of all skills including human skills, which may be developed through technology-enabled learning opportunities.

Whereas: Badging should be accessible to everyone.

Be it resolved that: The provincial government should adopt the Brookfield Institute's working definition of digital literacy as being: "The ability to use technological tools to solve problems, underpinned by the ability to critically understand digital content and tools. This can include the more advanced ability to create new technological tools, products, and services"

Be it further resolved that (BIFRT): The Ministry of Training, Colleges and Universities should engage in mandatory data collection on the current status of digital literacy at the post-secondary level through existing sector partners, such as eCampus Ontario or the Higher Education Quality Council of Ontario.

BIFRT: The Ministry of Training, Colleges, and Universities should encourage the use of student assessment programs by universities and their respective student populations in order for the university to evaluate the digital competency levels on that campus.

BIFRT: The Ministry of Training, Colleges and Universities should publicly report the collected data on digital literacy in an accessible manner.

BIFRT: The Ministry of Training, Colleges and Universities should work with the Ministry of Education to integrate concepts of digital literacy into both early post-secondary education, and within the K-12 curriculum.

BIFRT: The Ministry of Training, Colleges and Universities should include concepts of digital literacy and competencies in any reporting or planning in regard to preparing students for the workforce.

BIFRT: The provincial government should conduct meaningful consultation with marginalized and underrepresented groups and communities when developing resources for technology enabled learning such as: workshops, learning camps, and modules to encourage technology enabled learning.

BIFRT: The Ministry of Training, Colleges, and Universities should introduce targeted programming to ensure that a standard of digital literacy required is met for all students, regardless of location, background, or socio-economic status.

BIFRT: The Ministry of Training, Colleges, and Universities should ensure targeted programming is specific to the different needs of different underrepresented and marginalized groups.

BIFRT: The Ministry of Training, Colleges and Universities, should partner with agencies such as eCampus Ontario to create resources and trainings through an online platform of modules on the basics of digital literacy to help faculty develop fundamental digital skills.

BIFRT: The Ministry of Training, Colleges and Universities should task the relevant pre-existing committees to determine necessary technology and digital infrastructure for post-secondary institutions in a manner similar to the partnership between the Ministry of Education and the Ontario Software Acquisition Program Advisory Committee.

BIFRT: The Ministry of Training, Colleges and Universities should create and continue funding opportunities for post-secondary institutions that lack the funds to upgrade their existing digital infrastructure, and provide further incentives for institutions that already are.

BIFRT: The Ministry of Training, Colleges and Universities and the Ministry of Economic Development, Job Creation and Trade should work with post-secondary institutions to invest in innovative, technology-centric learning methods relevant to current and future industry standards.

BIFRT: The Ministry of Training, Colleges and Universities should dedicate funding to subsidize the cost of technology-enabled learning at post-secondary institutions.

BIFRT: The Higher Education Quality Council of Ontario should review current progressive technologies use in post-secondary classrooms to gauge its effectiveness.

BIFRT: The Ministry of Training, Colleges and Universities should, through eCampus Ontario, encourage the use open-source LMSs and dedicate resources to ensuring the software is conducive to student success.

BIFRT: The Ministry of Training, Colleges and Universities should, after consultation with the Ontario Confederation of University Faculty Associations and Council of Ontario Universities, provide appropriate grants for successful integration of technology in courses.

BIFRT: The Higher Education Quality Council should evaluate the value of technology use in classrooms and publish those findings.

BIFRT: The provincial government should task eCampusOntario and Contact North with consulting experts and faculty with developing a framework for the development of quality online courses.

BIFRT: Ontario University Council on Quality Assurance (OUCQA) should expand Institutional Quality Assurance Processes (IQAPs) requirements to include program delivery criteria for online courses.

BIFRT: The provincial government should mandate that an assessment of online learning be included in OUCQA's Final Assessment Report.

BIFRT: The provincial government should develop materials to displace myths around the quality and legitimacy of online and technology-enabled courses through partnerships with stakeholders like eCampusOntario.

BIFRT: The Ministry of Training, Colleges and Universities should work with the Council of Ontario Universities to examine and eliminate additional administrative fees charged to students for online courses taken at their institution.

BIFRT: The Ministry of Training, Colleges and Universities should partner with open institutions in Canada and their jurisdiction's governments, such as Athabasca University and the Province of Alberta, in order to eliminate additional fees including those applied to out of province students.

BIFRT: The Ministry of Training, Colleges and Universities should task eCampus Ontario with researching and reporting emerging practices in online education geared towards reducing the cost of education for post-secondary students.

BIFRT: The provincial government should work with faculty stakeholders in Ontario, including but not limited to the Council of Ontario Universities (COU) and Ontario Confederation of University Faculty Associations, to incorporate accurate and up-to-date information on OERs for faculty orientation across institutions.

BIFRT: The provincial government should provide envelope funding to support the expansion of eCampusOntario's library to increase capacity and diversity of texts that encompasses all disciplines.

BIFRT: The provincial government should, through collaboration with eCampusOntario, develop a more robust promotional strategy for greater OER awareness including the promotion of ancillary resources.

BIFRT: The provincial government should work with the Ontario College and University Library Association in order to promote OERs to faculties when they are choosing course texts.

BIFRT: The provincial government should work with the Ontario members of Campus Store Canada to promote the use of OERs to faculty when choosing their course material.

BIFRT: The provincial government should increase funding allocated to eCampusOntario to work with faculty members to peer review existing OERs with a focus on quality assurance.

BIFRT: The provincial government should, through eCampusOntario, establish a quality assurance process to review OERs as they are developed.

BIFRT: The provincial government should mandate that institutions report data regarding both students and faculty members' experiences with OERs.

BIFRT: The provincial government should task eCampusOntario with the collection, analysis and publication of institutional user satisfaction data.

BIFRT: The province should work with the Ontario Confederation of University Faculty Association (OCUFA) to develop proper meaningful incentives geared towards faculty for OER development.

BIFRT: The province should work with the Council of Ontario Universities to develop a best practice system for incentivising OER development.

BIFRT: The creation and development of OERs should be included in Ontario's Strategic Mandate Agreements as a metric for effective pedagogy and faculty innovation, linking performance-based funding to increasing financial access to education.

BIFRT: The provincial government should invest in the development of OERs that can applied through an interdisciplinary approach to the largest introductory courses taken by students in the province, similar to the implementation of British Columbia's 'Open Education Resource' Project.

BIFRT: The Ministry of Training, Colleges and Universities should task eCampusOntario with the creation of an Ontario-specific toolkit that faculty members can use as an initial resource for the creation, adaptation, and development of OERs on their campuses.

BIFRT: The provincial government should work with Ontario College and University Library Association (OCULA) to provide assistance to faculty through library administration related to the facilitation and development of OERs.

BIFRT: The Ministry of Training, Colleges and Universities should provide access to grant funding for institutions to fund OER specific coordinators, in institution's libraries, mandated to work towards supporting OER development and use on university campuses.

BIFRT: The Ministry of Training, Colleges and Universities should mandate that Universities release data publicly.

BIFRT: The Ministry of Training, Colleges and Universities should task HEQCO with expanding their Open Data Inventory database to improve public access and accountability.

BIFRT: The provincial government should provide envelope funding for HEQCO to expand their Open University database.

BIFRT: The provincial government, through eCampus Ontario, should establish a badging framework.

BIFRT: The provincial government should consult employers, post-secondary institutions, and students in developing skills competencies for badges, as well as further communicating the value of skills articulation for employment.

BIFRT: eCampus Ontario should develop a centralized platform to house badges achieved by students enrolled at Ontario's publicly funded universities.