Designing a Regenerative Future: Higher Education as a Driver of Change

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ABSTRACT

Many Ontario colleges continue to educate students in the traditional mechanistic fashion of the linear economy. Graduates in search of a career are equipped to perpetuate the take-make-waste economic system that continues to dominate globally and negatively affect our environment and social systems. As knowledge generators and community influencers, higher education institutions can play a significant role in the transition of our current economic model to one that is circular. The future of how Ontario colleges manage its internal operations and design curricula is of paramount importance. However, there is little evidence in the literature to support the transformation process required of higher education to become a supporting structure needed for a circular economy .

Some industry innovators, academics and practitioners are collaborating and experimenting with circular economy. However, too little is happening in Ontario. A shift needs to happen within the Ontario college system. If not, higher education will continue with business-as-usual in developing graduates who do not have circular economy competencies and employers who are all too happy to take them. This paper will enable us to see where Ontario colleges are at today, what they need to be doing for a sustainable and regenerative tomorrow and how they can begin to develop a circular narrative within the college system to support a transition to a circular economy.

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DEDICATION

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1. INTRODUCTION

> *"The world is a complex, interconnected, finite, ecological-social-psychological-economic system. We treat it as if it were not, as if it were divisible, separable, simple, and infinite. Our persistent, intractable global problems arise directly from this mismatch."*
>
> ~ Donella Meadows

This research paper explores how Ontario, Canada could transition to a circular economy and the critical role played by Ontario colleges. As a contributor to the economic and social development of the province, this paper discusses the responsibility higher education has in creating a more sustainable future.

Using Humber College in Toronto, Ontario as a case study, the paper presents how an Ontario college can begin to transform its business model to become a supporting structure to aid in the transition to a circular economy.

Circular Economy: Global and Local

The current Canadian government, as well as the City of Toronto, is increasingly in pursuit of a sustainable and circular economy. The government is a strong supporter of a variety of initiatives to enable the transition to a circular economy. Environment and Climate Change Canada was set to host the World Circular Economy Forum in Toronto in 2020 until the coronavirus pandemic resulted in the forum moving to a virtual platform. At a local level, the

City of Toronto is the first Canadian city to become a member of the Ellen MacArthur Foundation's Circular Economy 100, a global network that aims to lead the transition to a circular economy. With the goal of being the first municipality in Ontario with a circular economy (City of Toronto, 2018), the City of Toronto has established a Circular Economy Working Group made up of government, nonprofit organizations and industry partners.

Public-private collaborations in pursuit of a circular economy are increasing within Canada. For instance, the Circular Economy Leadership Coalition, made up of industy leaders, municipal government, nonprofit organizations and thought leaders, is working toward "accelerating sustainable, profitable, zero-waste solutions" (Circular Economy Leadership Coalition, 2020). Supported by the federal government, five companies within the food and beverage as well as the packaging industry have created a Circular Plastics Taskforce to help solve the problems of the recycling industry. These partnerships are examples of early adopters that are committed to helping Canada transition to a circular economy. Notably missing from this ever-growing circular scene are Canadian post-secondary institutions.

The concept of circular economy as an economic model is not yet widespread within Canadian higher education except for a few universities. In 2019, the University of Waterloo introduced a circular economy course within the School of Environment, Enterprise and Development. The University of British Columbia has some faculty with circular economy research interests and participates in a pilot project to make a nearby community circular. Going a step further, the University of Montreal's Institute for Environment, Sustainable Development and Circular Economy engages in multi-disciplinary projects to experiment with circular solutions. At the college level, there is even less activity in circular economy.

The pursuit of the circular economy is occurring in other countries around the world and most prominently in the United Kingdom (U.K.) and European countries such as The Netherlands, Denmark, France, Belgium, Finland and Germany. The European Union is investing heavily in finding circular solutions and providing circular economy education. The Ellen MacArthur Foundation (EMF), a non-profit organization in the U.K. dedicated to accelerating the transition to a circular economy (EMF, 2012), is clearly a leader in this area. The foundation is a world leader in circular research and fosters a growing network of collaborative partnerships made up of industry, academia and nonprofit organizations. The EMF has also developed free educational resources to promote the circular economy concept and offers access to free online courses as well as teaching and learning resources to support the introduction of circular economy and systems thinking, the foundation of this alternative economic model. EMF has also been working closely with eight pioneering universities to develop courses as well as full Masters-level programs in circular economy. Furthermore, it has partnered with International Baccalaureate (IB) to embed systems thinking and the circular economy into the IB Diploma Programme so younger generations learn to think differently and better understand complexity (EMF, 2015). There are more than 5000 IB schools worldwide.

The time has never been better to adopt circular economy principles in the 24 Ontario colleges and embed it into curricula, an applied research agenda and its business model. Education is a powerful tool in creating a more sustainable mindset of future generations, and academic institutions can play an important role in moving this agenda forward. To be truly sustainable and transition to a circular economy, it is imperative that we educate our youth, so they develop the needed competencies such as systems thinking, creativity, communication skills

and the ability to collaborate to help us get there. Higher education institutions are in the perfect position to drive us toward a sustainable future. Ontario colleges impart knowledge to students as well as generate new knowledge, solutions and opportunities through applied research with industry partners. Colleges have a long history of working collaboratively with industry and community groups. "The increasing awareness and public pressure on national and international governments to address environmental and social concerns is resulting in a growing recognition of the vital role that education needs to play in attaining sustainable development." (Ehrenfeld, 2006).

Using Humber College (Humber) in Toronto, Canada as a case study, the research aims to address how Ontario colleges might innovate to become a driver in the transition to a circular economy and develop graduates with the needed mindset and competencies. To do this effectively, the college system must lead by example by weaving circular design principles within its business model and embedding circular economy into curricula, applied research and work-integrated learning opportunities. This requires a shared vision by all stakeholders and a large-scale change management process beginning with a shift to a sustainable mindset. This study explores the role Ontario colleges may take in the pursuit of a more sustainable world by asking *how might the Ontario college system become a driver in the transition to a circular economy?*

Circular Economy: Drivers and Opportunities

What is circular economy? There are many definitions of circular economy and the literature review demonstrates that scholars and practitioners have yet to agree on one definition (Schroeder, Anggraeni & Weber, 2019; Kirchherr, Reike, & Hekkert, 2017). The Ellen MacArthur Foundation (EMF) has defined it as

a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources (EMF, 2015).

The EMF definition highlights that a systemic approach is needed to truly understand and implement a circular economy. With systems thinking at its foundation and a focus on renewable energy sources, a circular economy is based on three design principles as shown in Figure 1. First, product developers need to design products with minimal to no waste or pollution during the production process. The EMF reports that 80% of environmental impacts within the production and consumption cycle of a product or service are determined at the design stage (EMF, 2015).

Secondly, a circular economy keeps “products and materials in use as long as possible by designing products and components to be reused, repaired, & remanufactured” (EMF, 2015). When considering textile production and consumption, this industry is one of the most polluting in our linear economy. The textile industry produces “1.2 billion tonnes of CO2 equivalent per year, which is more emissions than international flights and maritime shipping” (EMF, 2017), as little to no thought is given to how textiles can be kept in the production value chain instead of ending up in landfills. However, some fashion companies have partnered with other organizations to reuse, repair or repurpose its products. For instance, Levi Strauss & Co. partnered with Cotton Inc.’s Blue Jeans Go Green recycling initiative to repurpose demin to be used as sound-proofing or thermal insulation (Hayes, 2019). Finally, a circular economy regenerates

natural systems. In nature, there is no concept of waste (EMF, 2015) as natural systems regenerate. When a tree leaf falls to the forest floor, it does not become waste, but has a larger role to play in regenerating the nutrients in the soil. In natural living systems, the waste is turned into a nutrient for another interconnected process. Similarly, in a circular economy, the waste or by-products produced during one production process should aim to become a raw material for another one. For this to happen, companies need to collaborate and invest in research and development to keep waste generated during production in the value chain. One way this can be supported is with the development of industrial symbiosis—a network of regional companies that can convert waste from one production process into a resource for another one. "One of the main underlying structures of a CE is a regionalized industrial symbiotic system" (EMF, 2015). Figure 2 contrasts a linear "take-make-waste" industrial systemi with industrial symbiosis—a network of companies which collaborate to reduce waste and pollution by using by-products or waste from one company as a resource for a partner's production process.

To sucessfully create these symbiotic partnerships and begin to shift to a circular economy (CE), it is essential that our current and future workforce have the needed skills and competencies. Herein lies a big part of the problem. All but a few early-adopter higher education institutions have yet to adopt CE design principles into their vocational training and academic programs. The majority of graduates do not know what circular economy is, and nor do they have the skills to drive the transition. Schroeder et al. (2019) state that many designers lack the needed skills to "make products last longer or design them in ways to be refurbished or repaired"

(p. 91). Until our education programs take a circular approach and adopt the three basic design principles of a circular economy, the transition from a linear economy will be extremely challenging.

The skills needed to investigate opportunities, as well as design and manage complex industrial networks are not found in many present-day workforces (Schroeder et al, 2019). Since the inception of the Industrial Revolution, global economies have inadvertently created an ever-increasing demand for workers with skills and mindsets that have been detrimental to the degradation of global biodiversity and ecosystems and have contributed to global warming. To date, most vocational training and higher education, has played a significant role in supporting unsustainable production and consumption processes.

In pursuit of continued economic growth, our economy has led to a consumer culture of convenience, fast fashion and planned obsolescence. This has all but created a system of products and services that seems to make the generation of waste its primary goal. Keeping products and materials in use throughout the production and consumption process by reusing, repairing or remanufacturing has not been a priority among companies and educational institutions. However, there is a growing trend for companies to become more sustainable and some are looking at how participating in a circular economy can be financially viable.

Drivers for a Circular Economy

Common drivers discussed in circular economy literature are primarily economic, regulatory, resource scarcity, and environmental. For instance, Gusmerotti, Testa, Corsini, Pretner and Iraldo (2019) completed a study to learn what drives traditional manufacturing companies to adopt actions to become circular. The authors "identified 10 potential drivers that

could encourage adoption of a circular strategy" (Gusmerotti et al, 2019). The findings revealed that the most influential driver was an economic one. More specifically, 65% of the companies that participated in the study identified they were still operating as a linear company with a focus on providing information to its consumers on how to recycle (Gusmerotti et al, 2019). For the manufacturing companies that identified as adopting more circular practices, 15% had implemented a product stewardship strategy as a way to increase its market competitiveness (Gusmerotti et al, 2019). While 10% of the companies surveyed focused on resource efficiency to reduce costs and, at the same time, lessen the company's environmental impact, only 8% integrated CE design principles into all its business functions (Gusmerotti et al, 2019). This study shows that the biggest motivation for a company to partially or fully integrate circular design principles is economic.

If economic drivers continue to be the dominant narrative, then it is apparent that businesses will need to continue taking a leadership role in the transition to a circular economy. To do this, businesses cannot continue 'business-as-usual', but need to adopt a business model that supports the integration of circular design principles and, simultaneously, invest in research and the development of symbiotic production processes. For companies to make this shift, Bhattacharya and Polman (2107) argue that strong leadership is essential, so all board members and employees truly understand the purpose of the organization. Leaders must develop an ambitious vision, commit to a long-term strategy, make the needed investment in research, establish collaborative partnerships across the supply chain and alliances with competitors (Anderson, 2011; Bhattacharya and Polman, 2017). All these elements are ingredients for success.

> "Sustainability involves creating value for all stakeholders in the ecosystem and viewing profits as a consequence of such value creation. Implementing a sustainable business model requires executives to engage with the entire organization as well as multiple external stakeholders (such as nongovernmental organizations, shareholders, suppliers, regulators, and competitors), and to balance multiple goals that are sometimes in conflict. To accomplish this task, a business needs to operate in a much more transparent and symbiotic way and strive to make everything it does purpose-driven." (Bhattacharya and Polman, 2017).

The late Ray Anderson, founder and former Chairman of modular carpet manufacturer Interface Inc., also believed that the transition to a sustainable business model needed to be led by a company's leader by first ensuring all employees understood the purpose and vision of the company. Its 25-year commitment to sustainable practices enabled Interface to achieve its target one year ahead of schedule—every product it manufactures is to be carbon neutral across its full life cycle (Cosgrove, 2019). In a 2011 interview, Anderson highlighted that his long-term sustainability strategy paid off. While the initial transition to a circular business model was costly, the long-term impact on the company's profits was positive as sales increased and costs were greatly reduced. Interface was successful in creating value for all stakeholders across its entire value chain.

Whether it is Unilever's *Sustainable Living Plan* or Interface's *Mission Zero* vision, both companies clearly understood that the transition to a sustainable business model takes time and investment. There is no quick fix and it is imperative that companies approach this transition systemically. This highlights the need for companies to work together collaboratively to

investigate opportunities for circular alignment in their production processes to become eco-effective—a system of upcycling that "inherently generates a synergistic relationship between ecological and economic systems…" (EMF, 2012). For this to happen, investment in collaborative research and development is necessary.

While success stories, like Interface, are great case studies and other companies can learn from them, the majority of small to medium-sized companies (SMEs) often do not have the capabilities and financial resources to make this transition to a circular business model. Companies do not have to do this alone. Higher education institutions can be a valuable research partner in the design and testing of new circular ideas as well as provide learning opportunities for students who will become future leaders and problem solvers. As Ontario colleges are well connected to industry, they have the capacity to become active participants in the pursuit to circularity.

Summary of Opportunities in a Circular Economy

The movement toward transitioning to a circular economy is gaining momentum in industry, academia and governments mostly in the U.K. and Europe. However, other countries are beginning to look seriously at the benefits of a circular economy. Not only are there environmental benefits, but research shows that there are cost savings and business opportunities in a circular economy. In partnership with the Ellen MacArthur Foundation, a McKinsey study revealed that adopting a circular economy approach "could boost Europe's resource productivity by 3 percent by 2030, generating cost savings of €600 billion a year and €1.8 trillion more in other economic benefits" (McKinsey Quarterly, 2017). The study also

demonstrated that the largest area of opportunity could be "found in supply chains which typically account for 80 percent of a consumer business's greenhouse-gas emissions and more than 90 percent of its impact on air, land, water, and biodiversity (McKinsey Quarterly, 2017).

IDEO, a global design and innovation company known for its consulting in design thinking, has shifted its business model and is now taking a systemic view by adopting circular design principles in its consultations. In partnership with the Ellen MacArthur Foundation, IDEO developed the Circular Design Guide in 2017 to help companies make the transition to circular. In partnership with the global consulting firm Accenture, the World Business Council for Sustainable Development created the *CEO Guide to the Circular Economy*, a guidebook and call to action for global business leaders to adopt a circular business model for their organizations.

The opportunity to create an economic model that benefits society, the environment and businesses is one that some industry trailblazers are taking seriously and making the needed investment to begin the transition. One such industry leader is Unilever as it focuses on making the consumer goods packaging more circular and playing an important role in helping to achieve Sustainable Development Goals 12 (Responsible Consumption and Production) and 17 (Partnerships for the Goals).

For our current linear economy to become circular, the EMF argues that there are four essential building blocks: 1) building core competencies of organizations, 2) a need for innovative new business models, 3) new and additional skills in the workforce, and 4) enablers and favourable system conditions to foster and support the transition from a linear, take-make-waste-dispose economy to one that is circular and regenerative in nature (EMF, 2015). Kirchherr

et al. (2017) also reminds us new business models are necessary to transition to a circular economy as well as changing consumer behavior to make more sustainable purchasing decisions.

Changing consumer behaviour is extremely difficult—especially as many countries engage in increasingly overconsumption behaviours with the rise of the middle class globally. At the same time, there is a growing trend that younger generations are becoming environmentally aware and advocates for more sustainable business practices. However, when it comes to reducing one's carbon footprint, a Censuswide survey in the U.K. found that people between "16 to 24 years of age were the worst offenders" (Williams, 2020). Integrating circular economy into all levels of education with a sense of urgency is key to increasing knowledge on its three basic design principles as well as educating younger generations of the global impact if we cannot collectively figure out how to make these drastic changes to our economy.

The remainder of this research paper outlines the methodology used for this study in section 2. A literature review was conducted prior to the design and implementation of a participatory future-oriented workshop and interviews conducted with professionals within the Ontario College system and consumer goods industry. In section 3, the research findings and discussion are presented and followed by the conclusion in section 4.

2. METHODOLOGY

Literature Review

The literature search for peer-reviewed sources was completed using online databases accessible to an Ontario college in addition to Google Scholar using a combination of keyword

searches of circular economy, sustainability, pedagogy, higher education, sustainable development, curriculum design and Canada. This study also included grey literature sources from organizations with a focus on circular economy and education as well as a Google Search for media articles. Finally, the study looked at websites from all levels of government in Canada and various post-secondary institutions to compare what is currently happening in circular economy higher eduction in Canada, the U.K. and the European Union. The purpose of the literature review was to identify what is and is not happening within the Ontario college system, explore the role these academic institutions may play in advancing circular economy not only in Ontario, but across all of Canada. Finally, the literature review aimed to reveal possible barriers that need to be addressed.

The literature review reveals that scholarly research on circular economy and its importance is rising. Not only are industry innovators researching how to become more circular, but consulting companies such as IDEO in the United States are also shifting their business model to guide its clients to integrate circular strategies into their operations. In terms of circular economy education, the research is beginning to increase as more higher education institutions are experimenting with circular economy from designing short-courses and minor semesters to developing full masters-level programs. Between 2017 and 2019, the EMF conducted a study to identify the global circular economy learning opportunities within higher education. According to the study, Finland is leading the world in providing circular economy education. Not only does Finland have the highest number of higher education institutions that offer circular economy learning opportunities, but it also has trained more than 1800 educators in integrating circular economy into the curriculum and has educated more than 73,500 students on this alternative

economic system. (EMF, 2019). This is in large part to innovation funding provided by the Finnish government and the coordinated efforts of schools and higher education institutions across the country working together to integrate circular economy into the curriculum from Kindergarten to master's level programming.

The Netherland's higher education system is also a "global leader in promoting circular economy" (EMF 2019). For example, Delft University of Technology offers the highest number of circular economy courses—most of which have a focus on systems thinking and product design (EMF, 2019). Fontys University of Applied Sciences offers a minor semester in circular economy and has also produced a textbook that focuses on "circular economy as a social innovation" (EMF, 2019). The study also highlights that higher education institutions in the U.K. have a good number of courses in circular economy and two master's programs dedicated to it. In looking at the Canadian higher education landscape, the EMF reports there are no formal programs or courses dedicated to circular economy in Canada. However, honorable mention is given to McGill University and the University of Alberta for discussing circular economy within its sustainability courses. The author is also aware that the University of British Columbia (UBC) is quite active in circular economy research and its website lists several professors with an expertise in circular economy. To the author's knowledge, none of the Ontario colleges dedicate a course or program to circular economy.

The literature shows there is a growing number of studies on circular economy in higher education in relation to teaching and learning. However, research on higher education institutions adopting circular economy principles into its own business model is only emerging. Yet to be uncovered is how higher education can become a leader in driving the circular economy

agenda forward by leading by example as well as embedding it into curricula to develop tomorrow's leaders. Most of the literature stems from researchers within the European Union or the U.K. as knowledge of the circular economy, its significance in combating climate change and the economic and social opportunities it will bring is not yet widespread in Canada.

Participatory Workshop

Using Humber College as a case study, a participatory workshop was conducted at Humber to learn how Ontario colleges might become a driver in the transition to a circular economy. The objective of the workshop was to discover what sustainability looks like at Humber today, explore ideas of why and how it may integrate a circular economy agenda and design a way forward. To do this, a future-oriented World Café research method was used to collect the data. The initial design of the workshop was to include current Humber students and was scheduled to take place at the end of the final exam period on campus. Due to the coronavirus global pandemic, it was necessary to obtain permission to facilitate the workshop remotely using a video conferencing platform. Unsure of how moving this participatory workshop online would impact the quality of the facilitation for a large group of people, it was decided that students would not be invited. Not having the student voice represented is a limitation in this study and this was highlighted during the workshop. More than 30 faculty and staff were invited to join the workshop with the goal of having representation from each of the six academic faculties and several administrative departments including the Office of Sustainability. One faculty extended the invitation to several Program Advisory Committee members to include the perspective of industry partners. The criteria for participating in the workshop was for participants to have an

understanding of the Ontario college system, the circular economy or sustainability. The final workshop had 16 participants made up of faculty, support staff, college administrators and industry partners.

The World-Café method was selected as it is well-suited to host a larger group dialogue. The workshop was designed to explore and discover the role Ontario colleges may play in advancing a circular economy. Participants were surveyed to learn how familiar they were with the circular economy concept before being presented with a definition and the three basic design principles. The workshop was also used as an opportunity to further educate the participants on a circular economy as well as the four building blocks needed to support the transition from a linear to a circular economy to become a more sustainable society.

The participants were presented with three rounds of discussion questions. For each round, the participants were randomly put into three virtual breakout rooms except for a "Room Host" that was identified prior to the workshop beginning. The role of the Room Host was to stay in the same breakout room during all three discussion rounds to share the ideas and insights gained from each previous discussion with new Room Travelers that were randomly moved from room to room at the beginning of each new round. Each discussion round was prefaced with a question. The first discussion question enabled participants to discover what Humber was already doing well in terms of sustainability. For the second discussion question, participants were asked to think about a preferred-future scenario for the year 2050—one where Canada had successfully transitioned to a circular economy. Participants had the opportunity to dream about the experience of being a college student in a "circular" 2050. Finally, in the third discussion round, participants were asked to explore actions that Humber could take to help get us to this

preferred future scenario. At the end of the three discussion rounds, all participants were brought back together to a Harvest session where everyone could share the biggest ideas and insights gained.

The World Café was selected as a data collection method to allow participants to collaborate, share, and build on previous conversations to cross-pollinate ideas to gain more insights. It was also selected to bring together like-minded individuals from different departments and faculties who normally do not have the opportunity to work together. It is hoped that the workshop will plant a seed within the Humber community to generate future conversations on how integrating circular economy into its operations and its curricula will help the institution meet its strategic goals. The participants were asked to consider four themes of *leadership, business model innovation, teaching and learning* and *applied research with industry partners* to guide conversations.

Expert Interviews

The study also aimed to learn more about the challenges and barriers in transitioning to a circular economy as well as existing structures within the Ontario college system that may prevent it from becoming a driving force in pushing the circular economy agenda forward. Individuals with an expertise in integrating sustainability or CE principles into a company's business model were invited to participate in a semi-structured interview. Not only were they asked about the challenges in adopting circular practices within a company, but they were also asked about the role Ontario colleges may play in transitioning us to a circular economy. Also

interviewed, were those with an expertise in leadership and innovation within the Ontario college system.

3. RESULTS AND DISCUSSION

This section of the report presents an analysis of the key findings from the participatory workshop supported by the literature review to further develop the case study. The barriers identified throughout the research process are also highlighted and addressed using the findings from the expert interviews and literature review. Both workshop participants and interviewees alike were polled on how familiar they were with circular economy using a Likert scale from one to five—one being a novice to circular economy and five being a master practitioner. The poll showed that 50% of the participants ranked themselves as somewhat familiar with circular economy and 36% felt they had a good understanding of circular economy. As Humber does not offer any courses, programs or professional development in circular economy, this reveals that most of the participants have learned about the concept from their experiences outside of the academic institution.

In reviewing the data from the workshop, ideas and insights generated mostly fit within one of the four themes presented. A significant number of ideas and insights fell into the *teaching and learning* and *applied research with industry partners* themes. However, most of the desired changes and needed actions identified related to *business model innovation*. Only several ideas and insights were categorized as part of the *leadership* theme.

Discovery Discussion: Appreciating the Now

The study's findings clearly highlight the need for Ontario colleges to adapt its business model if they truly want to become a leader in sustainability and support the transition to a circular economy. For Ontario colleges to take a leadership role in supporting the transition to a circular economy, they need to lead by example. One of the biggest insights gained from the workshop is that colleges need to "practice what they preach" and stop unsustainable practices that currently exist.

Colleges can do this by taking a holistic approach and become circular campuses that integrate circular economy into their business model, curricula and applied research activities. A holistic, systems view is needed as "we cannot seriously consider how higher education can contribute to a transition to more sustainable societies without first understanding the scope and implications of higher education's embeddedness in unsustainable social and economic models" (Shields, 2019, p. 601). While sustainability practices and measures are happening within the Ontario college system, they are not mandated to do so by the Ontario government. Ontario colleges can decide which initiatives they choose to implement.

Ontario colleges are well-positioned to become agents of change by helping to create the favourable system structures needed to support the transition to a circular economy. Colleges are known for their industry and community partnerships and have the physical space to not only experiment in becoming a circular campus, but also to convene key stakeholders and amplify the message of how a circular economy can help Canada meet its net-zero emissions targets for 2050 (Government of Canada, Environment and Climate Change, 2020).

Humber College in Toronto is moving in the right direction. In its 2018-2023 Strategic Plan, sustainability is one of its core values and a strategic priority. Humber has adopted the

Bruntland definition of sustainability: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission, 1987). In reviewing its website and key planning documents, Humber wants to provide “national leadership in developing sustainable campuses” (Humber College 2018-2023 Strategic Plan, p. 15) and to support this goal released a five-year Sustainability Plan with a supporting actions and targets document.

The Sustainability Plan and its supporting actions highlight how it aims to reduce its campus environmental footprint, integrate sustainability into teaching and learning as well as applied research projects. More importantly, these documents show alignment with the 2030 Sustainable Development Goals and demonstrate how Humber will be accountable in implementing these actions and has set measurable targets for the next five years.

Furthermore, the data reveals that Humber faculty and staff are aware of the emphasis the institution places on sustainability and are most familiar with past accomplishments. Many participants knew Humber is recognized as one of Canada’s greenest employers and for its new sustainable building construction and retrofits. Workshop participants stated that Humber demonstrates leadership and innovation in green building and carbon reduction. For example, Humber’s NX building at its north campus was the first retrofit in Canada to achieve a zero-carbon design certification.

Within the teaching and learning space, workshop participants highlighted the newly announced Humber Learning Outcomes (HLOs)—a framework of mindsets and skills to be integrated across the curriculum for students to be able to demonstrate upon graduation. In consultation with its Program Advisory Committees, Humber has developed this framework to

prepare its graduates with the needed mindset and skills to successfully contribute to the ever-evolving workplace (Humber Learning Outcomes, 2020).

Humber has identified three mindsets of *Equity, Diversity & Inclusion*, *Sustainability*, and *Systems Thinking* designed to guide how its graduates interact with the world. The framework outlines that a sustainability mindset will create sustainability-minded graduates who lead by example (Humber Learning Outcomes, 2020). Taking a systems perspective, Humber graduates will be curious, compassionate and courageous thinkers who actively break down silos and promote holistic problem finding (Humber Learning Outcomes, 2020). The Humber Learning Outcomes project highlights that Humber students will also demonstrate critical thinking, collaboration, digital fluency, innovation, leadership, professionalism and strategic problem-solving skills. The goal of the Humber Learning Outcomes is to future-proof its graduates in the workforce and provide them with the world views and skills needed to take on real-world challenges. These mindsets and skills align very well with the enabling skills needed to transition to a circular economy.

The literature on the competencies needed for the transition to a circular economy is not extensive. More research will be needed in this area as organizations learn more about the skill gaps in transitioning to circularity. The EMF and the World Economic Form have identified creativity, collaboration, complex problem-solving, social and people skills, and data analysis as the main enabling skills needed (EMF, 2017; World Economic Forum, 2018). The CYCLE project, a strategic partnership project funded by the ERASMUS+ program, also developed a competency framework for adult education programs that address technical subject-specific competencies, generic interdisciplinary competencies and normative competencies (the vision and values

needed to support the transition to a circular economy) (CYCLE Project, 2017). An apparent underlying theme is that of systems thinking—one of the mindsets articulated in the Humber Learning Outcomes.

A systems-thinking mindset allows us to gain a better understanding of complex problems and look at them a different way to learn how all its parts are interconnected and gain a better understanding of the roles and relationships between them. Taking a "systems thinking approach is fundamental to understanding how our economy could work, for economic, societal and environmental gain" (EMF, 2015) as all these systems are interconnected. Creating a sustainable world is a complex problem, one that cannot be solved with reductionist, linear thinking of cause and effect.

Systems thinking allows us to identify and avoid unintended consequences. For example, our current linear economy is designed for products to lose their value over shorter periods of time through planned obsolescence so consumers will buy more. When a product is no longer useful to the consumer, the "burden of disposability is shifted away from the producer and onto the consumer through taxes and costs to governments in cleaning up the [environmental] damage that this creates" (Acaroglu, 2018). When faced with a complex problem, we often create solutions that address only symptoms and not the root causes of a problem. As a result, we only improve part of the system while creating more problems within the same system or negatively impact another one. Our current linear economy is full of unintended consequences to the detriment of our social and ecological systems. As a foundation of circular economy, systems thinking enables us to gain a better understanding of how individual parts of a system inteconnect and uncover root causes so we can design better solutions. Moreover, systems

thinking provides "a lens or frame for our conceptual understanding of [circular economy]" ("Systems and the Circular Economy", EMF, n.d.). Having the ability to look at complex problems through a systems-thinking lens is key to transitioning to a more sustainable world.

Developing a systems-thinking mindset and other competencies needed for a circular economy in students is one thing, but what about those of faculty and staff in Ontario colleges? Sitra, a non-profit organization funded by the Finnish Innovation Fund, has a mandate to work with all levels of education to embed circular economy principles throughout curricula. Sitra has worked in collaboration with academic institutions to develop circular economy teaching packages to aid its faculty who are responsible for educating students on this alternative economic system. Upon evaluation of the pilot program, it was apparent that one of the main challenges was a shortage of circular economy knowledge and skills among the faculty and "other stakeholders such as funders, public administration, decision-makers and companies which made it more difficult to carry out a project" (Sitra, 2017).

Within the Ontario college system, teaching and learning resources exist and faculty can take advantage of them. For instance, Humber's Centre for Teaching and Learning has education resources for faculty to access and provides professional development opportunities to better improve the learning experience for students. In searching the Centre for Teaching and Learning's website, there are no opportunities to learn about circular economy. This contrasts with what is currently happening in European higher education institutions. According to the Ellen MacArthur Foundation, the universities of applied sciences are the vision for a circular economy as 25% of them require its faculty to understand its principles and integrate it into teaching and learning (EMF, 2019). Faculty are required to learn about the circular economy and impart this knowledge

on to students. The Ellen MacArthur Foundation provides free online resources for all levels of education and has been working collaboratively with several higher education institutions to support the increase in circular economy knowledge. Most of these institutions are in Europe and the United States.

In the space of applied research, Humber has developed a Strategic Applied Research and Innovation Plan in its attempt to build a research culture based on its institutional areas of strength (Strategic Applied Research & Innovation Plan, 2018). The plan outlines five areas of applied research focus: Systems Integration, Internet of Things, Transmedia, Social Innovation (with a focus on community development), Sustainable Architecture & Energy Efficient Construction. While there is no requirement for proposed applied research projects to meet any sustainability criteria, Humber's Sustainability Plan highlights the desire for applied research projects to have a sustainability focus. The data from the participatory workshop shows that there is a progressive sustainability-orientation within faculty research interests, but this is not enough to support the transition to a circular economy or a more sustainable society. It was suggested that all applied research projects should integrate sustainability and that adopting circular economy principles may be one way to accomplish this.

As previously mentioned, one of the outcomes of the workshop was that the participants communicated that Ontario colleges need to change their business model if they truly want to be leaders in creating a more sustainable world. One way to achieve this at Humber is to focus on a holistic integration of circular economy on campus, within its curriculum and applied research projects. Like most large, complex organizations, change is difficult to implement on such a wide scale. The findings from the workshop reveal that there is little confidence that even

implementing such as massive change is even possible for several reasons. It was concluded that without support from senior leadership and many champions of innovation who want to experiment with adopting circular economy principles holistically, change would be extremely slow and incremental at best. Additionally, participants highlighted that for Humber to embed circular economy into its business model there is a lack of guidance.

Should Humber want to adopt a circular business model, it would be charting new territory as no other Canadian higher education institution has done this yet. Mendoza et al. (2019) state that most of the studies done about sustainability in higher education emphasize "campus sustainability management practices to identify opportunities for reducing overall environmental footprint" (p. 565) rather than shifting an entire business model. As the 24 Ontario Colleges play a large role in the economic and social development of the province through the knowledge and skills its graduates contribute to the workforce as well as their ability to conduct applied research and outreach to community partners (Mendoza et al., 2019), they are in an excellent position to influence the transition to a circular economy. With Humber being one of the largest colleges in the province, it could be argued that it has a responsibility to take a leadership role not only in developing a sustainable campus, but also to become an example of how to transition to a circular organization through business model innovation. The questions that remain are 1) what would this new business model look like and 2) how would it move forward?

Dream Discussion: Humber in 2050

In the participatory workshop, participants were asked to envision a preferred future scenario of what it would be like to be a student in an Ontario College in year 2050—a time when

Canada is on a pathway to completing the transition to a circular economy. The data was organized into the four themes of *Leadership, Business Model Innovation, Teaching & Learning,* and *Applied Research & Industry Partners*.

Participants envisioned Humber College as a circular living lab—a space where students, faculty and industry partners worked together in interdisciplinary teams on tangible sustainable solutions. A campus committed only to designing and building LEED-platinum new construction and all older buildings were retrofitted to have no carbon emissions. A space where students did not observe any garbage on campus as all its operational processes had turned its waste into a resource to be used at another location on campus or elsewhere within the region. In 2050, project-based learning across the academic disciplines was the norm and students had the opportunity to "do the curriculum" to develop competencies instead of "follow the curriculum". It was a time when students only experienced meaningful evaluations to demonstrate their competencies as projects were designed with the end in mind and multiple-choice exams were banned.

In 2050, students were not debt-ridden and were no longer concerned with "learning to earn", but "free to focus on creative, co-curricular projects" with a sustainability focus. Prospective students chose Humber knowing that they would get an education in sustainable practices no matter which discipline they studied and that all student projects would only integrate transformative models of sustainability like circular economy.

In 2050, sustainability was a priority for all faculty as professional development opportunities to acquire the needed skills were readily available. All faculty and staff had a systems-thinking perspective and a good understanding of circular economy principles as

creating the conditions for sustainability was a part of every employee's job description. Humber was also known as an employer where its faculty and staff were not always tied to job descriptions, but had time allotted to contribute to projects and new initiatives based on their skill sets without worrying about having to do things "off the side of [their] desks". The Humber community was designed so that students and faculty were given time to explore and experiment on future circular possibilities with industry and community partners. Humber truly had become a learning organization, and it had achieved its goal in becoming a model of sustainability not just for other campuses in Ontario, but for businesses in the region.

To achieve this Humber of 2050, it would be no easy task. Many external and internal barriers exist and uncovering them is outside the scope of this project. It is the author's intention to explore how Ontario colleges might begin to become a driver in the transition to a more sustainable economy. More research would be required to identify all the barriers so they could be addressed systemically by creating a common goal and developing a shared language among all stakeholders to design a way forward.

The prevalent idea uncovered during the workshop was for Humber, and ideally all Ontario colleges, to become a "circular" living lab to raise the awareness of circular economy and its principles. This idea is one that requires more attention as most of the literature on transitioning to a circular economy emphasizes developing students' competencies with a focus on teaching and learning. As Horan, Shawe and O'Regan (2019) highlight, increasing in popularity is the concept of a living lab where higher education institutions and municipalities experiment to find innovative, sustainable solutions to local problems. An example of this concept is CityStudio in Vancouver, Canada. It is a collaborative innovation hub where students and faculty

from seven higher education institutions can connect with city staff and community members to learn about local challenges and co-create projects to experiment with possible solutions. There are several CityStudios across Canada as this model is gaining traction in the social innovation space including a CityStudio in London, Ontario where Fanshawe College is an active participant. Might this model be adapted to create a circular economy living lab on an Ontario college campus where industry partners collaborate with students and faculty to experiment with circular solutions?

Horan et al (2019) state

> "the overall aim of living labs is to learn and experiment by integrating the processes of research and innovation. The innovation aspect refers to the development of new products and to the discovery of innovative solutions to existing problems, whereas the learning and experimenting aspect refers to the generation and dissemination of knowledge among participants. The emphasis on formalised knowledge production, that is, lessons that are formulated and can be disseminated, is what sets living labs apart from other… experiments and niches of innovation. One vital aspect of the living lab is that the output created does not stay in the academic community but is disseminated to wider society with the hope for impact being refinement and dissemination of new methodologies and technologies. (p. 5)

This concept of a living lab aligns well with the emphasis on increasing applied research opportunities within Ontario colleges. To create a "circular" living lab in search for sustainable solutions to current industry problems, industry and community partners can collaborate with faculty and students to co-create projects to explore and experiment. Any innovations developed as an outcome of the projects would belong to the industry partner while the research findings can be disseminated to enhance knowledge creation as well as teaching and learning in circular economy.

In the 2050 preferred future scenario, it was clearly a time when Humber students, faculty and staff alike *genuinely* cared about its campus, the community and the future. The emphasis is placed on genuinely. Participants communicated that if Humber is to truly become a leader in sustainability, or even become a driver to the transition of a circular economy, an internal transformation is needed. This transformation comes from a place of authenticity where Humber "walks the talk". No longer can it be acceptable to promote that it will be a national leader in sustainable campuses.

Participants shared that sustainability needs to be embedded in everything Humber does from campus management including procurement policies to curriculum and applied research projects with industry and community partners. While attempts are being made at Humber to move in this direction, participants communicated the vision and messaging from the college is not always clear. To add to this, Humber is a large, complex organization with many things going on. Workshop participants posited that if Humber could focus on fewer initiatives and ones that strongly aligned with its goal to be a national leader in sustainability, this future could become a possibility.

Designing our Collective Future

At the time of writing this paper, the world is experiencing a global pandemic and the impact this will have on the Ontario economy and the college system is still largely unknown. Global conversations seem to have a common theme of "building back better" (OECD, 2020) as returning to business-as-usual is not the way forward. The present call to action for governments and businesses to strengthen its local resiliency to economic and social disruptors is growing.

Figure 3 illustrates the key elements needed to build a more resilient economy as outlined in the Organization for Economic Cooperation and Development's (OECD) 2020 policy recommendations for global recovery after the world-wide pandemic. This in combination with the world's leading scientists' urgent claim that we have less than ten years to significantly reduce emissions to limit the impact of climate change (Berwyn, 2019) may be the wake-up call the world needs to urgently shift to a circular economy.

The opportunity to transition to a circular economy in Canada is upon is. More than ever, it is clear that policymakers must take urgent action to create the economic incentives needed for companies to adopt circular design principles into their business models. At the same time, policymakers have the ability to direct Ontario colleges to incorporate circular design principles into their business models to ensure graduates are equipped with the necessary skills to transition to a circular economy. The Strategic Mandate Agreements between the Ontario government and the colleges is a tool that can be leveraged to get colleges to better understand the important role they play in supporting the development of regional circular economies. In the aftermath of the coronavirus pandemic, the challenge in getting Ontario colleges to

understand the necessity and urgency of embedding circular design principles into all aspects of their operations is an immense one.

Higher education institutions have been greatly impacted by the coronavirus (COVID-19) pandemic as they have had to scramble to move the delivery of academic programs online and plan how to navigate work-integrated learning and practical lab training to ensure public safety takes priority. Prior to the global pandemic, Ontario colleges were already faced with funding cuts and working hard to adapt to the current funding model. "COVID-19 related developments will put [higher education institutions'] budgets under even more pressure" (Bevins, Bryant, Krishnan & Law, 2020). Focus is now on how to deliver quality programming, manage enrolment and decide which activities and new initiatives can continue and which ones need to be put on hold or cancelled altogether.

Developing the Circular Narrative

As in any large, complex organization, there are always competing priorities and new initiatives being introduced that need to be resourced. With our new normal, "competition will only increase as resources diminish within the Ontario college system" (D. Simpson, personal communication, May 5, 2020). Recommendations made to the Ontario government by Colleges Ontario for the 2020 budget are unlikely to be given a lot of attention in the coming months. It is estimated that the Ontario government "will more than double the size of its current deficit to $20.5-billion in 2020-21 as it spends billions on health care, tax deferrals and payments to people in its battle with COVID-19" (Gray and Stone, 2020). With dimishing resources and competiting priorities, getting buy-in to embed circular economy into the college's business model can prove

very difficult. How might a large higher education institution, such as Humber College, begin to move forward so that ciruclar economy is not seen as yet another new initiative being added on top of everything else already happening?

Developing a circular economy narrative within Humber is critical for widespread acceptance (D. Simpson, personal communication, May 5, 2020). It is important for the college community to see value in embedding circular economy. The Humber community would need clarity on how embedding circular economy can help it achieve its strategic priorities such as developing career-ready citizens and creating healthy and inclusive communities (Humber College 2018-2023 Strategic Plan). For instance, creating experiential learning opportunities for students to build skills needed now and in the future is a priority. The development of a circular living lab where students can engage in interdisciplinary, applied research projects with industy and community partners strongly aligns with Humber's strategic priority in developing career-ready citizens. Furthermore, Humber's Strategic Plan (2018) claims it is "passionate about preserving our collective future by taking responsibility for the social, economic and environmental impact of the decisions [it makes] today and in the future" (Humber College 2018-2023 Strategic Plan, p. 26). Embedding circular economy into its business model is a perfect way for Humber to demonstrate its authenticity in its goal to provide" national leadership in shaping the future of sustainability" (Humber College 2018-2023 Strategic Plan, p. 26).

Not only can embedding circular economy into its business model support Humber's strategic priorities, but it is also an opportunity for the institution to support its industry and community partners in becoming more resilient in a post-COVID-19 world. Dr. Quy Nguyen Huy, a professor of strategic management at the global graduate business school, INSEAD, states there

will be new priorities for strategists in the post-COVID-19 world. "Strategy after COVID-19 will be less about beating your economic competitors, and more about how businesses can contribute to combating a larger, shared enemy like climate change, pandemics or perhaps socio-political woes such as inequality" (Huy, 2020).

Huy (2020) states that companies' strategies need to focus on surviving and becoming resilient before prioritizing economic effectiveness. Companies need to "plan for ecological and environmental threats" (Huy, 2020) and "build strong organizational immune systems rather than maximize short-term profits" (Huy, 2020). Finally, companies can no longer focus on business economics, but need to pay attention to political pressures to localize business operations (Huy, 2020) as a global pandemic clearly demonstrates how easily global supply chains can be disrupted.

In a McKinsey report, Sneader and Sternfels (2020) also stress the need for companies to become more resilient and adaptable as the trend to regionalize supply chains is only going to grow. Successful companies will be the ones that redesign their business model by shifting operations and supply chains to adapt to potential future shocks (Sneader & Sternfels, 2020). For this happen, businesses will need to establish "non-traditional collaborations with partners up and down the supply chain" (Sneader & Sternfels, 2020). The time for Ontario to begin the transition to a circular economy is now, and Ontario colleges can become a support to industry and community partners to enable this transition.

In reviewing the four essential building blocks for a circular economy suggested by The Ellen MacArthur Foundation, education is placed in the "Enabler and Creating Favourable

Conditions" category along with policy makers and thought leaders (EMF, 2015). For Ontario colleges to contribute toward creating the favourable conditions needed to transition to a circular economy, then these higher education institutions still need to make changes to its business model and how students are educated. Ontario colleges need to develop future leaders who can help us create an economic system that reduces negative unintended consequences. This places great responsibility on Ontario colleges to ensure they are doing everything they can to support the transition to a more sustainable economy. A starting point can be to weave a circular economy narrative throughout the college system. Based on the research findings in this study, there appears to be five points of entry should Humber College choose to become an enabler in the pursuit of a circular economy.

1. Sustainable Campus Management

Humber is well-positioned to continue building on the strength of its Sustainability Plan to ensure buildings, procurement and waste management policies adhere to circular design principles. Humber has demonstrated its commitment in this area and if it meets its targets set out in its Supporting Actions document, it is well on its way of becoming a national leader in creating sustainable campuses. However, one barrier to achieving this may be a lack of funding available to the college to retrofit its remaining buildings due to shifting priorities within the Ontario government to rebuild the economy after COVID-19 passes. In its pre-budget recommendations report to the Ontario government, Ontario Colleges called for the 2020 budget to include funding to retrofit college campus buildings to reduce energy use and costs. With the

delay of the 2020 budget, one can only speculate that this recommendation may not be considered anytime soon.

2. *Link Circular Economy with the Sustainable Development Goals*

In 2018, Colleges and Institutes Canada engaged its members, partners, staff, and key stakeholders in consultations to discuss the future and the role its members will play. The outcome was the development of a five-year strategic plan for 2019-2024, and it outlines the ImpAct initiative. Using the Sustainable Development Goals (SDGs) as a framework in setting priorities, ImpAct was designed to support Canadian colleges and institutes in their "contributions to economic and social development, community well-being and a sustainable future" (Strategic Plan, Colleges and Institutes Canada). This supports the findings from the participatory workshop that the SDGs are important to the Humber community. For circular design principles to become part of the narrative at Humber, it is essential that the "link between the achieving the SDGs and the circular economy is explicit" (D. Simpson, personal communication, May 5, 2020).

Schroeder et. al (2019) make the connection between a circular economy and achieving the SDGs. The study outlines how circular economy practices "directly contribute to achieving 21 of the [SDG] targets and indirectly contribute to an additional 28 targets" (Schroder et. al, 2019). The strongest connections are linked to targets found in SDG 6 (Clean Water and Santitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production) and SDG 15 (Life on Land) (Schroder et. al, 2019). The study also demonstrates the indirect contribution of circular design principles in achieving SDG 11 (Sustainable Cities and Communities). Finally, the study concludes that quality

education (SDG 4) and collaborative partnerships (SDG 17) are needed to "build the skills and capacity required for scaling up and replicating circular economy practices" (Schroeder et. al, 2019) and adopting innovative business models. This is further evidence that Ontario colleges have an essential role to play in achieving a sustainable world by becoming a supporting system structure in the transition to a circular economy.

3. Developing a Culture of Systems Thinkers to Promote Circular Practices

Humber can look to the mindsets within its own HLO framework to foster the development of a college-wide narrative that sees not only students, but also faculty and staff as sustainability-minded and having the capability to take a systems-thinking perspective to guide decision-making. As systems thinkers, Humber employees will be better equipped to find interconnections between its campus buildings, teaching and learning and development of applied research projects. This is essential should Humber want to become a circular living lab and a national leader in promoting sustainability. Moreover, having a systems-thinking mindset will provide staff with a deeper understanding of unintended consequences. For instance, when purchasing staff are creating requests for proposals, they can apply systems thinking (and ultimately circular practices) to better understand the importance of recognizing vendors whose products and services contribute to unsustainability. Being a large organization, Humber can leverage its purchasing capacity in an attempt to influence vendors to provide products and services that promote circular principles. Since circular economy "offers a unifying framework for systems thinking" (Hall and Velez-Colby, 2018. p.5), embedding it into all of Humber's

business functions will enable it to lead by example as it strives to become a national leader in sustainability.

4. Development of a Circular Living Lab and Fostering Circularity in the Applied Research Agenda

According to Humber's Office of Sustainability website, it states Humber's Applied Research & Innovation department "strives to be a leader among Canadian Polytechnics in sustainability-related applied research". While this is not an external condition placed on Humber, it is a positive step toward contributing to the creation of new knowledge and sustainable innovations. To be a leader in this area, the literature review and participatory workshop findings align with the need to establish a set of sustainability criteria for evaluating and ranking proposed research projects. For instance, the criteria could simply identify two categories of projects: 1) does the project relate to a sustainability problem or opportunity, or 2) does the project aim to have a sustainable solution and avoid unintended consequences? If the project promotes unsustainability in any capacity, the proposals would not be accepted. To do this properly, those assessing project proposals should have a knowledge of systems thinking and/or transformational sustainable models such as circular economy.

To increase the number of sustainability-related, and ideally circular-economy related, applied research projects being proposed by faculty and students, the college can look at providing incentives. For instance, the University of Waterloo developed the Sustainability Action Fund to foster and promote applied research projects focused on sustainability. The University of British Columbia has a Sustainability Scholars Program—a paid internship program where students are matched up with industry and community partners to work on sustainability applied

research projects. Another possible incentive is to provide opportunities for students to share their findings with the college community as a guest speaker or participate in a community of practice.

To support the growth of circular applied research projects, workshop participants suggested that the college identifies and brings in Program Advisory Committee members (representatives from industry and community partners) who are considered early adopters in finding circular solutions within their organizations or those who are excited by the sustainability conversation to collaborate on circular applied research projects. With these projects, it is essential for research to be shared in an open repository so other faculty, students as well as industry and community partners can learn from circular project successes and failures. At the time of writing this report, open repositories of faculty and student research does not exist at Humber and applied research findings are not openly shared for others to learn from.

Intentionally creating applied research projects and other learning opportunities that experiment with circular economy will lead to more and more students acquiring knowledge of circular design principles and developing the related competencies. Not only will this benefit students, but they can also become *reverse mentors* to businesses while completing work placements with employers or participanting an future applied research projects. As reverse mentors, students can help amplify the message of transitioning to a circular economy and ideally lead to more businesses that would like to work in collaboration with Humber that want to explore new business models or investigate how to improve business practices that currently support unsustainability.

Experimenting with the circular economy concept is still in its infancy within Ontario. Humber is well-positioned to become an early adopter in creating an enabling environment for a transition to an economy that is more sustainable. For instance, Humber's Centre for Technology Innovation and its clusters of knowledge in the Internet of Things and systems integration can be an entry point to creating a Circular Living Lab. As more companies shift their business model in an effort to make their supply chains resilient, the more likely these companies will be open to explore sustainable models like circular economy through applied research projects. Not only will these projects benefit student learning, but they will also benefit the companies. However, for this to happen, it is essential for colleges to commit dedicated staff and resources to find companies that genuinely want to integrate sustainable solutions into their business models.

5. Cultivating Circular Champions

In evaluating how to effectively embed circular economy into the Finnish national education system, Sitra Foundation revealed that "the greatest challenge facing the development of teaching was a shortage of expertise: the skills in and knowledge of [circular economy] issues was weak among teachers and stakeholders such as funders, public administration, decision-makers and companies which made it more difficult to carry out a project." (Sitra, 2017). Faculty need to be well versed in the principles of circular economy and to have the ability to draw on examples when sharing knowledge with students. Identifying faculty with sustainability interests are ideal candidates to start experimenting with the development of circular applied learning projects.

To support faculty in developing applied learning projects, Arizona State University created a step-by-step framework in the Guide for Applied Sustainability Learning Projects: Advancing Sustainability Outcomes on Campus and in the Community. The guide begins by stating that

> Colleges and universities have a major role when it comes to leveraging their research, education, and operations to help effectively address major sustainability challenges. They use their campuses, which often resemble small cities, as living labs to test and model innovative practices. Using the campus and increasingly the city as a living laboratory, colleges and universities contribute evidence-supported strategies, offering timely and relevant education. (Beaudoin & Brundiers, 2017. p.4).

The step-by-step guide is a framework to assist faculty in "how to design, implement and scale sustainability learning projects with interconnected goals [that] 1) provide students with exceptional learning experiences in sustainability; and 2) contribute to a workable sustainability solution pathway that—when implemented—can lead to positive sustainability outcomes on campus and/or in the community." (Beaudoin & Brundiers, 2017. p.4). A similar framework could be used at Humber to support the development of more sustainability-focused applied learning and/or research projects.

It is important to recognize that the development of applied research projects requires a lot of time on the part of the faculty and staff. David Porter, the former Dean of Innovative and Flexible Learning at Humber, states that faculty and staff need to be "given the time for exploring and experimenting." All too often, colleges are not set up for this as "existing structures are barriers" (D. Porter, personal communication, April 30, 2020). For instance, faculty research is encouraged, but it is not a requirement in the college system. Faculty who are interested in developing applied research projects to support student learning, do not have enough time allocated to do this. Some funding is available to release faculty from teaching one course, but depending on the applied research project, the time is often not enough.

Arizona State University's guide to applied learning for sustainability, also advances the idea that colleges and universities need to create an enabling institutional environment. "A major barrier facing an applied learning for sustainability program is that it can be viewed as a peripheral activity instead of something that is central to the institution's core values" (Beaudoin & Brundiers, 2017. p.15).

With sustainability being one of Humber's core values, it is essential to put structures in place and make resources available to demonstrate its importance to students, faculty and staff and external partners. Examples could be making sustainability a part of everyone's job description as well as providing opportunities and creating time for staff and faculty who already possess the required skills to participate in sustainability initiatives. An inventory of faculty and staff who already have *sustainability* or *circular* skill sets is a great way to identify those who may have an interest in . For those staff and faculty who have the will, but lack the needed skills, Humber could provide micro-training modules to develop these skills over time. Moreover,

curating circular economy learnings such as those from the Ellen MacArthur Foundation and arranging expert guest speakers to present opportunities found in a circular economy may contribute to a greater understanding of the importance and value of embedding it into curricula and implementing a circular living lab.

At the time of writing this paper, Humber College is designing a new International Graduate School (IGS) set to open downtown Toronto. The goal is to create innovative interdisciplinary, project-based learning opportunities for students. The IGS is another entry point Humber can consider should it want to experiment with circular economy. "Circular economy absolutely fits with the Humber Learning Outcomes and the Sustainable Development Goals. This is an opportunity. The IGS is a sandbox where Humber can experiment with innovative programming. Circular economy [can be] piloted with specific programs" (D. Simpson, personal communication, May 5, 2020).

Creating a circular narrative is essential to get buy-in from faculty, staff and students. However, this take time and time is not something we have a lot of if we truly want to build back better (OECD, 2020) in a post-COVID-19 world and make the urgent changes needed to reduce climate impact. College leaders need to re-evaluate the purpose of the college system in partnership with policymakers and industry partners for it to become the needed underlying structure for transitioning to a circular economy. Without strong leadership and collaboration, it will be difficult, if not impossible, for Ontario colleges to transform how they operate with any sense of urgency.

4. CONCLUSION

This paper highlights the responsibility higher education has in creating a sustainable future and presents ideas on how Ontario colleges might become a supporting underlying structure in the transition to a circular economy. Using Humber College as a case study, a participatory workshop was conducted to discuss Humber's strengths in promoting sustainability, a preferred-future scenario for 2050—a time when Canada had nearly completed its transition to a circular economy—and what it would be like to be a student at that time. The workshop participants also discussed the transformation Humber would need to undertake to realize the preferred-future scenario.

The literature review uncovered what is currently happening in the global, circular economy, higher education space and aimed to identify any potential gaps in the literature. For instance, circular economy in higher education is limited within Canada. Furthermore, most Ontario higher education institutions do not educate students about circular economy and its potential as an alternative economic model. Even more apparent is that the majority of these higher education institutions have operational practices, educational programming and applied research projects that contribute to an economic and social model that is unsustainable. Continuation of this business-as-usual model will greatly impact Ontario's ability to transition to a circular economy or other sustainable models.

The literature review was also used along with expert interviews to uncover barriers or challenges that may exist should an Ontario college choose to shift its business model to become a supporting structure for a transition to a circular economy. For instance, Ontario colleges are large organizations with competing priorities. With a reduction in provincial funding,

competition for resources has been increasing. This competition will only intensify as resources continue to diminish. The economic damage resulting from the global pandemic will be long lasting as Ontario works to build back its economy and pay down its largest deficit ever. At the time of writing this report, the Ontario deficit for 2020-2021 fiscal year is expected to hit CDN$41 billion (CityNews Toronto, 2020). Any needed investment required to make Ontario colleges more sustainable could be sacrificed unless there is a shift in Ontario government policy in how its funds are spent in higher education.

For Ontario colleges to create the favourable system conditions needed to support the transition to a circular economy, they need to begin with reimagining its business model to create opportunities for students, faculty, staff and partners from the community and industry to collaborate and experiment with circular economy principles. Embedding circular economy in a college's business model is key. However, this will take time. Whether it is large corporation, a small-to-medium-sized business or an academic institution, transitioning to a sustainable business model requires long-term thinking, strong leadership, and an ambitious vision with a clear understanding of the organization's purpose by all stakeholders.

Nonetheless, there are some smaller actions that colleges can implement to help nudge the Ontario college system to becoming a supporting structure for a circular economy. Faculty, staff, students and industry partners need to see the value in embedding circular economy principles and clearly understand the role colleges play in developing a more sustainable society. To do this effectively, a circular narrative needs to be developed at each college to get widespread acceptance. This report has highlighted five points of entry in developing this narrative.

Adopting sustainable campus management practices using the circular economy principles as a framework is essential. The popularity of the SDGs can be leveraged to demonstrate how a circular economy is both directly and indirectly linked to achieving several of the goals. Colleges must develop a culture of systems thinkers from faculty and staff to students and industry partners to enable big-picture thinking and understand how current practices and programs often lead to unintended consequences. Circular economy can be used as a framework in developing a deeper understanding of systems thinking as it is the foundation of this sustainable economic model.

Colleges are working hard to increase applied research projects even though faculty are not required to develop or participate in them. Cultivating circular economy champions among faculty and staff is essential for creating the momentum needed to embed circular principles into a college's business model. Colleges need to be intentional in nuturing these champions by providing them the time needed to experiment with circular principles and develop applied research projects as well as providing opportunities to share learnings with the college community.

Additionally, intentionally fostering circular economy within the applied research agenda and allowing the campus to become a circular living lab will provide the research funds and space for students, faculty, staff and industry partners to experiment in circular economy. The living lab can provide the space to convene stakeholders and lead to knowledge creation. This will help amplify the message that a transition to a circular economy will not only assist us in becoming more resilient, but it will also help us move closer to a regenerative future in the long-term.

However, current world events and climate scientists are sending a strong message that we are not in a position to make incremental changes. We do need to take immediate action to transition to a circular economy. Failure of Ontario colleges to not take any action in becoming a supporting underlying structure in the transition to a circular economy can be viewed as irresponsible. These higher education institutions have an essential role to play as they have been designed to contribute to the economic development of the province. Without them, the journey toward a more sustainable future will take too long and will be at the expense of our natural and social systems.

If education is to become an enabler for a circular economy by helping to create favourable systems conditions (EMF, 2015) to make the transition, it is important to remember that higher education institutions cannot do this alone. All levels of Ontario education have a role to play along with policy makers and thought leaders. If these key stakeholders along with representation from industry and community partners take a facilitated systems-thinking approach, it is possible for them to work together to develop a common goal and set priority actions to begin on a path to a regenerative future. With a call to build back better (OECD, 2020) in our post-COVID-19 world, we now have an opportunity to transform how we do things and stop business-as-usual. The Ontario colleges are in the perfect position to conveyne relevant stakeholder to move the circular conversation forward immediately.

"The world we created today as a result of our thinking thus far has problems which cannot be solved by thinking the way we thought when we created them."

~ Albert Einsten

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