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Practical Innovation: Beyond COVID

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Foreword

Chris Whitaker, PhD
President and CEO
Humber College Institute of Technology & Advanced Learning

"Embracing an innovation mindset propels curiosity into actionable results."

These past two years, we have endured challenges yet achieved numerous milestones. The impact of our ability to pivot, take risks and embrace change is apparent in the amount of research that colleges and institutes have achieved throughout the pandemic.

Keeping students at the forefront of our decision-making is even more important today as the future holds unprecedented and unpredictable challenges. Responding to the COVID-19 crisis has demanded that we rise to these challenges with courage and care and remain committed to delivering excellence and creating unparalleled opportunities for student success.

Our ability to successfully do so is evident in our ability to innovate, try new things, and take risks. I am in awe of how much we have all been able to achieve as we continue on the journey of uncovering an ambitious vision for the future of our world.

At the precipice of change, we are responding to our student's needs and industry's demands for skilled labour and an innovative and entrepreneurial mindset. We have addressed this through incorporating new ways of delivering world-class and valuable experiential learning opportunities, improving and elevating virtual learning experiences for our diverse learners, refreshing future-focused strategic priorities, and embodying research and innovation.

New partnerships and the commendable strength and resilience exhibited by our faculty, staff, students and industry and community partnerships, along with the support of relationships with our national and global polytechnic alliances, have assured us that despite the turmoil and upheaval, we have the capacity to endure and innovate.

Through research and curiosity, we are able to actualize a state of innovation, that is sustained by the resilience and perseverance of our research community. Perfect examples of these qualities and characteristics are documented in the pages that follow. The authors and researchers continue to investigate without losing sight of the value of dissemination. They document and share their insights and discoveries, queries that may require further research and collaboration to build a better and more cohesive body of evidence, eventually resulting in change.

Researchers and innovators embed students and/or industry at every level of investigation. In turn, they inspire the next generation of emerging researchers and innovators, faculty and students alike who build on the work of those before them. Research-enriched learning merges the stream of content-oriented learning and translates to practical, real-world knowledge, building on future-oriented skills and competencies to meet industry demands. Students participating in research projects become agents of change and innovation.

Augmented by our commitment to continue to inspire, inculcate and provide access to participation in such an environment that celebrates student-involved, experiential learning and a research and innovation mindset, our sandbox remains wide open.

The Journal of Innovation in Polytechnic Education (JIPE) is a collective dissemination platform about communicating the unique value of the polytechnic education model and its collaborative endeavours with other polytechnics. We encourage you to continue to share your story, for in sharing and collaboration lies the true value of education–education that transforms our students and their experiences to build skills and competencies that allow them to compete and stay ahead of the demands of the future.

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Practical Innovation: Beyond COVID

Sarah Watts-Rynard
CEO
Polytechnics Canada

For the last two years, Canadians—and indeed the world well beyond our borders—have been focused on COVID-19. Yet, even before the pandemic upended our everyday lives, Canada's economy and labour market were undergoing a significant transformation. New technology, demographic shifts and industrial transformations were already affecting the supply and demand for talent.

Despite months of economic turmoil, today's call for skilled workers is increasingly urgent. Businesses and governments recognize that today's workers must bring a combination of talents to the table—technical skills, an innovation mindset and tremendous resilience to change.

From my seat, it is increasingly obvious that Canada's polytechnics have a ready answer to these challenges. Positioned at the intersection of learner and labour market, institutions offer programs that are both responsive to known business needs and ahead of emerging trends. Flexible program design reflects the changing nature of work, offering an innovative and entrepreneurial approach to skills development.

Students walk in the door looking for an industry-relevant education; they leave both competent and confident in their skills. While the polytechnic model of education is more than its component parts, my sense is that there are three key elements at play: an industry focus, a commitment to experiential learning in all its forms and an innovation infrastructure that supports adaptation and resilience.

While a traditional post-secondary model is very much "education up"—translating labour market signals into curricula, delivering training and assuming employers will recognize credentials as responsive to their requirements—polytechnics embed industry at every level. By engaging the industry in the co-design of programs, labour market signals are that much clearer and more relevant.

This happens at the program level through advisory committees that review current programs, courses and learning outcomes against emerging requirements. It happens each time an employer donates a piece of equipment or shares insights into challenges and opportunities in their sector.

But, that is just the beginning. With instructors often drawn from industry and full-time faculty augmented by part-time instructors moonlighting from their regular employment, classrooms both reflect the realities of the workplace and integrate real-life challenges, problems and projects into course outlines.

The polytechnic toolbox includes capstone projects, engagement in applied research and in-class challenges posed by business partners. In addition, on-campus labs and shops provide workplace-authentic experiences, from building houses in carpentry programs to developing and interacting with robots in the manufacturing lab. These experiences help prepare students for a fluid, ever-changing world of work.

In response to COVID-19 restrictions, when access to work-integrated learning (WIL) placements became a more significant challenge, polytechnics began offering access to virtual labs, placements and training with partners that were, in some cases, located around the globe. What could have been a poor substitute for experiential learning has, in fact, opened the door to students who might have once faced barriers to WIL experiences. It will be fascinating to see how these new approaches become part of the WIL menu as the pandemic fades.

Change, and the human resilience required to embrace it, has also been front-and-centre during the past 24 months. As automation, artificial intelligence and the Internet of Things become commonplace across economic sectors, the global

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marketplace is transforming at an ever-increasing speed. One of the clearest messages coming from industry is a requirement for innovation skills among graduates.

Innovation drives economic growth and enhances social well-being. It can be incremental—improving efficiencies, experimenting with new technologies or testing theories and concepts. Innovations can also be ground-breaking and globally significant—impacting the food we eat, human health and wellness, and how we interact with the planet.

One of the most pragmatic examples of innovation at polytechnics is the capacity to undertake applied research. Institutions mobilize state-of-the-art facilities, equipment and expertise to deliver creative solutions to businesses and their staff. Applied research projects often include a student experience component, helping learners develop strong problem-solving skills, build employer connections and gain relevant experience.

The same companies later hire many students they assist during their studies, allowing employers to benefit from access to an innovation-enabled talent pipeline. Applied research also provides employers and their staff with a front seat to the process to develop products, adopt technology or develop a proof of concept. Given the prevalence of small- and medium-sized businesses in Canada—many without an innovation infrastructure of their own—polytechnic applied research stands to help power Canada's broader innovation ecosystem while creating the talent pipeline to drive it.

Taken together, an industry-driven approach to program development and delivery, experiential opportunities for students, and innovation supports to help businesses adapt are game-changers. They address the critical needs that were emerging before the pandemic and those rearing their heads again as Canada looks beyond it.

Like the rest of Canada, polytechnic institutions have been swept up in the realities of an extended pandemic, forced to adapt to health guidelines and restrictions. Unlike many others, the capacity to pivot and respond was built into institutional DNA. It is those characteristics that make polytechnics ideally positioned to drive recovery.

Practical Innovation: Pivoting to meet the demands of a hybridized environment post-COVID—Humber College continues to Lead, Transform and Differentiate

Gina Antonacci, PhD

Senior Vice-President, Academic, Humber College Institute of Technology & Advanced Learning

Interviewed by Anju Kakkar

Humber College Institute of Technology & Advanced Learning

Almost every aspect of our lives has been impacted by the global pandemic. We are nearing the two-year mark since COVID-19 changed our world incalculably. Businesses and individuals have had to adapt and pivot rapidly to this changing climate. The need for innovation has propelled the age of innovation. Socrates' words ring true today more than ever, "The secret of change is to focus all of your energy, not on fighting the old, but building on the new."

The Canadian economy, businesses, society, and academic, including polytechnic, institutions have displayed tremendous resilience, tenacity and endurance while adapting to a hybridized reality. From ensuring program offerings meet the demands of the industry, keeping students at the heart of decision-making, to redefining what education will look like in a hyflex environment, our polytechnics spare no effort in moving forward.

We sat down with Gina Antonacci, PhD, Senior Vice-President, Academic, Humber Institute of Technology & Advanced Learning, to discuss "practical innovation" and how polytechnic institutions like Humber College are indispensable to Canada's innovative future.

Author Note

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Office of Research & Innovation (ORI): Historically, major global crises have accelerated technological change. COVID-19 has propelled the world to rethink and reimagine our future. Can you tell us what steps Humber took to innovate post-COVID?

Gina Antonacci (GA): Recovering from the initial onset of tremendous disruption, like everyone else, we have faced challenges, but we have also witnessed some positive outcomes. What COVID did is, by necessity, it moved us forward at an accelerated pace to put some key initiatives into action. Call it "innovation acceleration"; we did not have any more time to contemplate; we needed to just do it. As a result of the pandemic, we had to first and foremost move our face-to-face courses to a remote environment. I would refer to that adaptation as a "development phase", and we began by introducing elements of Virtual Teaching and Learning. Over time, we became more adept at understanding the virtual environment. We have arrived at a place where we are well able to assess the value-add of the virtual environment and ensure that we have the capacity to continue to offer courses and programs virtually. That is something that is going to stay with us as we move forward.

Offering students added flexibility to virtually access software offered at Humber has been a top priority. Post-COVID, we worked closely with our industry partners, and now our students can access a wide availability (over 100) of software and digital resources virtually.

Another encouraging element is that we explored how we could best offer work-integrated learning (WIL) opportunities to our students in a virtual format. Led by Humber's International Centre, the Collaborative Online International Learning (COIL)

framework was introduced. COIL has been an overwhelming success that connects students with peers worldwide, taking the form of an experiential learning project or module co-created through a Humber faculty or staff "match" with a faculty or staff at a partner institution in another region or country. I witnessed COIL's tremendous value and success first-hand—my daughter is currently enrolled in a master's program at Nottingham Trent University, UK, and she was part of a Humber-COIL project. This framework has proven to be truly transformative for our students and institutions alike.

Recognizing that there are elements and types of WIL experiences that cannot be fully experienced virtually, Humber's technology experts have created a number of simulated environments for our students to learn specific skills. All these initiatives will continue to be offered as we move beyond the pandemic.

We have seen remarkable growth in the area of "research." Research has continued to thrive despite the challenges and hurdles we faced during the pandemic. Humber continues to be very proactive with our research partnerships and industry/community involvement.

ORI: Would you agree that Humber's current trajectory would not have accelerated, to this degree, had we not been thrust into this pandemic?

GA: We recognized long before the pandemic that we had to plan for a future influenced by digitization and growing demand for experiential opportunities offered by globally recognized institutions like Humber that combine a solid academic foundation with practical learning. The pandemic thrust us into actualizing our vision faster than planned and in a most time-efficient manner. For example, we established the Humber International Graduate School (IGS), which opened its doors in January 2021. In terms of innovation and academic excellence, the final frontier is what has been identified as the "hyflex" (hybrid flexible) education model. IGS was built for flexible teaching and learning and is the perfect example of a "hyflex" model. IGS houses global classrooms that support a hyflex academic delivery, facilitating engagement with students in class and those joining virtually simultaneously.

We want to continue to create hyflex situations where faculty and students are supported with the required technology in order to make it work while also continuing to be a leading polytechnic offering face-to-face applied learning opportunities in a safe environment.

Forging ahead, it is about creating refinement and sophistication when it comes to seamlessly intertwining these different yet codependent models.

ORI: What were the challenges Humber faced to adapt to this changing environment, especially adapting to a hyflex environment? What are the challenges that keep you up at night?

GA: From an academic perspective, the challenge moving forward is to determine a cohesive and compatible balance between face-to-face and virtual delivery–what does that look like, and how do we create fulfilling virtual experiences for our students. I am confident that we will get better and excel and that we possess the capability to continue to adapt and innovate.

Admittedly, some of our students stated that an online learning environment might not suit them best. Applied learning is what attracted them to an institution like Humber, combining both theory and experiential learning. During the pandemic, the challenge for us was to ensure that those students had opportunities to defer some of the courses that were totally applied in nature and support them as they completed other required online courses.

Furthermore, the academic leadership team has worked closely with faculty, and we have made some choices around specific courses and programs that will remain fully online henceforth. Notably, the pandemic has underscored the importance of face-to-face learning. Moving forward, it is about trying to meet the needs of the diverse group of students that we serve, and we remain dedicated to continuously providing the best possible options for hands-on learning, virtual learning and a hyflex experience.

The only thing that really ever keeps me up at night is ensuring that we are meeting the needs of our students; students are always at the centre of our decision-making.

ORI: Canada scored an overall C in innovation as per the Conference Board of Canada's Innovation Report Card 2021. In particular, Labour Productivity scored a D. What role can polytechnic institutions play to prepare the future generation to meet the demands of workplaces, skills and competencies in the age of innovation?

GA: I am confident that Canada's colleges and polytechnic institutions are best positioned to assess where those gaps are, what gaps exist in skilled environments, and how to address them. There is a difference between a labour shortage versus a gap in skilled labour. Pertaining to a skilled labour shortage

that has not been trained appropriately to work in specific areas, I believe that we have the ability to assess and come up with strategies to address this, for example, in the form of micro-credentials where we offer very specific industry-based courses. The key is that we need to be connected to the needs of the industry. Fortunately, we have built robust industry and community relationships, and we are continuously evaluating feedback from our Program Advisory Committees (PACs).

We also need to continue to engage in research. Humber's rising ranks in research and industry partnerships are a testament to our constant collaboration with internal and external connections. These partnerships and deep-dive discussions on the specific subgroups of industries and the specific skills and competencies required inform and assist us in designing and developing courses, programs, and training.

ORI: Can innovation be taught in classrooms?

GA: Of course! Innovation is not just for students; it is for each of us. Innovation is about moving forward. Within the context of the college, innovation belongs to all of us; no matter what your role is, no matter where you sit in the college, you have an opportunity to think about ways that we can innovate, ways that we can grow, ways that we can be better, and ways that we can look at new opportunities. I look at innovation as a generic skill that we all require to move forward. We will continue to talk about how we build our capacity to be innovative and that it is not something that just belongs to people in certain roles. We can all be innovative thinkers, innovative doers, and have an innovative discourse.

The Centres of Innovation (COIs) at Humber champion "innovation" and "innovative discourse", and we are going to continue to move this dialogue forward. I am an advocate of promoting productive dialogue on innovation; that is how you get buy-in, get people to connect, and recognize that it is not something to be afraid of; in fact, it is something that we are all good at. We all think about the future. So let us do it in a way that helps move Humber forward.

ORI: "Innovation is a generic skill," we remain encouraged and inspired by your words. Lastly, tell us how you have tackled achieving a work-life balance in this changing environment?

GA: It has been a challenging time to engage in work-life balance. Each of us is responsible for achieving that balance, and some of us are better at it than others. I know that we must take care of ourselves so that we can take care of others. We must be role models and emphasize that self-care comes first. In our strategic plan, we have made a commitment towards being a healthy campus, and we encourage self-care and caring for others.

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Applied Research in Post-Pandemic Canada

Alexandra Apavaloae, PhD, and Cody McKay
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Abstract

Though Canada's immediate priority is finishing the fight against COVID-19, we must not lose sight of other persistent national challenges. From an aging population to climate change, advancing Indigenous reconciliation to supporting businesses grappling with technological change, polytechnics are providing pragmatic and industry-aligned solutions through applied research. This paper explores how polytechnic applied research mitigates some of Canada's most pressing challenges, highlighting partnership and project outcomes, examining existing policy gaps and proposing bold new solutions.

Keywords

COVID-19, applied research, innovation, polytechnic, college, healthcare, climate change, Indigenous, reconciliation, technology, adoption, adaption, productivity

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Introduction

Although Canada's immediate priority is finishing the fight against COVID-19, we must not lose sight of the challenges on the horizon. An aging population will require new approaches to and solutions for healthcare. Achieving net-zero emissions to fight climate change will impact every sector of the economy. Indigenous reconciliation requires an intentional effort and the resources to support it. Layered across these issues, technological disruption is rampant in an increasingly digital world.

Meaningful progress to address these challenges must make use of capacity in every corner of the country. For the network of Canadian polytechnic institutions, this means looking within to see what we are doing to address these challenges today and where we are well positioned to do more. For governments both federal and provincial, it means recognizing pockets of activity that could be scaled for greater impact, particularly in areas of identified priority.

Healthcare

When the World Health Organization declared the novel coronavirus (COVID-19) a global pandemic, few could have anticipated the tremendous impact it would have on the world's population, economies, and healthcare systems. Even as vaccines are administered and businesses reopen, Canada should not rush to put the pandemic into history books. Instead, the time is right to take stock of the lessons learned and plan for what comes next.

From the mental health of healthcare workers (Wu, Styra, & Gold, 2020) and hospitals operating over capacity (Galasso & Mitchell, 2021) to delays in non-urgent surgeries (Dudevich & Frood, 2021) and weaknesses in long-term care (Clarke, 2021), the impacts of the pandemic will continue to reverberate. The pandemic illustrated the fragility of the Canadian healthcare system and should be viewed as a wake-up call.

Going forward, the system will need to both adapt to existing realities and address future needs, some foreseen—like an aging population—and others unknown. This will require creativity and innovation, efficiency and resilience.

Pre-pandemic, the Canadian Institute for Health Information estimated health expenditure at $11,599 per capita for seniors

***Innovation Spotlights** These are contributions that highlight innovative practices, approaches, or tools and provide accompanying evidence that speaks to the effectiveness of the innovation, including but not limited to an innovative teaching practice or an innovative methodology benefitting academia, industry, and community partners.

aged 65 and older, and $3,131 for those aged 15 to 64 (CIHI, 2021). With Canada's senior population expected to increase from 17 per cent in 2018 to 21 per cent in 2028, an estimated $98 billion in added healthcare costs are imminent (Gibbard, 2018).

Keeping these costs in check will rely on our ability to prevent and treat illness. Whether COVID-19 or another ailment, the national capacity to develop vaccines and other treatment options is critical. During the early days of the pandemic, researchers at Fanshawe were focused on reducing the body's inflammatory response to the virus (SONAMI, 2020). The research showed such promise that it was provided to the U.S National Institutes of Health for pre-clinical trials (De Bono, 2020). Such applied research efforts build practical capacity and talent in Canada to respond to existing and emerging diseases.

Polytechnic applied research is also well-positioned to support the healthcare sector as it joins the digital revolution. At Sheridan's Centre for Mobile Innovation, researchers are leveraging modern technology to transform and improve the efficiency of doctors' offices. Using augmented reality, the research enables doctors to view patient vital signs, test results and medical history, medications and allergies in real time (Kataoka, 2019).

At Algonquin, digital solutions to improve frontline care and patient/family engagement are also being developed. These include the Community Paramedics Continuing Medical Education App, the Healthcare Messenger App for Caremeda and the Patient Engagement Platform (Algonquin College, 2021).

While technology stands to make healthcare delivery more efficient, it is a fundamentally people-focused sector. Applied researchers at Conestoga are working to improve the outcomes of patients with complex needs, such as dementia. The initiative focuses on novel approaches to bridge skills gaps for unregulated care workers to improve outcomes, reduce turnover, and ensure greater job satisfaction (Conestoga, 2021).

That people-focus must extend even further, helping individuals navigate their healthcare decisions. During the pandemic, an unforeseen challenge was the spread of misinformation about COVID-19. Through a partnership with MediaSmarts, BEworks and leading misinformation researchers, Sheridan designed, tested, and disseminated creative interventions to combat the spread of misinformation using behavioural science and digital and media literacy research (Atkinson, 2020).

By supporting technology adoption, building talent and capacity, and responding quickly when new challenges emerge, polytechnics have proven their capacity to both solve current healthcare challenges and anticipate those of tomorrow.

Climate Change

The latest report from the Intergovernmental Panel on Climate Change is an indictment of the global record, noting that, "it is unequivocal that human influence has warmed the atmosphere, ocean and land" (IPCC, 2021). The warning has been accompanied by unprecedented global climate emergencies, prompting renewed calls for action. In Canada, commitments have included reducing emissions and energy waste, making clean, affordable transportation and power available in every community, and building a clean industrial advantage (ECCC, 2020).

This ambitious plan relies on contributions from and cooperation among all economic sectors, the general population, and all levels of government. We also see opportunities for polytechnics to play a key part given their experience with industry-academic partnerships, delivery of pragmatic solutions and central role training the green collar workers needed to implement solutions.

Given Canada's size and climate, it is of little surprise that its transportation sector contributes 25 per cent of the country's total annual emissions (Government of Canada, 2020). At Red River College Polytechnic, located in Winnipeg—one of Canada's heavy equipment hubs—they are actively working on green transportation solutions.

Between 2010 and 2017, RRC Polytech partnered with the Government of Manitoba, Mitsubishi Heavy Industries, Manitoba Hydro and New Flyer Industries to prototype and test the feasibility of electric buses in the region. Whereas previous electric public transit options have been tethered to overhead wires, this project sought to develop advanced lithium-ion batteries that would power city buses. In addition to RRC Polytech's expertise working with heavy equipment, Manitoba presented the ideal testing ground for global deployment given its weather conditions—very hot summers and frigidly cold winters. Partners involved in the research believed buses successfully deployed in Manitoba could be used anywhere in the world.

The project proved a resounding success, with the prototype introduced as part of Winnipeg's transit fleet. At the time, the prototype was the only modern, battery-based electric bus developed by a domestic manufacturer (Hoemsen, 2017).

Buildings are another significant contributor to Canada's greenhouse gases, accounting for 13 per cent of total emissions (Government of Canada, 2020). Making offices, buildings, and homes more efficient will both reduce emissions and

save consumers money. Here again, polytechnics are making meaningful contributions.

In Calgary, the Southern Alberta Institute of Technology's Green Building Technologies team is transforming the way we think about building homes. In March 2021, the team worked with Woodpecker European Timber Framing to build a home to meet the Living Building Certification, the world's most rigorous green-building rating program. The home allowed SAIT researchers to pilot a dashboard to monitor building performance and consult on the design of high-performance, energy-efficient wall panels (SAIT, 2021).

At Kwantlen Polytechnic University's Wilson School of Design in BC's lower mainland, efforts are also underway to help industry reduce their carbon footprint through a project called NetGain. Researchers and students are turning recovered fishing nets into filaments for 3D printing. Through this work, the team contributes to the environmental effort, incentivizes the return of old nets, and taps into the 3D printing industry, which is expected to be valued at more than $20 billion by 2030 (KPU, 2019).

In the oil and gas sector, cooperation with major industry players is critical. For example, Inter Pipeline, a major petroleum business, has invested more than $10 million in the Northern Alberta Institute of Technology's Plastics Research in Action (PRIA) initiative. PRIA draws on NAIT's expertise in process engineering, process automation and environmental sustainability, with a portion of the funding dedicated to improving sustainability practices at Inter Pipeline's Heartland Petrochemical Complex. Support from the federal Strategic Innovation Fund highlights how government dollars can support innovation and drive change.

As people around the world grapple with their impact on the planet, it is critical that governments use all available resources to develop and implement pragmatic solutions. Applied research at Canada's polytechnics offers practical, incremental, and impactful options, addressing climate issues as varied as greenhouse gases and water contamination. Furthermore, by involving students in cutting-edge projects, polytechnics are training the workforce needed to implement the broader transition to a green economy.

Indigenous Reconciliation

Canada is beginning to acknowledge its fraught history with Canada's Indigenous communities. As part of its report in 2015, the Truth and Reconciliation Commission issued 94 calls to action. Post-secondary education has an important role to play in reconciliation, from integrating Indigenous knowledge and teaching methods into classrooms to "building student capacity for intercultural understanding, empathy, and mutual respect" (TRC, 2015). Polytechnic institutions are doing their part.

One of the most painful and enduring legacies of Canada's relationship with its Indigenous people is the residential school system. Over the summer of 2021, Saskatchewan Polytechnic worked closely with Cowessess First Nation on an applied research project called the Remote Sensing of Residential School Cemeteries. Institutional experts used technologies drawn from other sectors to survey an area identified by the Cowessess First Nation as a potential site of unmarked graves. The partnership stands to inform and support reconciliation by helping the First Nation tell their story (Bergeron, 2021).

In addition to acknowledging the past, post-secondary institutions must consider how best to empower and support Canada's Indigenous population going forward. Based on a recent survey, Indigenous Works suggests that "85% of corporate Canada are 'disengaged' and have no credible plans to work with Indigenous people, businesses and organizations" (Malatest & Associates Ltd., 2017). In the absence of these relationships, full Indigenous participation in the Canadian economy will remain elusive.

Yet, the National Indigenous Economic Development Board estimates that closing the opportunity gaps between Indigenous and non-Indigenous Canadians stands to increase national Gross Domestic Product (GDP) by $27.7 billion annually (NIEDB, 2019). Polytechnics are enabling and supporting this process.

Because polytechnics are deeply embedded in their communities, understand local issues, and have a history of partnering with Indigenous groups, they are positioned to bridge gaps and boost opportunity for Indigenous business owners.

For example, researchers at Seneca's School of Biological Sciences & Applied Chemistry partnered with the Indigenous-owned Cheekbone Beauty Cosmetics Inc. to develop a mist formulation for a face primer. The primer mist contains Canadian-sourced, bio-based raw materials used in traditional, Indigenous medicine. As part of the project, Seneca is helping to devise a process to scale up manufacturing and commercialize the product, enabling Cheekbone to expand their product line, adapt to industry trends and meet customer demand for eco-friendly, "mindful" beauty products (Seneca, 2021).

Community challenges are also being targeted. The British Columbia Institute of Technology partnered with Denesoline Corporation, the business development arm of the Lutsel K'e Dene First Nation, to deploy green solutions for the remote community.

BCIT's Smart Microgrid Applied Research Team is developing a front-end engineering and design study for a hybrid renewable energy platform for the community, which is not currently connected to the North American electricity grid. If successful, the project could be replicated in 200 other diesel-powered Indigenous communities (BCIT, 2021).

Reconciliation is a national effort, and the education sector has a significant role to play. Polytechnic applied research offers pragmatic ways to connect students to Canada's Indigenous history. It also supports entrepreneurs and business owners in the bourgeoning Indigenous economy. These approaches stand to support reconciliation and build a stronger economy along the way.

Technology Adoption and Adaptation

Innovation, "the development and application of ideas and technologies that improve goods and services or make their production more efficient," has long been thought to have great economic benefit (ECB, 2021). Yet, Canada's most recent innovation report card from the Conference Board of Canada found the country continues to exhibit relatively weak innovation performance, ranking tenth among 16 peer countries. The Conference Board reports that, although entrepreneurial ambition is high, Canada lags on metrics such as business research and development and labour productivity (Nadeau & Gresch, 2021).

This is of particular concern among small businesses. As of December 2019, there were 1.23 million registered Canadian businesses. Of these, 1.2 million (97.9 per cent) were small and 73.6 per cent had fewer than 10 employees. These small businesses employed 8.4 million workers, or 68.8 per cent of the total private sector labour force. Yet, the contribution of small- and mid-sized enterprises (SMEs) to Canada's GDP between 2012 and 2016 was just 51.1 per cent (ISED, 2020).

The productivity gap could well be attributed in part to slow technology adoption. In fact, a recent Brookfield report found that Canadian SMEs lack the ability to capitalize on digital technologies, with challenges that included lack of data, limited access to infrastructure and supports, and lack of the necessary confidence to implement digital transformation strategies. Culture and level of digital awareness were also factors. The report argued that without supports to help SMEs better understand the benefits of digital investments and reduce uncertainty and risk, they are likely to see the earnings gap continue to grow over time (Goldsmith, 2021). From blockchain-enabled access to digital agriculture solutions (Seneca, 2021) to assisting local software developers transition their code to newer technology (NAIT, 2021), polytechnics have the capacity to offer a spectrum of solutions across sectors to help Canadian businesses improve their productivity.

Polytechnic applied research has long helped businesses overcome production hurdles, scale up using innovative technologies, and commercialize new products. State-of-the-art facilities within the institutions provide businesses access to dedicated labs and equipment where they can produce prototypes and test new processes. Partnering with institutions is particularly important for SMEs that may not have in-house capacity but can make considerable advances when they have opportunities to explore new concepts and ideas.

Such a partnership between George Brown College and Quantum Robotic Systems allowed the small company to improve a stair-climbing, domestic service robot. The robot has capacity to move heavy loads, with great potential as an assistive device for seniors and persons with disabilities (George Brown College, 2020).

Many of these research projects are led by faculty who themselves have considerable industry experience. As researchers, they are ideally positioned to add insights into both project development and the broader business environment. For example, Humber's Georges Livanos is an award-winning, patent-holding instructor with more than a decade of practical experience in his field (Livanos , 2021). He brings that expertise to projects, such as the collaboration with Martino Contractors Ltd., which sought to detect and warn people about potentially fatal furnace malfunctions (Shetty, 2017).

An ancillary benefit of this innovation activity is student involvement. By participating in applied research projects, learners not only acquire hands-on, practical experience but also foster creativity and build problem-solving skills. An innovation-enabled talent pipeline is critical to Canada's future productivity and growth.

For example, Saskatchewan Polytechnic's Innovative Manufacturing Centre has the capacity to assist industry in biomaterials testing, research, additive manufacturing, and prototyping (Bergeron, 2018). The centre also allows students like Luke Dombosky to follow their entrepreneurial passion. A graduate of the Innovative Manufacturing program, Luke started a custom solutions design and manufacturing business while he was still in school. The business now includes a team of multi-skilled tradespeople, including several other Innovative Manufacturing

alumni (Bergeron, 2021).

Closing the productivity gap will require precisely the kinds of support available via polytechnic applied research. Access to facilities, labs, and equipment can enhance the research and development activities of SMEs without requiring extensive investment in their own capacity. Students and faculty stand at the ready to support technology adoption efforts and business development, offering follow-on benefits for the talent pipeline and ensuring faculty remain in touch with industry challenges and realities. This ecosystem provides immediate benefit to the private sector and builds home-grown talent for the future.

Conclusion

As Canada builds back from the COVID-19 pandemic, there are a number of ways that polytechnic applied research stands to contribute. Existing facilities, equipment, and expertise are ready to help businesses and organizations, private enterprises and public sector institutions address some of the preeminent innovation challenges of our time. This capacity is too important to ignore or under-utilize in today's environment.

There are also ways to super-charge this capacity and enable even bigger contributions. This relies on revisiting government investment in applied research projects, infrastructure, and business development. It means recognizing how polytechnic institutions are currently contributing to healthcare innovation, Indigenous reconciliation, technology adoption, and business productivity, then scaling that capacity to have even greater impact. It is equally important to consider how pragmatic exposure to and involvement in applied research is providing key skills in the next generation of employees and entrepreneurs. These are the ingredients of practical innovation.

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Sustaining Innovation Capabilities Beyond COVID: A New & Distinctive Role for Polytechnics

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Abstract

In responding to the COVID-19 pandemic, many Canadian workplaces have experienced a surge of employee engagement with innovation. Maintaining this momentum can help the country to achieve its "Build Back Better" goals post-pandemic, as well as to address some of Canada's longstanding innovation challenges. In this time of change, Canada's polytechnic institutions are afforded an opportunity to make a distinctive contribution: equipping graduates with the innovation capabilities they need to navigate the future of work. Drawing on Breznitz's work, we begin by noting a key factor for Canada's longstanding innovation challenge, specifically its insufficient attention to the role of the individual as an Agent of Innovation. Then the case for employee-led workplace innovation is made, with reference to research and work underway globally, and mention of both the links to and differences from entrepreneurship (with which innovation capabilities are often equated). Having established the value of employee-led workplace innovation, the authors propose polytechnic institutions as the optimal venue for advancing this work in Canada. The paper concludes with a discussion of the opportunities that employee-led workplace innovation can bring to polytechnic institutions, specifically in terms of instructional development, collaboration with workplace partners, and potential for leadership in North American higher education.

Keywords

Employee-led Workplace Innovation, Future of Work, Teaching and Learning, Polytechnic Distinctiveness, Role of Polytechnics (in Canada), Pandemic Recovery

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Introduction

> *Innovation matters because "it is the only way to ensure sustained long-term economic and human-welfare growth, not because it is new or cool" (Breznitz 2021, p. 3).*

With Canada's highly educated population, excellent research universities, strong public investment in R&D, and inventions across diverse fields, Canadian innovation should be thriving. However, private-business R&D investment is one of the lowest in the OECD, patents and intellectual property rights are declining, and labour productivity is weak, with R&D as a share of GDP declining since 2001 (Breznitz 2021, p. 62 and Robinson & Komesch, 2018, p. 8; Sulzenko, 2016). Breznitz (2021, p. 61) even awards Canada "the wooden-spoon award for the worst innovation policy among all developed nations!"

Despite the havoc the pandemic has wreaked, it does pose an opportunity to flip the script. Anecdotally, many of our workplace partners have reported accelerated change through the discovery, rapid adaptation, and intrinsic validation of new work practices, many of which will continue to impact the workforce well beyond the pandemic. Similarly, many polytechnic educators have developed—or discovered within themselves—mindsets and skills for innovation in teaching and learning, applied research, and interaction with industry. Undoubtedly, almost everyone has

***Innovation Spotlights** These are contributions that highlight innovative practices, approaches, or tools and provide accompanying evidence that speaks to the effectiveness of the innovation, including but not limited to an innovative teaching practice or an innovative methodology benefitting academia, industry, and community partners.

experienced that innovation really does matter, from vaccine development to new uses for plexiglass.

Across the board, there has been an increased awareness of the value of employee-led innovation in the workplace, both in terms of ad hoc problem-solving and the development of new ideas to create lasting value. During the pandemic, employees have stepped up to engage with changes in their work practices. These have been created by individuals adjusting their own job tasks and roles for the pandemic's 'fluid situations', adapting innovation from outside their workplaces, and designing innovations in work units and cross-functional teams. These employee-led innovations have provided tangible value to organizations in trying times and demonstrated a high level of employee interest and engagement.

How might these achievements and the innovation momentum they have spurred be strategically leveraged to sustain and to enhance workplace innovation? Here we make the case for the integration of Employee-led Workplace Innovation capabilities in polytechnic education to better equip learners for the future of work, thereby strengthening innovation in the Canadian workplace, and sustaining the unique role of the polytechnic within the nation's higher education landscape.

Canada's Innovation Challenge

On paper Canada has "everything that academics and consultants alike argue is needed to excel in innovation": high levels of education, public R & D investment, investment in science, and the development of many significant technologies across a wide spectrum of fields (Breznitz 2021, p. 62). However, private-business R&D, labour productivity, patents and intellectual property rights tell a different story. And as Breznitz notes, "[t]he most damning statistic of all is that since 2007, the more the Canadian government has invested taxpayers' money in trying to spur innovation, the less Canadian private businesses have done so" (ibid).

Canada, in Breznitz's view, "is the most striking example of how people from all venues of life can consistently refuse to learn the most basic economic lesson: [i]f you want success in innovation, focus on its agents" (63). Breznitz identifies two agents: firms and individuals (62), both of which need to be equipped with "the capacities they need in order to excel" (63). Canadian policy makers may not sufficiently appreciate the focus on individual agents, but polytechnic educators certainly do by virtue of their work with individual learners. This is not to say that most polytechnic educators currently understand innovation, but they do know what the demonstration of competency looks like at the individual level, and can work collaboratively with those who possess expertise in innovation—in much the same way that they work with industry partners—to tease out what the competencies and capabilities[1] are and to determine how they can be integrated into curricula and practice, whether it be in academic programs or in workplace training.

The Employee as an Agent of Innovation

In shedding light on individuals as agents of innovation it is helpful to examine the literature on 'serial innovators' (Epstein, 2020, pp. 211-212; Griffin, 2012). Such people possess breadth, flexibility, and creativity, as well as the ability to work with others outside their fields and to synthesize information across a range of domains. Specifically, such individuals tend to:

- Display a high tolerance for ambiguity
- Be systems thinkers
- Access additional technical knowledge from peripheral domains
- Repurpose what is already available
- Be adept at using analogous domains for finding inputs to the invention process
- Have an ability to connect disparate pieces of information in new ways
- Synthesize information from many different sources
- Flit among ideas
- Have a broad range of interests
- Read more, and more broadly than others
- Learn across multiple domains
- Communicate with those who have technical expertise outside their own domain

(Epstein, 2020, pp. 211-212; Griffin, 2012)

There is certainly nothing new about these attributes—in the literature Charles Darwin is given as an exemplar of a serial innovator *par excellence* (Epstein 2020, p. 212). However, these capabilities do provide a helpful counter to the tendency to view successful innovation as solely the purview of specialists[2].

1 We differentiate between 'Competency' and 'Capability' in this way: competencies are more present-focused, describing what an individual 'can do' while 'capability' is more future-oriented as "the combination of skills, knowledge, values and self-esteem which enables individuals to manage change, be flexible and move beyond competency" (O'Connell et al. 2014; Bromley 2019).

2 One metric by which to quantify innovation is in the area of patents. Contributions from specialists spiked after World War II, peaking in the mid-1980s, but have declined dramatically since (Epstein 2020, p. 205).

Further, their breadth aligns with broader post-Fordist conceptions of 'skill,' as opposed to older, more segmented, Taylorist notions (that arguably harken back to pre-Fordist times).

At the same time, while references to famous innovators such as Darwin may be useful in understanding how innovation plays out at the individual level, they can also be unhelpful in that they reinforce the limiting stereotype of the so-called 'magic human' (Vereycken et al 2020, p. 53; Pacaux-Lemoine et al 2017). The misconception that regular people cannot be innovators—not unlike the outdated idea of entrepreneurs as being born, not made—can be an obstacle to understanding newer concepts of what it is to be an innovator. Take, for example, this particular definition of the 'Operator 4.0':

> *Operator 4.0 refers to smart and skilled operators of the future, who will be assisted by automated systems providing a sustainable relief of physical and mental stress and allowing the operators to utilize and develop their creative, innovative and improvisational skills, without compromising production objectives (Kaasinen et al., 2020, p. 2).*

An individual working as an "Operator 4.0" needs to develop the capacities of a 'serial innovator', such as synthesizing information from multiple sources and learning across multiple domains. The challenge, and indeed the opportunity, is for polytechnic educators to work in collaboration with workplace partners to identify these capabilities and to develop them in our curricula and teaching and learning practices. In that context, we find the research and work underway globally in Employee-led Workplace Innovation provide guidance.

During the pandemic, the general public has experienced the benefits of workplace innovation—much of it employee-led—even if the term itself is unfamiliar. Consider, for example, the many innovative solutions that have connected long-term care and assisted-living residents with their family members (e.g., Wadhwani 2020 & Care Quality Commission 2020). Might then the innovation momentum of the pandemic fuel an interest in and an acceptance of employee-led workplace innovation? During the pandemic, we have noted that the attention being directed toward employee-led workplace innovation within leading-edge organizations is being complemented by a wider workforce population—employees, employers, clients, etc.—experiencing its value in concrete and impactful ways.

What is Employee-Led Workplace Innovation?

Employee-led Workplace Innovation is defined here as the social process of engaging the workforce in generating and mobilizing new ideas to create lasting value (WINCan, 2017). The concept has emerged out of grass-roots activities in northern European initiatives to foster government, industry, and labour collaboration to improve both economic performance and quality of work life (Johnsen et al., 2021). In the last decade it has been formalized in both European Union (Pot et al., 2016) and national policies (Alasoini et al., 2017) and has generated a growing knowledge base from both research evidence and exemplary practice (McMurray et al., 2021). One of the distinguishing elements of the European perspective is its focus on two complementary goals: workplace innovation must improve organizational performance and improve the quality of working life for the workforce. This contrasts with a solely technology-driven focus for Industry 4.0 (Vereycken et al., 2021, p. 45).

For example, one European study on innovation in manufacturing (Cornelius et al., 2021) has found that digitalization and automation are transforming the roles of front-line employees, with "[w]orkers increasing value not only by performing their core duties but by contributing to broader organizational objectives such as competitiveness and innovation" (p.7). The study found that in making process improvements and finding business opportunities for their employers, the innovations of front-line workers have "become one of the largest sources of sustained competitive advantage in manufacturing industries: at leading companies, *up to 75% of productivity gains trace back to bottom-up ideas from non-R&D staff*" (p.10; italics ours). This finding clearly illustrates the value of employees leading innovation in their workplaces.

Further, it is worth noting that the ongoing U.K. research effort to develop Innovation Capability for technologists and technicians as part of Industry 4.0 requirements (Lewis, P.A., 2020), along with studies in other emerging industries (Lewis, 2020), is work which clearly has relevance for polytechnic education. The role of technicians in innovation tends to be downplayed or even ignored, but they contribute to innovation in two related ways. First, technicians' deep familiarity with the technology they operate and maintain gives them particular insight into the improvements that fuel incremental innovation. Second, they play a key role in disseminating information about the need for such innovations in their respective workplaces, thus contributing significantly to their firms' absorptive capacity without which productivity would lag (Lewis 2020, p. 622 & p. 634)[3].

3 The degree to which workers participate in incremental innovation is, however, impacted significantly by how their jobs are designed and organized (Lewis 2020, p. 634; Jones and Grimshaw 2016; Toner 2011). Some question how much employees will be involved

A case study on Leadership Readiness in Digital Manufacturing (Guzzo, 2019) also notes the need to enhance the innovation and change capabilities of leaders:

> *The new information-rich digital environments create occasions for insight and innovation at multiple stages in a production process. Digital environments put a premium on leaders' capacity to facilitate data-driven innovation within and among teams responsible for different production steps and to oversee new ways of doing things. (p. 83)*

Europe continues to be the leader in developing and utilizing workplace innovation capability, and there are some instances of higher education institutions stepping up in this area; for example, an early "every student" learning experience with innovation was recently implemented in a Finnish university of applied sciences [Hero & Lindfors, 2019]. Other regions are also pursuing initiatives in this area. Australia was an early leader—2009!—in developing workplace innovation capability with technician and trades students (ISBA, 2009); while this has stagnated with a change in government and the loss of auto manufacturing, recent government initiatives in Advanced Manufacturing seem likely revive it. A recent Australian-Canadian collaboration has introduced a course unit on Understanding Workplace Innovation at the university level (Nobis et al., 2020). Singapore has focused almost exclusively on Design-Led Innovation, specifically in Manufacturing domains such as Additive Manufacturing (Perez, 2018).

In contrast, in North America, there has been little government understanding of the importance of employee-led workplace innovation. There have, however, been initial efforts to incorporate workplace innovation capability into post-secondary curricula in the U.S. (Selznick, 2018) and Canada (Baregheh et al., 2021), and to foster collaborations across industry and academic sectors to develop capability specifications (Carey, Maxwell & Melnick 2018) and adaptable learning resources (Carey & Pierre, 2019). The emergent status of Workplace Innovation within higher education is analogous to that of Entrepreneurship a decade or so ago. It is important to note that "innovation and entrepreneurship are not only different concepts, but they also play out in postsecondary institutional contexts in different and important ways" [Swayne Selznick et al., 2019]. This interdisciplinary team of (U.S.) authors builds the argument that "innovation should be taught separately from any one disciplinary context…developing innovators should precede teaching future entrepreneurs."

in the technological innovation process in the future, with some predicting that gains will be temporary, disappearing once the bugs are worked out (Vereycken et al 2021, p. 45; Botollo et al 2018).

A Distinctive Role for Polytechnics in Workplace Innovation Capability

The high quality and the reach of Canada's public higher education institutions provide an opportunity to position the country as the North American leader in leveraging employee-led workplace innovation for quality of work life and organizational performance. Adapting and applying these processes in Canada can lead to more innovative workplaces and organizations (as well as more attractive opportunities for European companies seeking to invest in manufacturing and R&D facilities within North America).

In our view, the distinctive nature of polytechnic education offers several advantages for developing the emerging capability for employee-led workplace innovation for both traditional students and the 'not-so-new majority' [Deil-Amen, 2021] of working learners. We believe that the nature of polytechnic institutions supports a distinctive role in developing workplace innovation capability in higher education: polytechnic institutions are uniquely positioned to develop and sustain professional activity around innovation in learning and teaching, both as a way to improve learning and as a topic of the learning in its own right.

To illustrate the distinctiveness of polytechnic institutions, we turned to the inaugural issue of this Journal [De Courcy & Marsh 2018]. We have extracted quotations from the editors' introduction that describes the distinguishing features of polytechnic education, to which we have added comment on their relevance in supporting the development of capability for employee-led workplace innovation:

Polytechnic Education is…

- *nimble and responsive to the needs of industry and directly informed by industry partnerships*
  - ➤ As outlined above, developments in the workplace are driving the need for institutions to build graduate capability for Workplace Innovation. However, our existing mechanisms for academic-workplace cooperation on curriculum, such as the Program Advisory Committees cited in De Courcy and Marsh, are not well-suited to specifying work roles and job competences which are still emerging [4]. This creates an opportunity for new forms of collaboration in which industry and polytechnics work together

4 This need/opportunity was brought to our attention by Dr. Tom Roemer of B.C.I.T.

to identify new capabilities and how they can be developed, demonstrated, and documented.

- *education, innovation, and training are interwoven… learning moves seamlessly between inquiry, experimentation and skill development*
  - ➤ At first glance, the idea of students getting hands-on opportunities in workplace innovations seems highly unlikely, calling to mind the Annoying Novice effect [Schwartz & Blair 2021], i.e., "the ones in the meeting who merrily brainstorm utterly unworkable solutions" because of a lack of practical experience. However, there is a workplace setting available to all our students where our student learners already have familiarity and where our institutions exercise significant influence on their hands-on engagement with innovation: our institutional Teaching and Learning environments where students engage in the work of learning.

    Innovative teaching and learning can thus provide an authentic learning experience with innovation in our workplaces for learning. Initial proof-of-concept pilot studies in a Canadian polytechnic [Carey, Dastur & Karaush 2019] have demonstrated the feasibility of this approach. It has been developed further from prototype to scale-up in the Australian [Nobis et al., 2020] and Canadian [Baregheh et al., 2021] examples cited earlier, and later studies are beginning to demonstrate its viability as preparation for more traditional external work-integrated placements [Carey, 2020].
- *at the forefront of pedagogical experimentation… pioneering innovative, flexible, student-centred approaches to learning*
  - ➤ The pedagogical approach sketched in the previous point relies on ongoing innovations in teaching and learning, in which students can authentically engage and reflect and to which they can meaningfully contribute. A polytechnic institution with a strong culture of innovation in this area is therefore well-positioned to leverage those developments into distinctive capability development opportunities in Workplace Innovation.

    A similar approach is already well-established in another emerging graduate capability: the need to engage with Sustainability across all of our professional and technical programs.[5] Likewise, innovation in our teaching and learning environments can support workplace innovation capability as a graduate outcome [Carey & Ferreras, 2020].

Using our own innovation environment in this way, as a 'training wheels' setting for learners, will only succeed if we ourselves apply exemplary innovation practices at the level of individual teachers and supporting teams, and exemplary innovation processes at the organizational level. However, this is another area where the polytechnic commitment to learning from/with our workplace partners can create a distinctive advantage.

Discussion: Opportunities for Polytechnics

Employee-led workplace innovation has the potential to benefit polytechnics in multiple ways. Here we focus on two opportunities that are particularly well-suited to polytechnics: expanding the impact of our innovative teachers and taking on a new leadership role in North American higher education. The first opportunity is to build on existing strengths to develop capacity in Instructional Development for Exemplary Innovation in Teaching and Learning ("exemplary" in the sense that our students can treat it as a model for their own engagement with workplace innovation). As Kim and Maloney have pointed out: "[t]here is very little in the way of opportunities for practice or professional development for learning innovators involved in the full spectrum of advancing learning…As higher education evolves, there should be room for a wider variety of educator roles on our campuses, each with their own identity and place" [Kim & Maloney, 2020 p. 159].

A key consideration here is that new roles and career paths will be required—as outlined below based on lessons learned from our industry partners—as well as the required infrastructure for encouraging, supporting, recognizing, and rewarding the staff members who choose to pursue these new opportunities. We are seeing similar developments in polytechnic institutions around the parallel role of applied researcher in teaching and learning, where the traditional—more academic—label of Scholarship of Teaching and Learning has been given a more professional focus and support.[6]

5 Engaging students with Sustainability issues on campus — and enabling them to contribute to solutions — is now commonly used in developing student capability in Sustainability, where the campus becomes a so-called "Living Lab" for authentic work experiences in polytechnics and other institutions [Scott 2019; Leal Filho et al 2019; Rivera & Savage 2020].

6 For example, at Humber College the role has been integrated into offices responsible for Applied Research and Innovation (https://www.humber.ca/research/sotl-effect/).

Of course, the development of new roles and career paths in higher education teaching and learning is occurring across a wide range of other institutions. One example is the distinctive Teaching-Focused career paths emerging at institutions that have traditionally emphasized career progress based on research excellence [e.g., Rawn & Fox 2018]. The rise of Learning Designer as a professional academic support role with its own career paths [Altena et al., 2019; Obexer & Giardina 2016] is another example of the evolution of such roles within higher education.

We see polytechnic institutions as possessing two strengths that they can apply in establishing these new roles for exemplary innovative teachers. The first is the cultural respect for professional capabilities as of equal value to pedagogical (or other academic) capabilities. The references cited in the previous paragraph describe the challenges to a diversity of career paths imposed by academic cultures where research-engaged faculty are accorded a higher status than their colleagues on a "teaching-only" track and the other educators in "non-faculty" and "alt-academic" roles.

Another strength which polytechnic institutions can apply in fostering new roles and career paths for innovation is the culture and commitment for learning from—and with—our workplace partners. This applies at the level of individual educators as well as to organizational processes and policies. Further, the close ties to workplace practices maintained by individual polytechnic instructors can support the development of workplace innovation expertise through joint learning with workplace partners about the organizational processes and policies for promoting and sustaining innovation.

For example, in the area of Strategic Innovation—i.e., "disrupting ourselves" innovation—leading-edge mature corporations have developed specific roles and career paths for innovation project and program managers. Initial pilot tests have indicated that this could be a fruitful area for knowledge sharing in an academic-workplace collaboration and that the insights from industry could be adapted for use in our higher education contexts [Baregheh et al., 2022].

Polytechnics can also take advantage of the continuing involvement of so many of our teachers in their professional and technical domains. An instructor in Accounting, for example, could have a particular interest in the numerous innovations in ways of working which are emerging within that profession [Carey, Justice & Baregheh, 2021a]. Understanding how accountants could contribute to adapting and shaping those innovations in practice would require conceptual knowledge of Workplace Innovation as an individual and organizational process and skills such as Innovation Adaptation [Carey, Justice & Baregheh, 2021b] and Job Crafting [Justice, Henderson et al., 2021] to become an active participant in workplace innovation within the profession. That professional capability is equally applicable for effective workplace innovations in teaching and learning, in mentoring students in their own learning about workplace innovation, and—if developed to a sufficiently high level—to serving as a coach and facilitator for other instructors.

The second opportunity we see for polytechnic institutions is to take on a leadership role in developing workplace innovation capability in North American higher education. As noted above, the nature of polytechnic education itself provides distinctive advantages compared to other post-secondary institutions developing workplace innovation capability in higher education. However, if we are convinced that all graduates from higher education need to develop capability to engage with innovation in the workplace—and in their other roles as community members and global citizens—then we will want to see widespread adaptation of our innovations in this area into other higher education contexts.[7]

We have seen this happen in areas such as Work-Integrated Learning where polytechnic institutions led the way and the ideas have now been adapted in other institutions, albeit with varying levels of deep faculty engagement and therefore varying levels of success. We see a similar opportunity in engaging students with Workplace Innovation—and other new areas of graduate capability which are emerging as critical for the future of work, such as Sustainability and Digital Transformation [British Columbia Institute of Technology, 2021].

This new leadership role can build on the distinctive features of polytechnic education and polytechnic institutions as outlined above. Close ties with workplace needs and directions is one example, both of leveraging current strengths and of the need to go beyond them. Our current interactions with employers on curriculum typically occur via Program Advisory Committees and professional/licensing bodies around their expectations for workplace capability now or in the near future.

In contrast, emerging areas such as employee-led workplace innovation call for a co-creative and iterative approach, in which the specification of such capabilities is very much a work-in-

7 This adaptation of new opportunities goes in both directions, of course. The development of Scholarship of Teaching and Learning began in universities and has now been adapted to polytechnics to align with our stronger focus on Applied Research.

progress. Creating such curricula can and indeed should be a joint activity between workplace and academic partners that brings mutual benefit.[8] In brief, employee-led workplace innovation can benefit polytechnic education as it is applied in our own teaching and learning environments. Further, it has the potential to strengthen the differential advantage of polytechnic institutions in the higher education landscape.

Conclusion

> *...the pandemic has caused a fundamental and irreversible system shift in Canadian society and human civilization generally. Neither will return to the status quo ante.*
> *—Thomas Homer Dixon (Cox, R., Slick, J., & Homer-Dixon, T., 2020)*

The consensus is that higher education, like the rest of society, is not reverting to its pre-pandemic state (see for example, Hodges & McCullough, 2021). Much of the higher education commentary rightly emphasizes how the Emergency Remote Teaching phase "has inspired a burst of innovation on most campuses and set the groundwork for what's next" (Selingo et al., 2021). Importantly, this past year Polytechnics Canada communicated to government in its pre-budget consultation that polytechnics should play a key role in pandemic economic recovery by "[a]ssisting companies, non-profit organizations and entrepreneurs to *maximize their innovation potential*" (Polytechnics Canada, 2021; italics ours).

One way to maximize this innovation potential is to collaborate with workplace partners to better understand Employee-led Workplace Innovation and to find impactful ways of integrating these emergent capabilities into polytechnic curricula. This work can equip learners for the future of work, foster innovation in the workplaces of both our partners and our institutions, and contribute to spurring innovation-based growth in Canada. Finally, its success can demonstrate in new ways the distinctive value of polytechnics in strategic workforce development.

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8 Such collaborations will also likely involve different roles and different configurations of people than current institutional Program Advisory Committees. For example, a prototype collaboration between workplace and academic partners highlighted the need for strategic Human Resources Management expertise from workplace partners to be included in the collaboration (Carey, Maxwell & Melnick, Oct 2018).

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The Pandemic as a Catalyst For More Inclusive Pedagogy in Field-Based Disciplines

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Abstract

The rapid switch to alternative modes of delivery at the onset of the COVID pandemic in 2020 left Ontario college faculty scrambling to engage students and provide experiential learning opportunities to satisfy course and vocational learning outcomes.

This paper presents case studies from Fleming College that illustrate the ways in which curriculum developed for remote, emergency delivery was situated within the framework of Universal Design for Learning (UDL). Using case studies from Fleming College, we demonstrate that efforts to embrace the culturally responsive and inclusive pedagogy that UDL models during the pandemic will remain relevant after the Covid-19 pandemic has subsided. What follows is a description and analysis of the pedagogical strategies and technology-enhanced techniques employed by Fleming faculty to adapt their curriculum and teaching practice to meet the needs of variant learners by incorporating the guidelines of UDL, including multiple means of engagement, representation, and action and expression (Wakefield, 2018). We suggest that these examples from the pandemic supported alternative learning and can continue to do so in ways that enrich the educational culture in Ontario's post-secondary system.

Keywords

Universal Design for Learning, experiential learning, field-based curriculum, inclusive pedagogy, disability, variant learners, post-pandemic learning, diverse learning, inclusive technology

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Introduction

The rapid switch to alternative modes of delivery at the onset of the COVID pandemic in 2020 left Ontario college faculty scrambling to engage students and provide experiential learning opportunities to satisfy course and vocational learning outcomes. Learners experienced myriad challenges to learning, among them family commitments, disabilities, lack of access to technology and infrastructure, inability to travel to Canada for schooling as well as poor physical, mental, and overall health. Faculty at Fleming College's School of Environmental and Natural Resource Sciences (SENRS), whose curricula focuses strongly on experiential, field-based learning, faced many difficulties in designing field-based experiences without access to "the field" in the traditional sense, for example, lab courses, field trips and placements. Paradoxically, access barriers to field-based experiences were commonplace for learners before COVID-19. Historically, faculty accommodated disabled learners unable to access the field-based curriculum with alternative assignments, which often meant inferior educational opportunities to support individual needs. With the onset of the pandemic, however, everyone had an access problem, including faculty. This created an urgent need for an innovative curriculum that met the needs of variant learners but without compromising academic integrity and rigour.

This paper presents case studies from Fleming College that illustrate the ways in which curriculum developed for remote,

***Innovation Spotlights** These are contributions that highlight innovative practices, approaches, or tools and provide accompanying evidence that speaks to the effectiveness of the innovation, including but not limited to an innovative teaching practice or an innovative methodology benefitting academia, industry, and community partners.

emergency delivery was situated within the framework of Universal Design for Learning (UDL). Using case studies from Fleming College, we demonstrate that efforts to embrace the culturally responsive and inclusive pedagogy that UDL models during the pandemic will remain relevant after the COVID-19 pandemic subsides. What follows is a description and analysis of the pedagogical strategies and technology-enhanced techniques employed by Fleming faculty to adapt their curriculum and teaching practices necessitated by the rapid switch to alternative delivery during the COVID-19 pandemic and ways in which those curricula met and continues to meet the needs of variant learners by incorporating the guidelines of UDL, including multiple means of engagement, representation, and action and expression (Wakefield, 2018). Although Fleming College promotes the use of Universal Design principles across all the disciplines to encourage and promote inclusive teaching practices for all students, it has not been adopted universally across the college. The pandemic showed us how changes to the curriculum could support all learners, increasing the level of understanding and application beyond what was being done before COVID closures. We suggest that these examples from the pandemic supported alternative learning and can continue to do so in ways that enrich the educational culture in Ontario's post-secondary system.

Accessibility in Field-based Disciplines

Introductory courses in scientific disciplines can be highly theoretical, with a strong focus on instruction and the lower order thinking skills of Bloom's taxonomy, such as knowledge and understanding (Airasian, et al., 2001). The application of this theory to a field location, however, is highly subjective and open to interpretation. Learners, therefore, construct meaning by applying their knowledge and understanding to real-life situations and reflecting on those situations – cognitive constructionism (Larson & Lockee, 2020). The goal of fieldwork is to foster exploration through hands-on activities; the emphasis is on process, not product. In field-based disciplines like natural sciences, fieldwork is an essential undertaking and one that lends itself to a cognitive constructivist approach because learners engage in the authentic application of their knowledge to real-world situations (Mogk & Goodwin, 2012). This supports deep learning in their field of study, reinforces safety standards, and familiarizes students with outdoor environments. This is particularly important for variant learners, including newcomer and international students, students from urban environments, and marginalized groups who might lack access to outdoor recreation. If learners do not have access to the outdoor environment, there is a risk that their field of study will be too theoretical and abstracted from the observational and immersive nature of the industry.

Marginalized learners are sometimes separated from field experiences because of physical, social, and institutional barriers (Carabajal, Marshall, & Atchison, 2017). The medical model of disability positions disability in the learner (Oliver, 1996); as such, students with disabilities are often offered alternative assignments that may not be immersive, field-based—written assignments are one example of this—or exempted from assessments altogether. This has certainly been the case at Fleming College, and students are deprived of opportunities for meaningful learning. The social model of disability considers that barriers to inclusion result from interactions between learners—who are on a spectrum of impairment as part of the human condition—and their social and physical environments (Shakespeare & Watson, 2002). In the social model, therefore, access to learning is impeded by curriculum design and not by limitations inherent in the learner. Disability advocates have, for many years, been trying to increase accessibility in field-based disciplines (e.g., the International Association for Geoscience Diversity), but have been hampered by the attitudes of employers and educators (Atchison & Libarkin, 2016), as well as concerns about liability, and financial and logistical constraints to implementation (Healey, Roberts, Jenkins, & Leach, 2002). With the onset of the pandemic, however, everyone experienced barriers to access, and both institutions and educators had to devise creative solutions to those barriers.

Universal Design for Learning

Universal Design for Learning (UDL) aims to meet the needs of diverse learners through curriculum design, as opposed to providing accommodation to individuals during the learning process (Rose, Harbour, Johnston, Daley, & Abarbanell, 2006). The social model of disability underpins UDL and strives to inform curriculum through a lens of inclusion at the design stage. UDL is based on cognitive neuroscience, the key tenets of which are multiple means of engagement (ways in which to recruit the learners' interest); multiple means of representation (ways in which the learner can interact with curriculum); and multiple means of action and expression (ways in which learners can demonstrate knowledge) (CAST, 2018).

Despite research confirming the efficacy of improving educational outcomes both for students with and without disabilities (Seok, DaCosta, & Hodges, 2018), uptake of UDL in post-secondary institutions has been slow (Tobin & Behling, 2018). Most

institutions, our own included, still adhere to a medical model of disability, where faculty provide students with individualized accommodations rather than designing accessible curricula (Kumar & Wideman, 2014). Although we have a small group of early UDL adopters at Fleming College, it is not implemented college-wide, and there is resistance to the implementation of UDL by some instructors. There are several reasons post-secondary faculty may be resistant to UDL course design. For example, they may have limited background in education or lack training and resources, and by extension, time. There are concerns that it will decrease academic rigour or integrity (Tobin & Behling, 2018). There is also an increasing number of contract faculty in Canadian academic institutions (Usher, 2020), our own included, who often do not have access to professional development opportunities to integrate universal design into their curriculum (Xie & Rice, 2020). The problem of inaccessible curriculum came to the fore in March 2020 when everyone suddenly had an access problem, faculty included. To address the lack of access to experiential learning, including field trips, scenarios, and identification skills, Fleming College faculty at the School of Environmental and Natural Resource Sciences (SENRS) developed alternative, field-based opportunities to facilitate student learning in an environment that was accessible to the learner.

Case Studies

Case Study 1: Conservation and Environmental Law Enforcement

The Conservation and Environmental Law Program teaches students how to understand, interpret, and apply legal concepts and regulations using a compliance-based approach to natural resource management. The practical application of legislation in scenario-based field applications is not easy to master in a regular face-to-face environment and requires a strong understanding and good judgement by the student. COVID restrictions forced faculty to reconsider how students would demonstrate these advanced skills remotely with everyday technology, including smartphones.

After two field camps where students participate in outdoor enforcement skills were cancelled, learners created a scenario that modelled a reality television series, Northwoods Law, which follows Game Wardens from the United States as they investigate natural resource violations.

Learners were asked to create a video using everyday technology that depicted an enforcement scenario including a suspect, a vehicle, and a violation. They explained each step of their scenario with a voiceover on their video or by providing a separate presentation. The faculty provided a video exemplar, the rubric, and the course learning objectives. The students were encouraged to be creative, and, for pandemic-related safety reasons, they were encouraged to enlist members of their household.

Program coordinator and Fleming faculty member Kent Hodgin reported that the project results exceeded expectations. Students created excellent quality videos that met the learning objectives with creativity and detail. In her video "Fish Cops," student Kierstyn Bennett (2020) developed a scenario in which she approached an angler at a public dock to check their fishing licence, equipment, and catch for compliance. Learner feedback was extremely positive—they enjoyed designing and creating their video and sharing their learning with family members in the process.

This assignment replaced an on-campus assessment in which learners responded to a faculty-directed scenario. Although the on-campus assessment better reflects an actual enforcement situation to which conservation officers would respond, the alternative assignment provides learners with an opportunity to demonstrate advanced knowledge of procedures and skills while giving them the option to choose an environment in which they are familiar and comfortable. For students who struggle with anxiety in stressful situations, this is a suitable alternative to the in-person demonstration of skills using technology as a medium of delivery. Given its success, Faculty member Kent Hodgin plans to keep this assignment in the course as an alternative for learners who need accommodations for class absences, for variant learners who experience anxiety during an ordinary enforcement scenario, or as an alternative to the course final exam.

Case Study 2: Environmental Technician

Environmental programs focus strongly on identifying the 'bugs in the mud' or benthic macroinvertebrates. These are challenging concepts to teach in a virtual environment. Learners in SCIE 6 Aquatic Biology in Fleming College's Environmental Technician program were assigned to create an ecosphere—a closed ecological system powered by sunlight that can be stored anywhere, including in residence or in shared student accommodation. This assessment was designed to complement the course's field-based activity, reinforce identification skills and ecosystem thinking, and connect learners with the wonder of live invertebrates. Provided with an exemplar (Figure 1), a rubric, and a set of curated reference materials (Figure 2), learners collected water and vegetation from a lake or a river

of their choosing (Figure 3) in a 2L jug with a lid. Next, they observed the daily changes in their ecosphere over a four-week period. The assessment deliverables included journal entries and photographs (Figure 4-5) that effectively catalogued and identified the plant and macroinvertebrate species that lived and died in the ecosphere over the discovery period.

The open-ended journal format encouraged students to showcase their writing style and regularly featured personal anecdotes, multiple exclamation marks, and humour. Freed from the confines of technical jargon, international students performed remarkably well. The ecosphere's local focus allowed students to explore a location that could be re-visited, thus building a place-based relationship. Relationships were also forged with students' newfound aquatic 'pets.' Spurred by direct invertebrate observation and hypothesis generation, journal entries answered critical questions about how their bugs moved and were connected to the ecology of the jar. Students often asked how to best care for their charges beyond the assignment's due date, indicating an appreciation of benthic macroinvertebrates. Faculty member Erin McGauley, who teaches the course and designed the project, intended to inspire "wonder" in her learners, a goal that was achieved and reflected in student engagement and feedback. (Figure 6).

Case Study 3: A First Semester Geology Course

Learners entering eight different programs at Fleming College's School of Environmental and Natural Resource Sciences (SENRS) take an introductory geology course (GEOL 83, Earth and Atmosphere). This course introduces them to rock and mineral identification, geological processes, and fieldwork. Students who come to the college through the Ontario K-12 curriculum have limited exposure to geology—only soils and the environment in Grade 3 and rock and mineral identification in Grade 4 (Ontario Ministry of Education, 2007); as such, the content is unfamiliar. Geology is an immersive and observational science. Geologists immerse themselves in the environment they are studying rather than observing from the outside; therefore, access to field locations is important for developing observational skills and constructing new knowledge.

In the fall of 2020, this newly developed course was delivered entirely online; and many learners accessed the course from outside of the province or country. Field-based courses were not an option, nor were field trips; thus, learners were instructed to "Adopt an Outcrop". They found a suitable field location that was safe and publicly accessible and applied their first six weeks of instruction to write geological field notes. This required them to construct a field sketch of the outcrop, collect field photographs, and develop a basic interpretation of the formation processes (Figures 7-8). Learners were provided with instructions, an instructional video (Hodge, 2020), a template, and an exemplar of a field location. This assignment gave learners the opportunity to apply theoretical knowledge in a practical field setting and develop a new understanding while being immersed in the environment. The focus of the assignment was not on whether students correctly identified or interpreted their chosen outcrop but whether they could apply their learning in a practical situation to produce an interpretation based on their observations and measurements. Students were graded on process and engagement rather than the accuracy of their interpretations.

According to their instructor Joanna Hodge, this assignment brought previously abstract concepts to life and changed the way learners viewed their environment. Many reported that theoretical concepts that did not make sense in class were clarified when working on an outcrop rather than diagrams and illustrations in textbooks, and others reported that getting their hands on actual rocks permitted a better understanding of identification and formation processes than studying images did. They practiced identification skills using tools they took to the field and measured and observed previously abstract concepts such as the physical characteristics of rocks and minerals. Some students reported excitement at knowing how their favourite hiking locations were formed, and a few switched their program majors to geology because of exposure to new learning in the course.

Student submissions were of high quality and illustrated evidence of student engagement. Because they could choose their own field location, the typical access barriers of geologic fieldwork such as minimum fitness requirements or inaccessible outcrops were removed. Learners submitted assignments from across Canada and the world. A few students experienced difficulties accessing field locations, primarily due to transportation challenges. For those learners, an alternative digital assignment was provided using Google Earth field locations and videos of unknown rocks to identify. Although these learners did not quite get the "hands-on" experience of their peers, they were able to achieve the learning outcomes using technology; however, this was an accommodation of last resort.

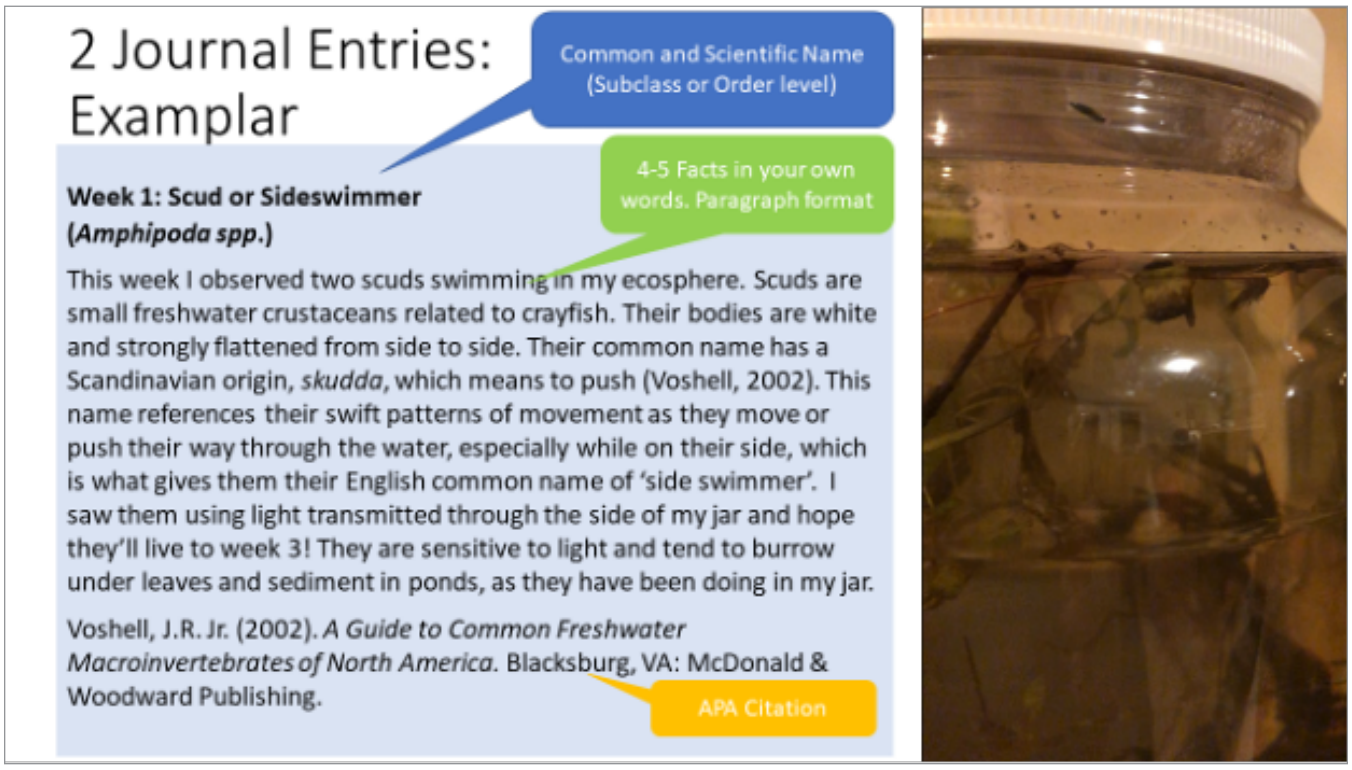

Figure 1. An exemplar journal entry provided to learners in Aquatic Biology, which included links to rubric items to scaffold learning (Erin McGauley, used with permission).

Figure 2. Curated reference material to scaffold student learning in inquiry-based labs (Erin McGauley, used with permission).

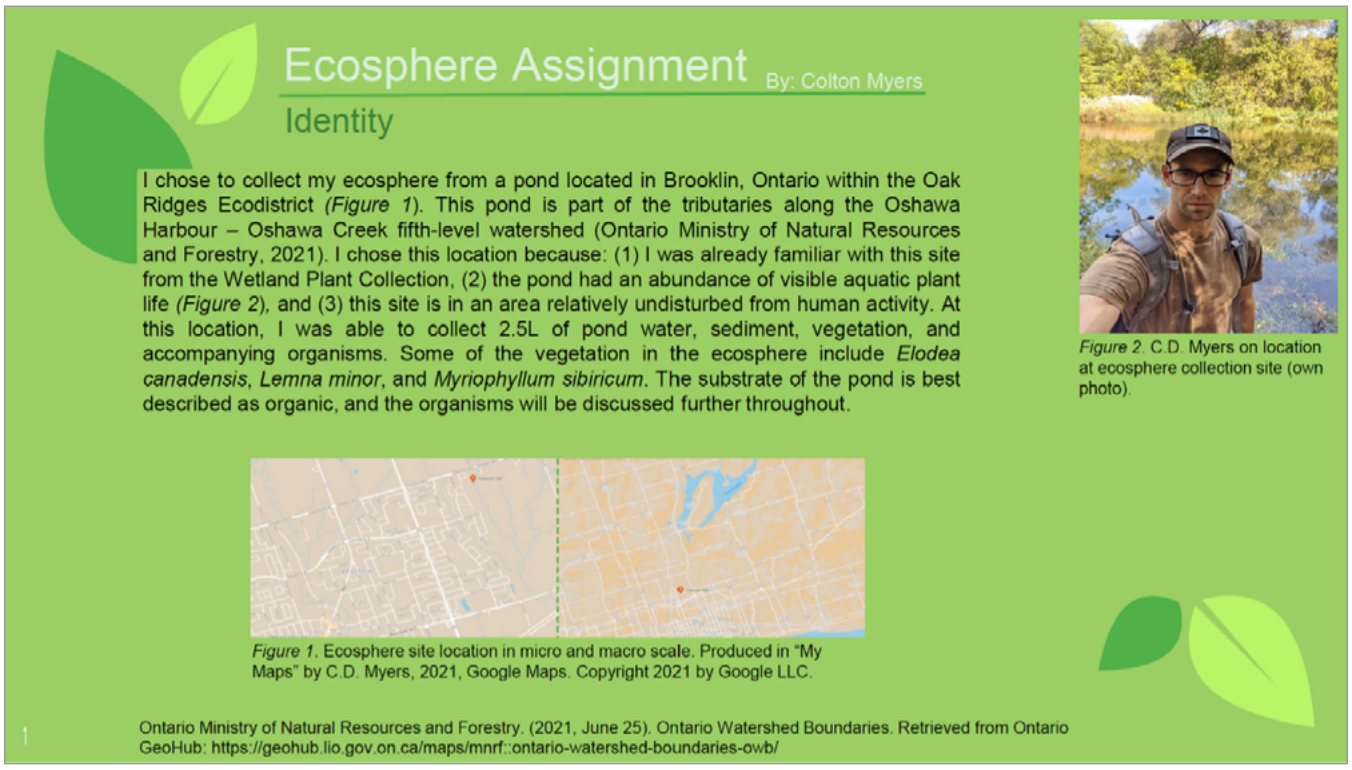

Figure 3. Location map and images from Aquatic Biology ecosphere assignment (Colton Myers, used with permission).

Figure 4. A student journal and photograph from Aquatic Biology ecosphere assignment (Vanesa Tunney, used with permission).

Journal Entry 2

Week 1: Crawling Water Beetle
(*Peltodytes duodecimpunctatus*)

During the second evening of ecosphere observation, several crawling water beetles were observed. These insects are oval with a rounded upperside, and have a yellowish color with black spots on the pronotum. This species is attracted to light and actively followed movements of the torch. The possibility of it thriving in the ecosphere is possible since Wade et al. (2017) notes that these beetles prefer shallow water, algae, and slow moving waters. It is likely that their rounded shape becomes cumbersome in rapids. I have observed them in my ecosphere holding an air supply bubble at the abdomen, allowing them to stay underwater for long periods of time.

Wade, S., Emmling, P. J., Pochert, C., & Bergschultz, L. (2017). *Wonderful wacky water critters*. University of Wisconsin-Extension, Cooperative Extension.

Figure 5. A student journal and photograph from Aquatic Biology ecosphere assignment (Oliver Kurz, used with permission).

Figure 6. Student learning. Wonder achieved! Feedback from the Ecosphere assignment met learning outcomes and promoted student engagement. The assignment will remain an integral part of the course to facilitate immersive and constructivist learning beyond the COVID pandemic (Erin McGauley, used with permission).

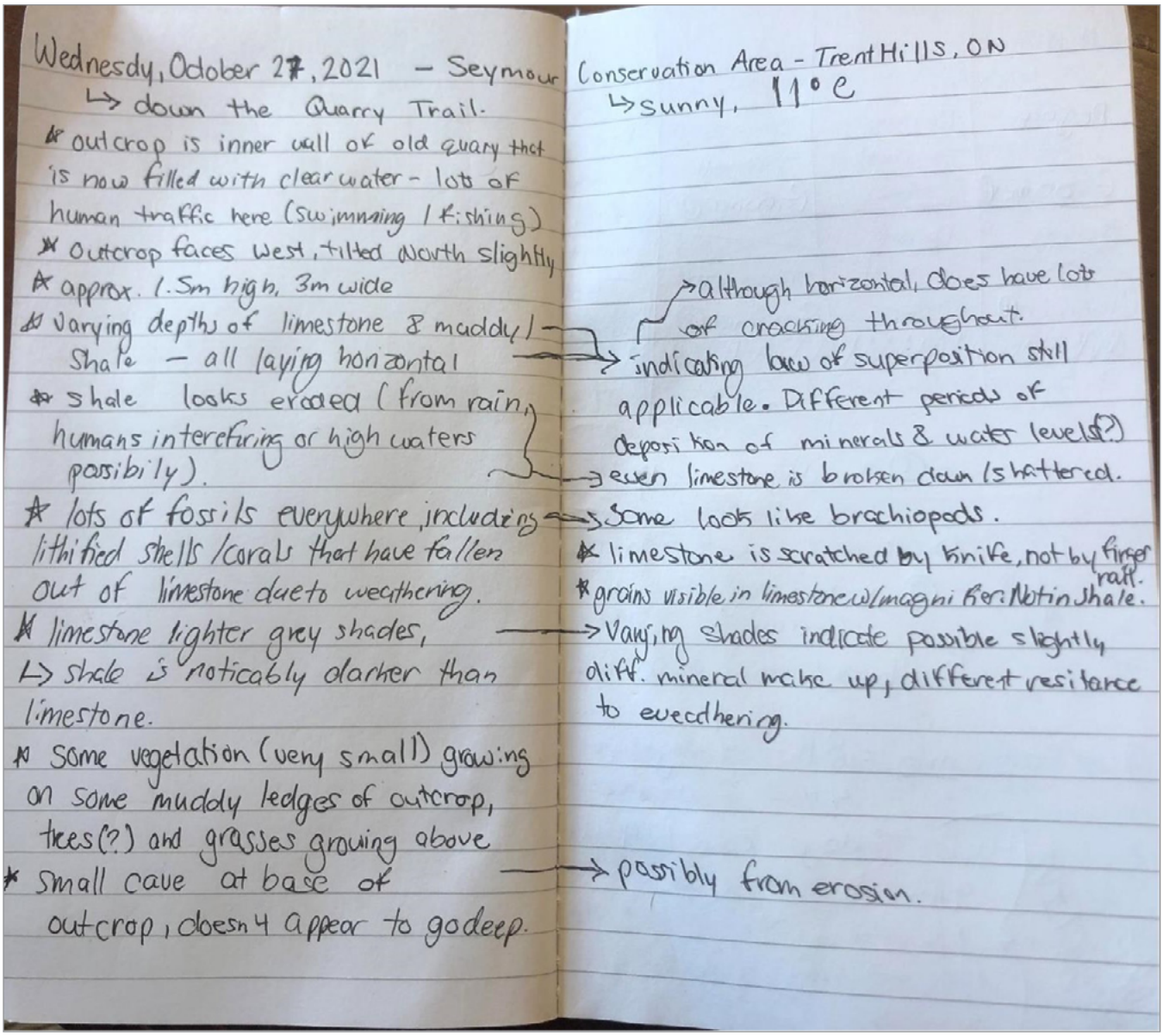

Figure 7. Student field notes submitted for GEOL 83 Adopt an Outcrop assignment demonstrating an introductory understanding of rock and mineral identification, stratigraphy, and formation processes (Ainsley Taggart, used with permission).

Discussion

Post-COVID Lessons

Despite the partial return to in-person education, students are still experiencing barriers to learning, either by the physical inability to access campus (e.g., accommodation shortages, cancelled public transit, high-risk COVID contacts, parental or filial responsibilities) or through illness and disability. In all three case studies discussed in this submission, curricula developed initially as a response to the pandemic have proven invaluable to accommodate learners without sacrificing the rigour of field experiences or jeopardizing course or program learning outcomes.

Equally important is that these opportunities provided experiential learning by affording students the opportunity to participate and learn no matter what their geographical location was or how they acquire knowledge. This is an assessment design benefit not otherwise afforded to these learners prior to the shutdown in March 2020.

Through these adaptations, we learned the following:

- Students for whom access to campus was a barrier could still meaningfully fully participate in the coursework and achieve the learning outcomes since

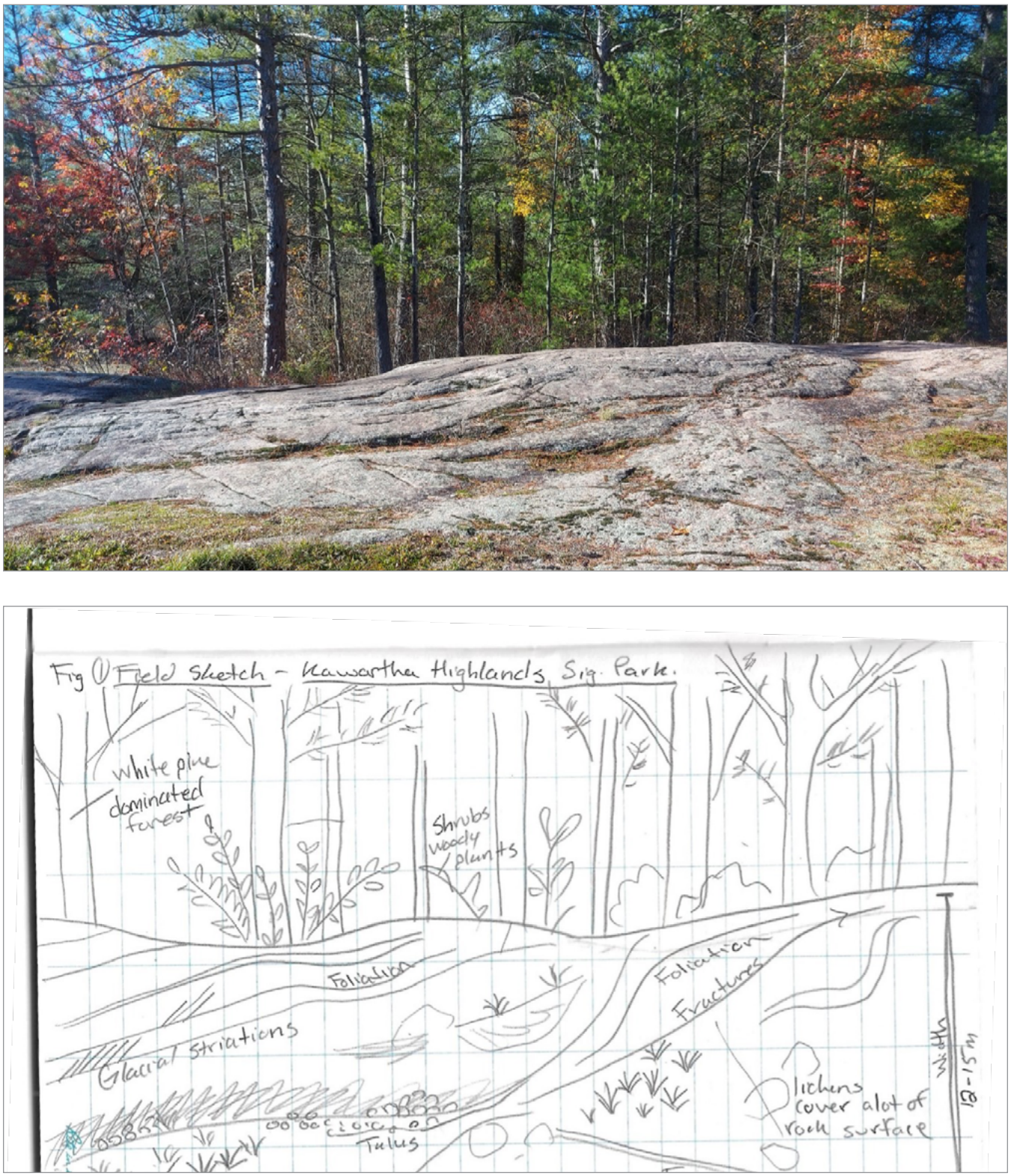

Figure 8. Field photograph and accompanying field sketch indicating geologic relationships submitted for GEOL 83 Adopt an Outcrop assignment (Julia Marshal, used with permission).

options for self-determined locations are included. This was a benefit for international students stranded outside of Canada by the pandemic and for students with disabilities who could complete the work at locations more accessible than typical field locations.

- Students with learning disabilities or neurodivergent learners could complete the assignment in a longer period than that usually afforded by a lab class, negating the requirement for extensions or extra time accommodations.
- The individual nature of the assignments, as opposed to "worksheet" or "correct answer" type assignments, meant that faculty could accommodate late submissions without sacrificing academic rigour or integrity.
- Structuring these assessments according to the three tenets of UDL—multiple means of engagement, representation and action, and expression—gave students ownership of their learning and led to a deeper understanding of the content than a purely instructive, classroom-based approach.

Some students still experienced barriers. Access to or familiarity with technology was an issue for some learners, and for learners who struggled with time management and lacked executive function, the self-directed nature of the assignments was a barrier. On balance, however, these additions to the faculty 'toolkits' have shown all the faculty at Fleming College that it is possible to meet learning goals in alternative and creative ways. In all cases, faculty who designed and developed these assessments plan to continue to implement and adapt them to F2F delivery, either as replacements of previous assessments or as supplementary assessments to accommodate variant learners. Student engagement was high, and the assignments met and exceeded the learning goals. This will provide opportunities for variant learners to successfully complete courses and programs with SENRS at Fleming. By providing options to demonstrate understanding, the faculty will be able to reach more students and share their passion for their field of work.

Acknowledgements

The authors would like to acknowledge the contributions of faculty members Kent Hodgin (CELE) and Erin McGauley (Environmental Tech) and students Kierstyn Bennett (CELE), Colton Myers, Vanesa Tunney, Oliver Kurz (Environmental Tech), Ainsley Taggart and Julia Marshall (CFS) for permission to share their work.

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A Reflection on Practical Innovation Beyond COVID-19

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Abstract
During COVID-19 and with the help of 80 students from the Entrepreneurship & Design programme of Copenhagen School of Design and Technology, we developed an innovation project within retail. The specific goal of the project was to develop a guide on how to use the physical space as a brand channel when commerce and transactions are going digital. The project resulted in the development of a new model—The DEAL Model. We tested the model together with 6 retail brands and a team of students. The learnings from the project were multiple: from using new digital tools for research and collaborations to how students can be motivated through close collaboration with real life case companies.

Keywords
Innovation during COVID-19, Student involvement, Retail, Physical space, Brand Channel

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Introduction

In January 2020, I kicked off the research for an innovation project at the Copenhagen School of Design and Technology (KEA). I went to the National Retail Federation (NRF) in New York together with 40,000 other curious practitioners and academics wanting to explore the latest trends within retail. Commerce was going online—the landscape of physical retail was changing dramatically from places of transactions to spaces for experiences. Physical experiences that called for a totally new approach to retail. The scope of my innovation project was to get insights into this trend and best practices and to develop an intuitive and easy guide on how to use the physical space as a brand channel. I was highly motivated to embark on the research project—my biggest challenge was to find time for doing all the research. My spring was jam-packed with physical lecturing and other stuff going on. Then COVID-19 hit the world.

This paper will explore how the research was carried out in the volatile, uncertain, complex, and ambiguous environment beyond COVID-19 with the help of 80 students from KEA's programme in Entrepreneurship & Design, how new ways of distance working and new tools were implemented overnight, and how we (almost) succeeded in doing a very hands-on three-dimensional case study for six case companies.

We live in a VUCA-World. The term VUCA was first coined in 1985 by economists and university professors Warren Bennis and Burt Nanus in their book "Leaders: Strategies for Taking Charge" and was originally used to describe conditions resulting from the Cold War. VUCA is an acronym for Volatility, Uncertainty, Complexity, and Ambiguity. And that was certainly the situation at KEA and in the rest of the world in spring 2020[1].

The Scope

At KEA, research and innovation are an important part of our work as lecturers. This must be done in close collaboration with the business community. We must ensure that the research projects are relevant to the business community. Furthermore, it is important that the generated project output is of interest to the

1 https://whatis.techtarget.com/definition/VUCA-volatility-uncertainty-complexity-and-ambiguity

***Innovation Spotlights** These are contributions that highlight innovative practices, approaches, or tools and provide accompanying evidence that speaks to the effectiveness of the innovation, including but not limited to an innovative teaching practice or an innovative methodology benefitting academia, industry, and community partners.

business community and that companies subsequently can be inspired by our work and implement some of the tools we use in practice.

Digital commerce is growing year by year and continuously sets new records. In recent years we have seen a decline in customer traffic to the physical stores, and more and more physical retailers have had to shut down due to lack of turnover. More and more retailers are now turning their physical spaces into experience places, showrooms, and other forms of brand-focused places. And while traditional retailers have been busy jumping on the trend of digital commerce, retailers born digital have started to open up physical spaces where they can stage their products and brands. But how do they do that? What practices and processes are necessary to follow and implement to succeed in this field?

My innovation project was set out with the scope of exploring: How can brands and retailers best use physical space as a brand channel?

The scope of the project was to give an overview of the most important retail trends and explore why and how retailers and brands use the physical space as a branding channel beyond digital commerce. The aim was to develop a knowledge product with highlights of best practices and preliminary findings and guidelines. The ultimate goal was to come out with a "how-to guide" to inspire practitioners, academics, and students with interest in the field of physical retail and branding.

The Process

The project was planned according to KEA's best practices for research and innovation projects in three phases. The project was to be implemented in 2020 and 2021. See Figure 1.

Parallel with my work with the innovation project, I was part of the teaching staff at KEA responsible for our students at Entrepreneurship and Design. In the spring of 2020, we had planned a course on experience design where the students had to work hands-on with physical installations at the 48-hour festival at Nørrebro in Copenhagen. The spread of COVID-19 in Denmark meant that on March 11th, 2020, the government shut down education, day-care institutions and schools. At KEA, all students and teachers were initially sent home the March 11th until March 30th, 2020. This date was subsequently postponed several times. We were forced to change plans, implement new tools and ways of working, all with a short notice and with the restriction that we had a number of learning goals that had to be complied with whatever we came up with. This was certainly a VUCA-WORLD entering KEA—some would call it a crisis.

The Opportunity

In Chinese, crisis means both danger and opportunity, and for my innovation project, which was just about combining branding theory and experience design, it became a great opportunity. An opportunity to get help with establishing a solid knowledge base through a major research project involving the students.

The opportunity was reached through the introduction of a new teaching module: Branding in the physical space. 80 students from KEA's programme in Entrepreneurship & Design got involved as researchers and helped exploring trends and best practices within retail. The research job could be done in small groups with a lot of desktop research and interviewing brands and retailers from home. To make sure we did cover all our learning goals, we also introduced a new teaching module that was planned to take place late in 2020, which we also called "Branding in the physical space." Here the idea was to get the hands-on part covered, inviting real brand cases in to test the outcome of the research project, our methods from best-practice experiences and the upcoming and newly developed guide of how to best use the physical space as a brand channel.

The Task

The first course was planned as a three-week process in which the students should 1. identify examples of best cases within branding in the physical space, 2. interview one company expert from a best-case brand, 3. Uncover retail trends in general and understand what the drivers are changing the retail landscape, and 4. communicate and visualize their findings.

Figure 1. The three phases of project

They worked in small groups of two to three students. The outcome was 27 interviews with both international and national brands, big and small companies, companies within different industries.

All 27 brands had in common that they were doing an exceptional good job within branding in the physical space.

The Tools & Methods

To help in the process, the students were introduced to three new tools, of which only one was known beforehand.

The tools were:

1. Trello, a project managing tool (www.trello.com)
2. Microsoft Teams, a then rather unknown Microsoft collaboration app built for hybrid teams (www.teams.com)
3. Mural, a digital visual collaboration platform (www.mural.co)

Microsoft Teams and Mural were indispensable in the process and were used both in combination as platforms for the teaching, group work, interviews, and coaching and guidance.

The methods used were:

1. The DART-analyses
2. Qualitative methods and interview techniques
3. Affinity diagramming
4. Mood boards

DART stands for Driver Analysis Reading Trends, and is a model developed by Maria Mackinney, Associate Professor at the Academy of Fine Arts' Design School in Copenhagen with a specialization in trends, and Lene Hald who teaches communication at KEA. The model is suitable for analyzing and describing trends, and therefore fit perfectly into the module where the students, among other things, had to uncover trends in retail[2].

To ensure that everyone got around to the research questions asked, I developed a common question frame with some overall research questions, which the students were given the task of answering. They should then develop their own question frame. As long as they got to answer the overall research questions, it was ok to be flexible in how and what they asked their chosen best-in-class brand. All interviews were recorded and transcribed by the students so I could afterwards dive deeper into the answers.

As way of organizing all the information from their interviews the students used the affinity diagramming. The method is a way of clustering complex information with the scope of identifying patterns and highlights. The students were instructed to swop interviews after having transcribed them, read each other's findings, and then work in pairs of groups with the affinity diagramming discussing each other's findings.

All cases were presented written and visually using mood boards to describe and understand the brand experiences that were staged in the physical spaces.

The Result of Phase One

The outcome of phase one was a knowledge product in form of a new model and guide describing how to use the physical space as a brand channel—The DEAL-model.

The DEAL-model consists of four phases: DEFINE, EXECUTE, ACTIVATE, AND LEARN as illustrated in figure 2 below.

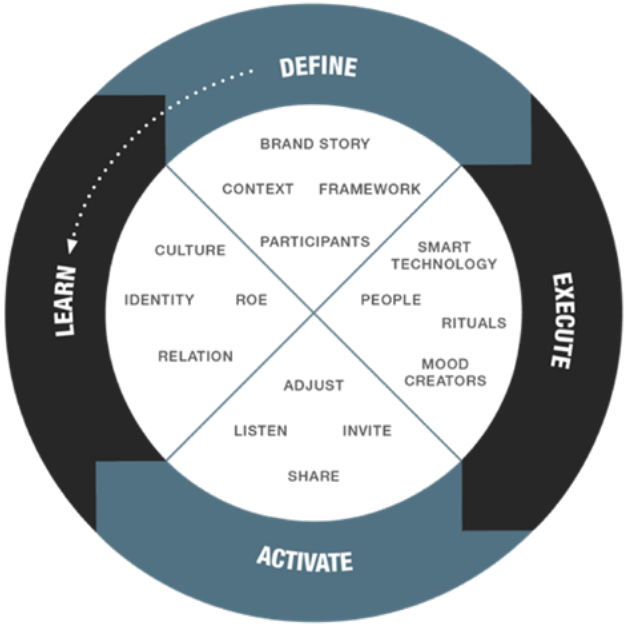

Figure 2. DEAL-model

The DEAL-model, a Short Presentation

Branding in the physical space is a process in constant development. The brand will change and develop under the influence of the context in which it appears and the people taking part. The process is therefore not linear, with a start and an end. Rather it is circular and continuous. In each phase, there are several interdependent focus points that need to be addressed before moving on to the next phase. Typically, you start with DEFINE, but if you have already defined your brand, your participants, the context, and the framework, you can jump right to the EXECUTE phase. Conversely, you may have to take a step back into the LEARN phase. The dotted arrow between

2 A full description of DART can be downloaded here: https://archive.nordes.org/index.php/n13/article/view/109

LEARN and DEFINE shows that decisions in the latter phase are dependent on the current state, expectations and insights into culture, identity, relations and ROE (return on investments). In the report "The Physical Space as a Brand Channel" the prevailing retail trends and the guide are described more thoroughly. The report can be downloaded here: https://kea.dk/en/research-at-kea/future-for-physical-retail.

Phase Two—The Transference

Step two in the research project was knowledge transference. This phase is all about looping back knowledge to the industry and getting further feedback and insights. In autumn 2020, we launched a new teaching session for the Entrepreneurship & Design students in the third semester. It was a smaller class with only 25 students. This time we invited six retail brands in. They had in common that they were primarily digital brands but taking steps into being physical, and they were all curious about how to work with branding in the physical space. The six brands were Barons, Yoga Mood, CamCam Copenhagen, Lampemesteren, Son of a Tailor, and EDIE.

The session was built on the newly developed DEAL-model. First task was for the students to DEFINE the brands, their participants, the framework, and the contexts; and the next task was to propose specific EXECUTIONS of how to stage the brand in the physical space by integrating people, smart technology, rituals, and mood creators. The students should end up building physical 3D scale models of their executions and make suggestions for how to follow ACTIVATE and LEARN from the execution. During the five-week course it was only possible to actually get through the first two phases of the DEAL-model.

We planned the course in late autumn/winter 2020 with the expectation that COVID-19 at that time would be long gone history. It all started out very well, but on December 2nd, 2020, we had to reorganize to online teaching due to the spread of COVID-19. With the help of Teams we did, but in the phase of working with physical prototypes and with the outlook to doing the final presentations digitally, this was by no means ideal. The students were highly demotivated, but with the enthusiasm and engagement from our case-companies, they all succeeded in finalizing and presenting some great case works.

The Learnings

1. Be prepared and coordinated

It requires great coordination and management. 80 students and 27 case companies that need attention is quite a challenge. The students were invited to choose an interesting case company to work on themselves. It happened that many of them came back with the same brands, that they thought did a really good job and that they wanted to work on. To avoid that some companies were contacted by more groups of students, it was necessary to coordinate which brand they could work on before they started. As not to delay the process, all groups were initially asked to make a "wish-list" of three brand cases they would love to work on. I manually coordinated that they did not choose the same, and if their primary wish to case company was taken, they could work on the secondary and so forth.

2. Do not be shy—go for the top

The time was limited and from my previous experiences working with account management in advertising I know that getting through to the right person (decision maker) takes time. The students had only three days to research, choose a case company, and plan interviews. It was important that they did not waste time talking to people in the company not wanting to participate or not being able to find time or having the mandate to express the company's strategy working with the brand in the physical space. The students were instructed to contact the top employees in the companies, that is CEO's or CMO's with the philosophy that it is better to be directed downwards, than waiting for permission upwards. It was a big challenge for many of the students to kind of "cold canvas" their project and "sell" the idea of getting involved to the brand, especially since they are used to us teachers making the appointments with the case companies.

3. Give back and give credits

When asking companies to be involved in the research, it was important for us to be able to give back. All companies involved in the interviews would get first-hand access to the innovation project and the "how-to-guide" that was the aim of the project. We invited the companies being interviewed to be part of the final knowledge product, with photos, quotes and mentions and not the least their inputs and comments. This was important for them, especially for the smaller and more unknown brands as a way of getting their names out. It was also important to us as a way of looping back our knowledge and get further input to the project.

4. Distance is no hinder

Given the new digital tools, it was possible to easily both research and work from a distance. Some of the students actually chose to interview brands physically placed far from them. Teams was a tool for being face-to-face with the interviewed and recording it at the same time. Mural made it possible to share and visualize

knowledge using good old sticky “post-it-notes” but in a virtual space, where you didn’t have to worry if your notes would still be hanging on the wall the day after.

5. Motivating through real-life cases

Working with real companies is highly motivating. Many of the students pointed out afterwards that they were highly motivated by the task of interviewing real professionals and in the final part when the physical presentation was changed to digital a great part of their motivation lay in the fact that they had a “real brand” expecting some real and highly creative and usable solutions.

Now and the Future

We are now in the phase three of the innovation project—knowledge sharing—and this article is a part of it. The world is still VUCA. Since the arrival of the omicron variant we must all still be flexible and ready to adapt plans and projects. New tools have been introduced and what we have learned is that it is still possible to run research and innovation projects despite distance, and being creative in the virtual space is absolutely possible. But COVID-19 is still here. The new retail landscape is a reflection of the consumer’s demand for both shopping and experiences, but this is ever changing. Even though many are now craving real-life experiences, others might worry a lot and have concerns about experiences in the physical space. There’s no doubt that smart technology will play an even greater role in the future of retail. But how? And why? This would be a great next research topic to explore.

Notes

If anyone reading this paper would like to share knowledge or insights on the future of physical brand experiences or research, feel free to contact me anytime at beor@kea.dk.

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Innovation Leadership in Polytechnics Beyond COVID: Sensemaking and Transformation in an Age of Uncertainty

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Abstract

The COVID pandemic has and continues to affect us all. It is the all-encompassing catastrophe that has forced us to face uncertainty and question our values and face our challenges in every aspect of society, including academia. It has also been the commonality that binds us all together, our shared experience in an age of uncertainty. For Polytechnics overall, it has also been a call-to-action and has clearly demonstrated our ability to innovate, adapt and overcome. Whether it has been the transitioning to an online, remote workforce or the accelerated use of new technological advances in education, Polytechnics have embraced these challenges and pivoted to meet the needs of students, faculty and industry. As such, Polytechnics have continued to emerge, now well positioned to prepare Canada for a prosperous future and growth through insights learned during the pandemic and innovative new educational program offerings and formats.

This paper discusses the critically important role of innovation leadership in Polytechnics beyond COVID. Starting with an example of innovation, I will introduce the new interdisciplinary Centre for Digital Transformation (C4DT) at the British Columbia Institute of Technology. This centre brings people together from across various distinct communities of practise and expertise to confront complex modern challenges through a process of communication, collaboration and sensemaking. Then merging significant literature review, I will examine recent success stories and practise transformations that shine light on Polytechnics innovation leadership role beyond COVID. Finally, I will examine the future of Polytechnics in an age of uncertainty and challenge readers to reflect upon what they have learned over the past year and consider the question, How can their own Polytechnics embrace these insights through sensemaking and transformation to embrace innovation leadership beyond COVID?

Keywords

Educational Leadership, Innovation, Digital Transformation, Lifelong Learning, Organizational Culture, Collaboration, Change Management

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Introduction

The COVID pandemic continues to affect us all. It is the all-encompassing catastrophe that has forced us to face uncertainty, to question our values and to face our challenges in every aspect of society, including academia. Even as we start to look beyond the COVID pandemic, considerable challenges still await us. According to Earhart & Cath (2021), the COVID pandemic has been a “rehearsal” for the much larger forthcoming main event of anthropogenic climate change.

The COVID pandemic has also been the commonality that binds us all together, our shared experience in an age of uncertainty. Although our individual experiences during the pandemic will have been based on the understanding we ourselves make of the relevant information available to us and the specific circumstances in our lives, and it cannot be overstated that we truly are all in this together. Our common expectations, hopes, fears and, for many of us, a clearer sense of awakening to the fact

***Innovation Spotlights** These are contributions that highlight innovative practices, approaches, or tools and provide accompanying evidence that speaks to the effectiveness of the innovation, including but not limited to an innovative teaching practice or an innovative methodology benefitting academia, industry, and community partners.

that we are all part of the same global village. This same solidarity (Auge, 2008) will be required as we deal with the considerable challenges still awaiting us.

For Polytechnics overall, the COVID pandemic has also been a call-to-action and has clearly demonstrated our ability to innovate, adapt, and overcome when faced with circumstances that were largely unanticipated. Whether it has been transitioning to an online, remote workforce or the accelerated use of new technological advances in education, Polytechnics have embraced these challenges and pivoted to meet the needs of students, faculty, and industry. The COVID pandemic has shifted the way Polytechnics engage with society overall, with the increased use of online learning resources and more technologically advanced tools (Young, Deller and McCallum, 2021). With the continued pandemic-related issues and challenges, we can expect this trend to continue well into the foreseeable future.

As such, for Polytechnics, the COVID pandemic has been a learning opportunity that has highlighted the need to be continuously adaptable and innovative in everything we do. It has become the fundamental catalyst to shift the traditional culture and program delivery models within Polytechnics to be more responsive to the needs of students, faculty, industry, and society overall. Although this is no easy undertaking, it represents the foundation of innovation leadership in Polytechnics beyond the COVID pandemic. Polytechnics will continue to transform during this time of uncertainty and emerge well-positioned to prepare Canada for a prosperous future and growth through insights learnt during the pandemic and innovative new educational program offerings and formats.

One example of innovation leadership in Polytechnics beyond the COVID pandemic has been the introduction of the new Centre for Digital Transformation (C4DT) at the British Columbia Institute of Technology (BCIT). This centre brings people together from across various distinct communities of practice and expertise to confront complex modern challenges through a process of communication, collaboration, and sensemaking towards transformation. The Centre for Digital Transformation was designed to appeal to interdisciplinary teams of experts from fields like cybersecurity, artificial intelligence, the internet of things, data analytics, remote piloted aircraft systems, simulation, and multimedia to collaborate, research, and share issues, information, best practices, and opportunities related to the realm of digital transformation, including the recent addition of the Smart Campus Initiative at BCIT.

> *"With change comes opportunity. In our day-to-day consultation with industry leaders and business owners, the digital transformation of our world and its associated challenges have clearly become the dominant theme. New models of business operation like telecommuting, online collaboration, geographically distributed projects and global marketplaces are increasingly redefining the way people live and work. Digital technologies are at the root of this worldwide transformation, and this generates an open invitation to catalyze innovation, think boldly and reimagine the future. The new Centre for Digital Transformation at BCIT has been conceived to take an interprofessional approach and link our on-staff champions and advocates in pursuit of integrated, often multi-disciplinary solutions. Only together can we tackle complex problems, inspire innovation, and foster global progress."*
> *(Roemer, 2021)*

As the world changes beyond COVID, so too will the C4DT, with the aim to ensure that skillset relevancy is prioritized and people are empowered as the surrounding world evolves. Training and ongoing skill development will also be made available to the industry to support the development of digital skills across the workforce and the continuous futureproofing of Canada's workforce. The C4DT also has several emerging focus areas, including digital twins, automation, smart building integration, blockchain, and microservices. In 2022, the C4DT also plans to expand the C4DT model across Canada with the addition of several other Polytechnic Institution collaborations. While it is understood that digital transformation has existed long before the COVID pandemic, now there is a sense of urgency, and digital transformation has become a key strategic initiative across most, if not all, organizations. According to the International Data Corporation (IDC), worldwide digital transformation (DX) investments in technologies and services that enable digital transformation will reach $6.8 trillion by 2023 (IDC, 2020).

The Centre for Digital Transformation at BCIT represents an example of innovation leadership in Polytechnics beyond the COVID pandemic and provides a promising framework for future initiatives in other Polytechnical Institutions. The C4DT is also unique in its design and elements, including being inter-disciplinary, people-focused, leadership empowering and existing within a hybrid environment or framework called "common ground" in which innovation and entrepreneurship are encouraged and supported. The long-term goal of the C4DT is to be one of the many resource hubs within BCIT that supports to futureproof

education and careers, and to a greater extent, provide the fundamental catalyst to shift the traditional culture and program delivery models within Polytechnics to be more responsive to the needs of students, faculty, industry, and society overall.

The Centre for Digital transformation puts people first or is "people-focused," in that technology needs to support people and society overall, and people need to have the skills to make the technology useful. The innovation or creative aspect of technology is entirely dependent on people (Frankiewicz and Chamorro-Premuzic, 2020). This involves not only lifelong learning, upskilling, and reskilling but, more importantly, also providing an environment in which people, "students, faculty and industry," are comfortable and encouraged to communicate, ask questions, admit shortcomings and even failures and then are provided with an opportunity to collaborate and develop new skills.

Many of the current and future challenges and opportunities facing Polytechnic Institutions will require skillsets beyond the traditional lines of communications within schools and their unique focus areas. For this reason, the Centre for Digital Transformation is interdisciplinary, with teams of experts brought in from across the various schools as required. There is also the added benefit of interdisciplinary communication and collaboration to create an ecosystem of innovation (Crow and Dabars, 2015) that would not exist within the traditional lines of communications within the Polytechnic Institution. If we consider, for example, the digital twinning of aircraft, we require skillsets from various areas of expertise, including the School of Transportation, the School of Computing and the School of Business and Marketing.

The Centre for Digital Transformation is also leadership empowering or encourages students, faculty and even industry to come forward with their ideas and bold visions for the future. The centre develops and fosters innovation and celebrates change. Many people have reached out to the C4DT when it was first launched with opportunities and ideas that just required some assistance and guidance, whether it was with grant writing, next steps or aligning network contacts. The C4DT reduces barriers and institutional frictions and plays a significant role in the actual change process (Ancona, 2005) by creating an environment in which others are empowered to act. It is anticipated that by creating this positive change environment, we will see the gradual shift of the traditional culture within Polytechnics to be more responsive to the needs of students, faculty, industry, and society overall.

The Centre for Digital Transformation also exists within a hybrid environment or framework called "common ground." This has proven to be a fundamental component of the C4DT during the COVID pandemic and will continue to evolve through research and become part of the permanent landscape even after the C4DT's physical facilities are completed in 2022. Ongoing communications and collaboration across various digital media have been identified as being a critical component for the success of the new centre. With the rapid shift to online learning and the remote workforce at the start of the pandemic, the Centre for Digital Transformation started incorporating various communication and collaboration technologies, including Zoom, Miro, and SessionLabs. These technologies were further adopted for use within the C4DT for projects and collaborations based on the FORTH Online Innovation Methodology (Wulfen, 2021) and will continue to be used and refined for further use in 2022 and beyond.

Even with the centre's new physical meeting space, it is anticipated that the current hybrid model will remain, and the addition of smart technology and video walls will only enhance the centre's current communication and collaboration technology. There is also the added benefit of the Centre for Digital Transformation being able to collaborate with the various BCIT campus locations and even other C4DT centres across Canada with the addition of several other Polytechnic Institution collaborations planned for 2022. Going back to the "people-focused" aspect of the C4DT, it is important to ensure that everyone is comfortable with and develops the skills to use online communication and collaboration technology.

One final element of the "common ground" framework is the adoption of the sensemaking theory throughout everything done within the Centre for Digital Transformation. Sensemaking, the term coined by Weick (1995), means making sense of the world around us. As mentioned previously, the COVID pandemic has been the all-encompassing catastrophe that has forced us to face uncertainty, question our values, and face our challenges in every aspect of society, including academia. The act of sensemaking is discovering new terrain as you are inventing it—embracing uncertainty and to "talk the walk" as we create our new environment. Contrary to the commonly used term "walk the talk," which often leads to hypocrisy, talking the walk is based on discovery and creates an opportunity for more genuinely adaptive discussions, which are critical during times of uncertainty such as these.

Beyond the COVID pandemic and as part of the C4DT, sensemaking provides us all with the shared meaning,

commonality, or collective reality in which the future of true innovative leadership in Polytechnics will emerge.

One recent success story of the Centre for Digital Transformation has been the collaboration between the Royal Canadian Mounted Police (RCMP) and students at BCIT. The students working with BCIT's Cybersecurity Team and RCMP members developed a Cyber Learning Resource Portal to provide frontline members with training resources to become better equipped and specialist investigators to investigate complex cyber investigations more quickly. The training material includes topics ranging from cryptocurrency, bitcoin, blockchain, ransomware, malware, phishing, IP location tracing, and more. As well, there are infographic videos, documents, and cybercrime investigative guides, along with templates and checklists, to provide a "one-stop-shop" learning and resource portal (Chen, 2021).

The collaboration between RCMP and the Centre for Digital Transformation also highlights how Polytechnics can provide innovative leadership, best practices, research, support, and training in cybersecurity, data analytics, Internet of Things (IoT), and privacy. With several additional collaborations in 2022, the C4DT will continue to focus on the leadership and management of digital transformation. The interdisciplinary team works with faculty, industry, and students to empower people, shape Canada, and inspire global progress.

Finally, we all need to consider the responsibility of innovation leadership in Polytechnics beyond the COVID pandemic and contemplate the potential opportunities for Polytechnics in an age of uncertainty as we navigate the future and its challenges. To reflect upon what we have learnt over the past year and to ask the question: How can our own Polytechnic Institution embrace these insights through sensemaking and transformation to take on innovation leadership beyond COVID? As we continue to chart the path forward, I have no doubt that Polytechnics will continue to transform during times of uncertainty and will emerge well-aligned to play a critical role in positioning and preparing Canada for a prosperous future through insights learnt during the COVID pandemic.

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Original Research Paper*

Home-Based Learning (HBL) in Higher Education Post-COVID: An Analysis From Staff and Student Perspectives

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Abstract

The purpose of this work is to analyze the impact of COVID-19 on teaching methods, focusing on the Home-Based Learning approaches (HBL) utilized at short notice to support students at the Robert Gordon University in Scotland. Building on the themes developed by Tay et al. (2021), this paper focuses on: Student engagement; Software applications and Communications; Staff; and Self-directed skills to better understand the teaching decisions taken by staff at the onset of the pandemic and the impact this had on students' learning. The aim is to then use this data to support how best to go forward in our teaching practices in a post-COVID world. To achieve this, qualitative research is undertaken using an exploratory approach looking at the key areas and antecedents drawn from the literature; it utilizes the views of staff and students to better understand how the post-pandemic use of technology in education can be designed to be fit for purpose. The paper outlines that when addressing the issues described above, the views of staff and students need to be analyzed to better plan for the post-pandemic use of technology in higher education.

Keywords

Home-based Learning (HBL), Online learning, Online education, COVID-19, Pandemic

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Introduction

Since the onset of COVID-19, the use of technology has increased exponentially, particularly in the field of social media synchronous communication (Ren et al., 2021). This COVID-19 imposed 'crash course' in teaching methods has been subject to scrutiny by teachers, students, and the wider community. This recent post-COVID-19 development is referred to in this paper as Home-Based Learning (HBL). Much work has been done in this area (Sherwin, 2021) for pure open distance learning (ODL) courses, but this has traditionally been only a small part of the higher education (HE) sector. Some of the same problems that have been identified and studied in the ODL academic literature supply insight into problems of mass online learning, but the emphasis for this research is focused on the post-COVID-19 world move to HBL.

The aim of this paper is to add the earlier post-COVID-19 work and consider the implications of their findings from the perspective of teaching staff and students at Robert Gordon University (RGU) in Scotland. The explorative, qualitative approach adopted develops issues identified and considers these from the perspective of staff and students showing how expectations and concerns correlate or diverge. The work gives insight on how to manage a shock event, but more importantly, it evaluates how technology can be used in post higher education.

Literature Review

Of the many global disruptions that have occurred over the last few decades, none have had the extreme impact of that felt due

***Original Research Papers** These papers report on original empirical research with a focus on teaching and learning, research and innovation, and insights and observations resulting from participation in a particular project or case study.

to COVID-19 (Yustina et al., 2020). UNESCO states that 90% of learners worldwide had their educational delivery affected by the pandemic (Teo et al., 2021). Issues derived from having to learn away from the traditional classroom environment are not new; Mahlangu (2018) draws on several international studies naming problems such as isolation, difficulties with the technology, and inadequate online support.

Tay et al. (2021) suggested the following prerequisites for successful online delivery: engagement by students is essential for learning to take place; different software applications should be considered and adjudged depending on the learning activity; teaching staff would require continuous professional development to keep them up-to-date with changing technology; online social networking platforms might be required following any online sessions; and finally, that students would '*need to be inculcated with more self-directed skills and habits for learning in online and face-to-face contexts*' (p. 299). This paper develops further the main antecedents outlined above, considering the unprecedented and rapid change to HBL. This paper will add to the discussion by considering the HBL experience from both the students' and staffs' perspectives.

Student Engagement

Academic literature has generally identified that defining student engagement is complex. Pre-online efforts find the psychological investment and effort aimed at learning the knowledge and skills academic work is intended to promote (Newman, Wehlage and Lamborn, 1992). Cole et al. (2021) show that engagement covers several academic and non-academic aspects of the student experience and that the measurement of this can be difficult, whilst Dismore et al. (2019) and Tansey et al. (2020) show that the extracurricular programmes and communications are vital to building strong relationships that ultimately enhance the students' ability to engage with their studies effectively. From an online perspective, Martin and Bolliger (2018) link engagement to interaction and the need for fostering this in an online environment. Axelson and Flick (2010) outline the link between the students' and the institutions' responsibility for the quality of the learning, stating that students need to input the necessary effort, and institutions must supply the right environments to support students' learning. Chiu (2021) explains that student engagement has three universal and psychological needs: autonomy, competence, and relatedness, whilst Tay et al. (2021) name the following factors relating to student engagement: the teacher, the learning environment and technology, learning activities, and peers. This research will aim to take a holistic view of student engagement by discussing these antecedents from the perspective of both the staff and students.

Software Applications and Communications

One of the issues staff faced at the start of the COVID-19 lockdown was deciding which platform to use (Teo et al., 2021). Observing the number of competing technologies in the field, Tay et al. (2021) identified the need to better understand how staff choose which technology to adopt. Teo et al. (2021) reflect on the admirable attempts by staff to create the best environment from the platforms available. Blackboard Collaborate was the approved RGU platform; however, individual staff had the volitional control to decide which platform would best serve the needs of themselves and their students, dependent on what they were teaching (Hayes et al., 2020). Many adopted Zoom for its speed, easy interface, and stability (Sherwin 2021; Ho et al. 2021). This, not surprisingly, had the potential to lead to student confusion. Staff were also expected to be creative and adaptive in this (Yustina, 2020).

Hill and Fitzgerald (2020) find that the use of more informal messaging on apps such as WhatsApp gave an invaluable lifeline to students to replace the face-to-face interactions and opportunity to ask 'silly' questions. It is normally the choice of the staff member to adopt the communication platform best suited to fulfil the students' needs (Yustina, 2020); accordingly, staff are likely to adopt a particular platform and use it in their communication with all their students. In the context of the increasing discussions around the 'right to disconnect' (Muller 2020; Franconi and Naumowicz 2021), the increase in availability and multiple platforms that staff can be contacted on must be treated with caution. The adoption of multiple platforms is, however, likely to be confusing for students (Ylirisku et al., 2021), as well as staff. That said, the use of these technologies supported the creation of a conducive space allowing students to continue their peer-to-peer learning in a user-friendly environment (Sia and Adamu, 2020).

Staff CPD and Self-Directed Learning

There is a requirement for staff to upgrade and update the various skills required to be competent HE professionals (Sia and Adamu, 2020). Tay et al. (2021) outline the need for research into how academic staff design and implement online learning. The onset of COVID-19 and the rapid adoption of HBL has put this requirement to the test in terms of how best to achieve the goal as well as the ability of staff to switch to an alternate teaching approach in such a short space of time (Yustina, 2020). Mansor et al. (2021) suggest that teacher readiness is central to the

likely success of a rapid move to HBL, outlining understanding, confidence, positive attitude, and motivation as the central antecedents. Mansor et al. (2021) present a four-dimension model based on the Technology Acceptance Models (Davis, 1989; Venkatesh, 2003). The constructs are *attitude*, i.e., the individuals' perceptions of a technology (in this case, an online learning platform); *perceived behaviour control*, the perceived ability to achieve the goal of utilizing the technology; subjective norms, the prevailing belief amongst a group towards a technology; and *ICT self-efficacy*, individuals' perceived ability to achieve specific tasks via technology. Almajali and Masadeh (2021) studied how facilitating conditions, social media and ease of use affect the perceptions students have towards online learning. The required facilitating conditions (Venkatesh, 2003) designed to support student engagement are an important requirement for a successful outcome; however, these have yet to be explored fully in HBL.

Methodological Approach

Despite the extensive literature on Online learning (Mahlangu, 2018), the COVID-19 enforced transition to HBL has received limited investigation at this stage; thus, qualitative research will enable a greater understanding of the implications of HBL within higher education. The research takes an exploratory approach: i.e., although key areas and antecedents are drawn from the literature that gives structure, the data will lead to the creation of theory rather than seeking to prove specific pre-defined outcomes (Bryman et al., 2021). The interpretivist, inductive approach allows for the researchers to investigate the respondents' views and opinions (Turner and Pirie, 2015) on subjective and personal matters (Cresswell and Cresswell, 2017), building on a body of knowledge and attempting to derive concepts and theories from this (Patton, 2002). Following this research paradigm leads to the appropriate selection of a qualitative methodology (Bryman, 2021). Using in-depth, semi-structured focus groups, the researchers explored the respondents' views, opinions, and attitudes (Kvale, 1994) towards HBL. The focus groups were designed to investigate the following key themes, developed from the academic literature:

1. Student engagement
2. Software applications and Communications
3. Staff CPD and Self-directed skills

Tay et al. (2021)

A purposive non-probability approach, i.e., where anyone who can purposively enlighten the research and is affected by the phenomena can form the sample (Silverman, 2013). Respondents were nominated based on their experience with the phenomena (Honigman, 1982). Due to the authors' joint knowledge of and access to the staff and students, Robert Gordon University was identified as the basis of the sample. The selection of the specific individuals was based on the following criterion: staff and students must have been teaching or studying at RGU pre-pandemic to enable adequate reflection on the difference between 'traditional' and HBL pedagogies. This led to a total of 13 participants, seven staff and six students. The students ranged from third-year undergraduates to recently completed postgraduates, whilst the staff ranged from early-career academics to semi-retired individuals with 4 to 27 years of teaching experience. Upon completion of the data collection, thematic coding of the verbatim transcriptions enabled an evaluative and structured approach to the qualitative data (Josselson and Lieblich, 1995).

Results and Discussion

Student engagement

Staff agreed that a personal approach to online tutorials was needed and that starting a session talking generally about non-university work set the scene and aided in two-way engagement (Bolliger, 2018). The students noted that a smaller group (<10) was more conducive for good engagement while there was less of an obligation to speak in a larger group. Enthusiasm by staff following any responses to questions was essential to build student confidence. Throughout the process, it was noted that a degree of respect and maturity was needed, but it was not always forthcoming from students and the staff, given the speed that HBL had to be introduced (Axelson and Flick, 2010) and the vagaries of the online environment. Students identified peer support as being important to the adaptation to HBL (Tay et al., 2021); this was made easier for those who had pre-existing friendships. For those coming into the HBL environment without knowing anyone, it was a struggle.

During the actual online sessions, the use of the cameras was an area of much discussion and debate. The ability to see someone's face clearly changes the dynamic in any discussion (Hu, 2021). Staff identified that getting students to turn cameras on as a major challenge, whilst recognizing that in some instances, there may be reluctance due to personal circumstances. The students tended to be supportive of being expected to have cameras on, but not forced, with some suggesting that the ability to be more casual was an attraction of using HBL. They further suggested that a conducive atmosphere for camera usage was best achieved in a small group and by setting protocols early in the module that was adhered to by all throughout (Hu, 2021). Similarly, there was a mixed response as to the value of break-out rooms from staff. The

students noted that when staff did not come into the room, there was a tendency towards inertia; therefore, the students were in support of staff coming into break-out rooms to give guidance. The efficacy of break-out rooms was viewed with some suspicion by students, who suggest that when you knew the people in the room, it was fine (Tay et al., 2021), but it is less likely to be productive if you didn't, and less likely for cameras to be turned on (Hu, 2021).

Software Applications and Communications

As staff experimented with the functionality of platforms and applications, they found that certain tasks worked better on certain applications. As per Teo et al. (2021), staff acknowledged that they sought the 'best' technology for the specifics of each class. In line with Yustina (2020), this could lead to 'platform-hopping' and student confusion as the students suggested that one platform for all classes would be preferable to reduce confusion. MS Teams is now favoured, particularly for those who have live clients or group work components, due to its ability to share files and track engagement via chat functions. Staff noted that the groups' discussions on an 'official' platform resulted in increased professionalism and a reduction in communication issues. Polls and interactive quizzes were seen as especially useful in live classes by staff and students alike for illustrating key points or identifying upcoming topics. Staff and students highlighted screen sharing and shared documents as critical, enabling collaboration in class on a shared document and/or shared work which enhances the overall class discussion (Sia and Adamu, 2020).

A change in the formality of communication between staff and students was one of the unintended consequences of the rapid shift to HBL. This was partially due to everyone's experimentation with the technologies and learning their etiquettes, but also due to the break-down of some of the traditional barriers between staff and students: students acknowledged that seeing the staffs' homes and the day-to-day lives occurring in the background had a humanizing effect and helped to maintain, and arguably enhance, the staff-student relationship (Dismore et al., 2019). Informal class group chats via, e.g., WhatsApp / Facebook were seen as of vital importance and comfort at the start of the pandemic for student peer-to-peer support, although their use declined as education settled into the 'new normal' (Sia and Adamu (2020). Staff noted a significant shift in tone (and timing) of communications from students over platforms such Zoom and MS Teams, with both groups identifying that instant messaging was seen as a replacement to the 'quick question' at the end of classes, but it had led to a deterioration of professional communication standards, supporting the findings of Hill and Fitzgerald (2020) and Tansey et al. (2020). Students recognized their role in this shift, suggesting that quick messaging was beneficial and deliberate as staff were more likely to respond faster to a 'quick Teams message.' Contrary to the 'right to disconnect' (Muller 2020; Franconi and Naumowicz 2021), staff increasingly felt they needed to respond to students at 'all hours,' with one noting that rather than 'working from home,' it was more like 'living at work.' Staff are concerned that post-pandemic students will expect everything that was once delivered on campus and the flexibility and interactivity of HBL, exacerbating existing feelings that the pandemic delivery has been exponentially more work than the traditional model.

Staff CPD and Self-Directed Learning

Self-directed learning (Teo et al., 2021) was viewed differently across staff and students, with the staff feeling that they were more capable of 'getting through it' whilst identifying that students needed more structured guidance on the 'new normal.' The lack of appropriate 'facilitating conditions' (Almajali and Masa'deh, 2021) was noted as a problem by students, citing a lack of initial support with how to access and use the new platforms. Both groups cited the need for clear, short video content—from basic 'how-to' guides for the various platforms moving on to 'advanced techniques'—as key factors in encouraging the adoption and use of the various platforms, supporting the assertions of Mansor (2021). Staff identified that, unsurprisingly, there was no organized training on HBL prior to lockdown (Sia and Adamu, 2020). Whilst some had been undertaking ODL for years (Sherwin, 2021), most staff did not have ODL experience to call on (Yustina, 2020) and existing ODL knowledge was not inculcated sufficiently. This led to staff feeling unsettled (Mansor et al., 2021) in the opening phases. Staff peer support (Tay at al., 2021) suffered due to the lack of 'water cooler' chats where ideas would be shared traditionally. One-to-one training was flagged as the best way to support staff, although no formal structure was put in place to accommodate this, and the main approach appeared to be self-learning (Sia and Adamu, 2020).

The lack of comprehension of HBL was clear from students and staff alike; students were generally patient with staff, being aware that where staff had to 'play with' the technology to get it going, the flow of the engagement was impaired (Bolliger, 2018). Students noted a clear improvement in the ability of staff to manage the technical side of HBL as time progressed, with their own views of the platforms being generally positive, finding them accessible and easy to navigate (Davis, 1989;

Venkatesh et al., 1995). They also reflected on their own performance, with some suggesting that it was a positive educational and social experiment with several positive aspects that should be taken forward to allow for flexibility in the future. As Mahlangu (2018) notes, a functioning technological infrastructure is a key to any successful online delivery; this is clearly heightened in the HBL environment.

Conclusion

This exploratory qualitative study has built on earlier post-COVID-19 work addressing staff and student perspectives on student engagement, CPD and self-directed learning, software applications, and communications. Further study is needed to address each of these topics in depth; however, the initial findings support the following: Creating a supportive online classroom environment that encourages students to participate fully is a difficult balancing act that requires small groups (<10) and familiarity within the group. Peer support for both groups continues to be an invaluable resource, whilst the specific need for short video guides for the various platforms and software was identified as critical for staff and students to engage with HBL effectively. The breaking down of traditional staff/student barriers has had many positive benefits, such as the humanizing effect it has had; however, the deterioration of students' professional communication and increase in staff workload are clearly issues that need to be addressed. Accordingly, and supporting the assertion of Naimbar (2020), this study suggests that cognizance of staff and student views is needed in planning for the post-pandemic use of technology in higher education.

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Original Research Paper*

Phone Visiting as a Novel Clinical Experience for Healthcare Students During COVID-19 and Beyond

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Abstract

During the COVID-19 pandemic, there was a need to utilize innovative clinical placements for healthcare students. The Saskatchewan Polytechnic Continuing Care Assistant (CCA) Program created a five-week phone visiting program to meet the clinical needs of CCA students and to assist older adults who were experiencing social isolation during the COVID-19 pandemic. Student evaluations from the project were analyzed using Braun and Clarke's (2006) thematic analysis and resulted in three themes: building communication skills, communication as your job, and older adults as people. This program was successful in providing students with the opportunity to practice communication, learn the importance of effective communication in the workplace, and view older adults from a new perspective. The phone visiting program was beneficial for both students and the older adults involved; therefore, it would be a beneficial addition to health science programs as part of clinical or communication classes.

Keywords

Older adults, clinical experience, healthcare students, phone visiting, program evaluation

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Introduction

Finding clinical placements for healthcare students has been an ongoing challenge that increased exponentially with the additional regulations of the COVID-19 pandemic. To address this challenge, the CCA Program in Regina, Saskatchewan created a phone visiting program that paired CCA students with older adults in the community for weekly phone calls as an alternate clinical experience. Implementing a phone visiting program met students' clinical needs for completing their course requirements and also provided social interaction for older adults who were socially isolated during the pandemic. The phone program afforded these students opportunities to work on their communication skills without the distraction of the personal care tasks found in a standard clinical experience. This paper will describe the phone visiting program along with the results of a thematic analysis of student evaluations. Creating innovative options for clinical experiences is essential for skill-building and ensuring successful program completion during the pandemic and beyond.

Background

The COVID-19 pandemic has significantly impacted healthcare students' clinical placements. In March 2020, Saskatchewan post-secondary institutions cancelled in-person clinical placements and replaced them with case studies, simulations, and other virtual means of learning (Bamford, 2020). In the fall of 2020 and spring of 2021, many students returned to clinical placements but there continued to be limitations. Students were removed from placements if there were COVID-19 cases, and many facilities did not accept clinical students.

The CCA Program (home care/special care aid, home health aide, resident assistant) is a nine-month certificate program offered at Saskatchewan Polytechnic. This program prepares unregulated care providers to work in a variety of settings, including long-term

***Original Research Papers** These papers report on original empirical research with a focus on teaching and learning, research and innovation, and insights and observations resulting from participation in a particular project or case study.

care facilities, home care, and some acute care units. As part of the overall clinical experience, the CCA program includes a 40-hour clinical experience in a home care or community setting. During the COVID-19 pandemic in March 2021, several agencies were unable to accept students for clinical experiences due to the increased risk of COVID-19 transmission to staff and residents. To facilitate a quality clinical experience for all students during this pandemic, faculty needed to find other options. Students without a traditional clinical placement were assigned to the phone visiting program to give students a practical chance to work on their communication skills.

Older adults were selected as the volunteers for the phone visiting program for two reasons: the CCAs primarily work with older adults, and older adults were experiencing social isolation during the COVID-19 pandemic. Older adults who were 60 years of age or older, retired, and living independently were included in the program. The phone visiting program aimed to help ease the loneliness many older adults were experiencing during the COVID-19 pandemic, as up to one-half of older adults experience loneliness, and this was worsened during the pandemic (Cho et al., 2019). Loneliness impacts older adults' physical health, with socially isolated older adults being more likely to experience depressive symptoms, sleep disturbances, and dementia (Cacioppo et al., 2002; Cho et al., 2019; Holwerda et al., 2012). The phone visiting program was one way to help older adults in the community during this challenging time.

One of the aims of this project was for students to develop their therapeutic communication skills, which is an essential part of working in healthcare. Therapeutic communication is a form of information transmission that builds interpersonal relationships, and it is an important clinical competency in patient-centred care (Abdolrahimi et al., 2017). It is essential for students in healthcare fields to develop effective communication skills in order to build therapeutic relationships and provide the best quality patient care (Sancar & Aktas, 2019). However, nursing students reported knowing therapeutic communication skills but were insecure or unable to apply them in actual communication with patients (Dermani et al., 2020). Finding ways to develop students' practical therapeutic communication skills will benefit them and their patients/residents throughout their careers.

There is a paucity of research regarding phone interventions by non-medical healthcare professionals and their usefulness as a clinical experience. While many programs exist that match volunteers with older adults experiencing loneliness, little research has been completed on their potential as student clinical experiences. Two studies were located that found positive results for older adults in short-term phone interventions through the lens of the volunteers participating in the phone program (Office et al., 2020; Van Dyck et al., 2020). Office et al. (2020) conducted research with medical student volunteers who called older adults one time for an average of 8.3 minutes. Another study also involved medical student volunteers calling residents living in care facilities weekly (Van Dyck et al., 2020). Both studies found that medical students viewed the phone calls as a positive, and most believed they were beneficial to older adults (Office et al., 2020; Van Dyck et al., 2020).

Ethics

This project received ethics approval from the University of Saskatchewan BEH#2884.

Description of the program

The phone visiting program was conceptualized through the team's preliminary qualitative research examining the experience of older adults during the COVID-19 pandemic. During this research, loneliness and social isolation were found to be significant problems for older adults. The research team wanted to implement an intervention that might help alleviate some of these negative emotional symptoms. Phone calls as an intervention were suggested as a COVID-19 friendly socialization option. This idea coincided with faculty expressing concern about the lack of home care clinical placements and the need to seek new opportunities for CCA students. This project aimed to meet the needs of both older adults experiencing social isolation and students in need of clinical placements.

Older adults were recruited for the phone visiting program through acquaintances of research team members and from the original research participants of the experience of older adults socially isolating during the COVID-19 pandemic. These individuals were invited to participate in the CCA phone program if they wished. Interestingly, the older adults in the initial research most often stated that they did not wish to be part of a phone support group; however, they expressed a desire to help CCA students complete their clinical experience.

Students were emailed guidelines for conducting the phone visits and suggestions for weekly conversation topics. To assist students in initiating conversation, open-ended questions and tips were provided. Themes such as family or former working life were provided each week to guide the discussion. Instructions were merely a guideline, and students were encouraged to follow the flow of the conversation regardless of the guide. Each older

adult was paired with a CCA student, and the CCA student was given contact information for the older adult. The students were responsible for initial contact and scheduling of weekly phone calls over a five-week period. Each phone call was to last between 25 to 60 minutes. Students were required to submit a half-page summary after each phone call which included answers to weekly reflective questions.

Student evaluations of the program

Twenty-two students were assigned to the project, with 21 students successfully completing their five phone calls. Sixteen of the 21 students completed the program evaluation. The evaluation questions included reflections such as what they learned about older adults, themselves, and their interpersonal communications. The questions also asked for reflections about how this experience would help in their future CCA practice. The last questions asked for feedback on the phone visiting program and suggestions for improvement for future students. Students' evaluations were overwhelmingly positive and showed the growth of the students throughout the phone visiting program.

Methods

Braun and Clarke's (2006) thematic analysis was used to create themes of the results of the student evaluations. Thematic analysis is an inductive approach to data gathering that seeks to find patterns in the data (Braun & Clarke, 2006). Data from the student evaluations were de-identified and reviewed multiple times using a line-by-line coding process. The codes were then grouped together to create themes, these themes were confirmed, and overarching theme names were created by the research team. The research team used a constructivist and relativist approach to data analysis. As the research team members are all instructors or retired instructors in the nursing or continuing care assistant programs, we bring our own philosophies of teaching and learning to the analysis. The results give voice to the participants while recognizing that the researchers' experiences colour the interpretation. We also recognize that the evaluations reflect one small portion of the learning journey for students and the personal experiences of each student.

Results

Through analysis, the results were grouped into three themes: building communication skills, communication as your job, and older adults as people. These three themes identify the growth of students in their communication skills and their beliefs about older adults.

Building Communication Skills

Building communication skills refers to the multiple ways in which students learn new communication techniques and put their theoretical knowledge of communication skills into practice. Although the communication classes offered in the CCA program built theoretical skills, many of the students lacked practical experience speaking to older adults and people they did not know. Through the phone visiting program, the students were given the opportunity to gain practical communication skills.

Students described increasing comfort in their ability to talk to new people as a significant growth area:

> *"During this phone call experience, I have learned that I can hold a conversation with a complete stranger. It sounds odd, but if you really knew me, you would know that I have a very hard time holding conversations with people I do not know. But now I can say that has definitely changed."*

Students practiced active listening skills and used silence to allow older adults time to formulate answers. The simple acts of listening and reflecting were important lessons for one student, "Listen and be mindful of the other person's thoughts and beliefs." Furthermore, silence was used as a communication tool, "I also learned about the importance of becoming a better listener and allowing for natural silences." Several participants talked about the need for patience, "Patience is important, waiting a bit before talking in case they have more to say." Finally, the importance of allowing people to fully express themselves was identified, "It's extremely important to let them talk and not respond because sometimes they rail off in conversation, and you need to let them speak for as long as they need."

Simple lessons such as using conversation starters and checking for understanding were helpful tools that students developed during the phone program. One student found that talking about the weather helped fill the gaps in conversation, "Weather is something they may resort to talking about if they are unsure of what to talk about." Checking for understanding was a way to show engagement, "It is important to listen and give feedback on what they're talking about, so they know they are being understood." Students described the importance of learning new communication skills, and this was increasingly important as they were preparing to move into the workforce.

Communication as your job

Students are often focused on task-based learning, such as how to take a pulse or use a lift properly. During the phone visiting program, students recognized that communication with older

adults, tailoring care to individuals, and building relationships were as important as the tasks themselves. Many of the participants recognized the need for good communication skills when working in healthcare, "I believe that this will help me in the future because it showed me that it is easy to talk to someone you have never met before. With working at different facilities and with tons of different staff and residents, I will be able to strike up a conversation quite easily, at least I am hoping for that."

One student succinctly described the importance of communication and relationship building, "1. They want you to listen attentively, 2. They want to gain your trust and feel safe around you (before divulging any information), and 3. They want you to keep your promises (like time/appointment)." Students learned that communication is an important tool for putting their clients at ease, "Having good interpersonal communication can set a good relationship between the worker and the client, and it will make the client comfortable." Participants discovered that sharing information about themselves made older adults feel more comfortable, "I have also learnt that older adults feel safer to talk about themselves and families if you share a little bit about yourself too." These are invaluable lessons regarding the importance of communication in the workplace and the starting point for quality senior care.

Individualizing care through communicating with older adults was additional learning for students that will make them better care providers. In the words of one participant, "Giving care is not only performing the morning care and feeding; listening to them and spending time with them to make them happy is also part of care." A student further added to this thought, "Learning to listen to what the older person wants and how they feel instead of just doing your job." Another participant reflected on their learning, "I will use these lessons by not treating everyone the same because I do not know everyone's story; I do not know what they have encountered in their life or what they are going through at this point in time." Through the phone visiting program, students reflected on the importance of communication over tasks in the workplace.

Older adults as people

Many of the students in the CCA program have had little contact with older adults and may see older adults for what they have lost, not for what they have to offer. Students forget that older adults are people with joys, hopes, and vibrant lives. The phone visiting program allowed students a glimpse into an older adult's life that they may not have previously experienced. Students were pleasantly surprised by how quickly they were able to develop a relationship with an older adult:

> *"I learned that older people still have good communication abilities; they are always ready to chat with people—it does not matter if the person is young or old. As long as you are*
>
> *willing to be part of their company and conversation, you become part of their social network."*

Students also found that older adults enjoyed the same type of encouragement as they would, "They enjoyed being validated and praised for their past and present achievements."

One of the common learnings among the participants was about older adults' vitality and health, "Regardless of their age, they still desire a life with good health and lots of love and care." Other participants spoke of older adults' outlook on life: "They are so appreciative of the small things," "Their outlook on life during this whole thing is very inspiring," and "Keep optimistic in hard times." Valuing the experience of older adults was an important lesson, "They like to talk about their life experience and also like to hear about us." They learned about how older adults found joy in their life, "They like to spend their time with their family, especially grandchildren." Furthermore, "They like having company and someone to talk to." Finally, they expressed an interest in older adults continuing to have vitality after retirement, "I have learnt that just because you are 'retired', it doesn't mean you do or have to stop working."

Students enjoyed developing a relationship with the older adult they were partnered with and often gained much out of the relationship in return, "She has no idea how much I loved talking with her… I hate to say it, but I did not really have a grandma figure in my life, so this was an amazing experience." The students also enjoyed the encouragement they received from older adults, "He also told me that as long as you believe in yourself, you can get through anything." Many students expressed great enjoyment visiting with older adults, "It was very comfortable, and my senior was a total sweetheart. I wish this experience didn't have to come to an end!"

The phone visiting program led many students to reflect on the relationship they had with older adults in their own family, "I also learned that I am very privileged and lucky to be so close with my family and be loved by so many people." Another student improved her relationship with her own grandparents, "By getting this opportunity, I understand the importance of talking to older persons. After this phone project, I started to talk to my grandparents. Hearing them and spending time with elder persons makes them happy, and in one way, it's our duty." Learning about

older adults as people was a rewarding discovery for many of the student participants.

Discussion

The phone visiting program achieved multiple goals. It allowed students to develop therapeutic communication skills, meet clinical objectives, and support older adults in the community. Anecdotal evidence points to the fact that older adults enjoyed the experience. The students had very few negative comments; some wished for scheduled times to make phone calls, while others liked the flexibility. Some wished for there to be shorter requirements for conversations, while others enjoyed longer conversations. Several students expressed sadness that the program had come to an end. The lack of negative comments speaks to the value of the program. After initial instructions, students completed the experience with minimal guidance. Students stayed on task and were conscientious in submitting weekly reports with few reminders. The CCA program is an entry-level program, and students often need support to successfully complete tasks. This was not the case in the phone visiting program.

Many students reported that the phone clinical experience was beneficial for them to build their therapeutic communication skills. Although the students have taken courses on communication techniques, they often had little prior experience talking to people they did not know. Additionally, students lacked experience conversing with older adults. Healthcare students' lack of comfort with using communication skills aligns with the literature (Dermani et al., 2020). However, in this study, students improved their comfort with communication skills and felt more confident in their ability to use their communication skills going forward.

The phone visiting program allowed students to complete their home care practicum at a time when home care placements were few. The phone visiting program did not merely meet the requirements of the clinical but allowed students to grow their communication skills, which are essential in healthcare, and provided a new dimension to the clinical experience. Some aspects of the phone clinical experience were an advantage, such as being able to work on communication skills and relationship-building without the distraction of other tasks. The phone visiting program lacked the face-to-face connection, and many students missed the ability to read older adults' expressions and gestures. Also, there was no direct care completed during this clinical; however, direct care is not a requirement for this clinical experience.

CCAs and other healthcare workers are uniquely positioned in the healthcare system to develop relationships with their patients through continued communication. This is different than medical students who, as found in previous studies, often have short one-time conversations with patients or short, infrequent conversations (Office et al., 2020; Van Dyck et al., 2020). The nature of the CCA role as daily care providers positions them to develop strong therapeutic relationships with patients in a way that other healthcare providers cannot. As outlined by Abdolrahimi et al. (2017), good communication by healthcare providers can improve the quality of care and reduce negative outcomes. Providing opportunities for healthcare students to develop therapeutic communication skills is vital.

This program not only met the needs of student clinical requirements but helped meet the needs of the community by providing visiting opportunities for older adults who were socially isolating during the COVID-19 pandemic. Older adults have experienced high levels of loneliness during the COVID-19 pandemic, and this is impacting their health and well-being (Cacioppo et al., 2002; Cho et al., 2019; Holwerda et al., 2012). The need to find new ways to connect with older adults has never been greater. There will continue to be a need to innovate clinical experiences and find new options for students. The phone visiting program meets three needs: providing students clinical opportunities, growing student communication skills, and offering visiting opportunities for older adults.

Conclusion

Finding clinical placements for healthcare students has always been a challenge which worsened during the COVID-19 pandemic. Innovative clinical options that not only meet the minimum requirements for clinical placements but grow students' skills in new ways are essential. The themes of building communication skills, communication as the job, and older adults as people reflect the learning of the students through this program. Pairing students with older adults for phone visits was an excellent way to build communication and relationship-building skills. Going forward, innovations in clinical experiences should consider including both opportunities for students to learn skills and for their learning to support community needs.

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Original Research Paper*

A Study on Skills Gap: Beyond COVID

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Abstract

Keeping up with the pace of technological advancement is a challenge for companies of all shapes and sizes. It is increasingly crucial to reskill and upskill in the changing era of innovation, especially post-pandemic (Beyond COVID), and acquiring soft skills is imperative for success in the digital era. The importance of soft skills like teamwork, communication skills, problem-solving, and critical thinking is a growing demand, heightened especially during the pandemic while working remotely. Upskilling ensures employees' skillsets will not become obsolete. As you reskill your employees, you create a more well-rounded, cross-trained workforce, and increase your team's effectiveness (itagroup.com, n.d.).

According to the United Nations Department of Economic and Social Affairs, the equivalent of 255 million full-time jobs have been lost due to the pandemic, and 1.6 billion informal economy workers lacking a social safety net have been significantly affected. The recovery will be slow; global economic growth is expected to return to pre-pandemic levels only by 2025.

The pandemic has dramatically accelerated the need for new skills in the workforce, with social and emotional skills high in demand. The proportion of companies addressing empathy and interpersonal skills doubled in 2020, according to the newest McKinsey Global Survey on reskilling (McKinsey, 2021).

Keywords

skills-gap, soft skills, career ready, labour market

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Introduction

Skills Gap Analysis involves the comparison of actual performance with the potential or desired performance.

The skills gap analysis is an in-depth view of the most demanded skills required in the jobs which were published on various job portals. A skills gap analysis allows the industry to identify the mismatch between employees' current skills and those that are needed to achieve the organization's future success. It evaluates the current capabilities and compares them to what is required. (hays.com, n.d.). According to Mark Cuban, "To remain competitive, ditching degrees that teach specific skills or professions and opting for degrees that teach you to think in a big picture way, like philosophy, is a good investment" (CNBC make it, 2018).

According to 21st Century Competencies Ontario, "The most prominent 21st-century competencies found in international frameworks that have been shown to offer measurable benefits in multiple areas of life are associated with Critical thinking, Communication, Collaboration, and Creativity & Innovation" (21st Century Competencies, 2015). For our analysis, the jobs targeted were entry to mid-level positions and focused across four sectors: logistics, banking, telecommunications, and construction. The study focused on a Canada-wide job market. The duration of the study was five months.

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In this case study, we tried to find out which skills are required in the job market, and if there are any gaps among the programs offered by Humber College. This preliminary research will help Humber College to identify the gaps in skills developed at educational institutions and those needed by the industry; this will act as the first step in fostering ideas around skill-based learning and a much deeper conversation surrounding competency developments. The long-term purpose of the study is to ensure that Humber's students are competitively equipped to succeed in the workforce, as clearly defined in Humber's Strategic Plan 2018-2023 – Pillar #1: Career-Ready Citizens (Humber Strategic Plan, n.d.).

Background

The scope of this research study is to represent the list of most recurring skills in job postings and compare the results with Humber's program offerings. The data for the study was gathered by manually extracting information from job portals, such as Indeed, Glassdoor, LinkedIn, and other job boards. The information taken from each job posting provided us with the following details:

1. Job title
2. Seniority level
3. Province
4. Skills required
5. Name of company

Once the above information was gathered, we were able to use one of Scott's Directories databases to identify the following:

1. North American Industry Classification System (NAICS) categorization
2. Employee size
3. Type of industry

The data we gathered helped us narrow our search among the most repeated industry sectors: banking, logistics, construction, and telecommunications, which served as our initial benchmark.

The fields to source from this big batch of data were the following:

- Company Name
- Industry
- # Employees
- Estimated Sales
- Department
- Seniority Level
- Location
- Province
- Size
- Group
- Postal Code
- Job Title
- Source
- Initial Posting Date
- Skill
- Skill Description

The information categorized in the above format was helpful in grasping the big picture. More inferences were drawn, and patterns were identified from our initial dataset. Once the list of recurring skills was identified, we gathered information from Humber's program offerings, and the learning outcomes were translated as skills. (Please refer to Figure 6 in Section 7.0 Humber Skills Mapping: to view the match between skills required in industry and skills offered by Humber).

Method

Quantitative Research

Definition: A research strategy that focuses on quantifying the collection and analysis of data. The objective of quantitative research is to develop and employ mathematical models, theories, and hypotheses pertaining to phenomena.

Since this was a preliminary analysis, we used a Quantitative approach to begin a highly sought-after conversation in Industry and Academia. We maximized efforts to get a maximum number of open job postings in the job portals all over Canada. We narrowed our research into various categories like province, industry, and department to obtain the skills required.

Exploratory Research

Definition: Exploratory research intends merely to explore the research questions and does not intend to offer final and conclusive solutions to existing problems. This type of research is usually conducted to study a problem that has not been clearly defined yet.

Since the information is flowing from an uncontrolled data source, we had to understand the purpose behind each data field; therefore, some of the questions the research team addressed were:

a) What are we looking for? The scope of the search was limited to the skills described in the job descriptions.
b) Where do we gather the data from? Explored options to locate and gather data. We narrowed our search to popular job portals, such as LinkedIn, Indeed, Glassdoor, etc.
c) How to control the data? We defined the scope of the search and our criteria to company details, skills, and company demographics.
d) Why collect the data? The data was collected to understand skills most sought-after in the industry–this is a preliminary step to a more important topic of competency mapping.

Analytical Research

Definition: The analytical research usually concerns itself with cause-effect relationships and attempts to establish why it is that way or how it came to be.

Once the data was collected, we applied data cleaning and sorting techniques to the dataset for analysis and visualizations (Pedamkar, n.d.).

Findings & Outcomes

The data collected from LinkedIn, Indeed, Glassdoor and other job boards was organized and cleaned for further analysis. The data was separated into four industries: telecommunications, construction, banking, and logistics, and based on that, technical and soft skills were identified. In phase one of the research, the data was analyzed to understand the requirements of skills based on the geographics and target department for top organizations in each industry.

> *"The benefits of soft skills training can be hard to measure, but research reveals that it can bring a substantial return on investment to employers while also benefiting employees. Namrata Kala, an assistant professor of economics at MIT Sloan, with colleagues at the University of Michigan and Boston College, partnered with Indian garment manufacturer Shahi Exports Private to run a randomized controlled trial across five factories. They found that a 12-month soft skills training program delivered substantial returns." (Walsh, 2017).*

The following trends have been identified; the top 15 skills which were ranked based on most recurrences in the job postings were (See Figure 1):

1) Communication skills
2) MS office skills
3) Organizational skills
4) Teamwork
5) Problem-solving skills
6) Customer service skills
7) Relationship management skills
8) Team player
9) Time management skills
10) Leadership
11) Physical skills
12) Project management skills
13) Analytical skills
14) Multi-tasking skills
15) Detail-oriented

Further, the jobs were classified as entry-level (one to three years of experience), mid-level (four to ten years of experience), and senior-level (11+ years of experience). The data shows that construction occupies around 52% of the collected skills, followed by telecommunications (30%) and banking (17%). (See Figure 2)

Based on the analysis, the maximum number of skills are required in entry-level positions, especially in the construction sectors, followed by telecommunications, banking, and logistics. Based on

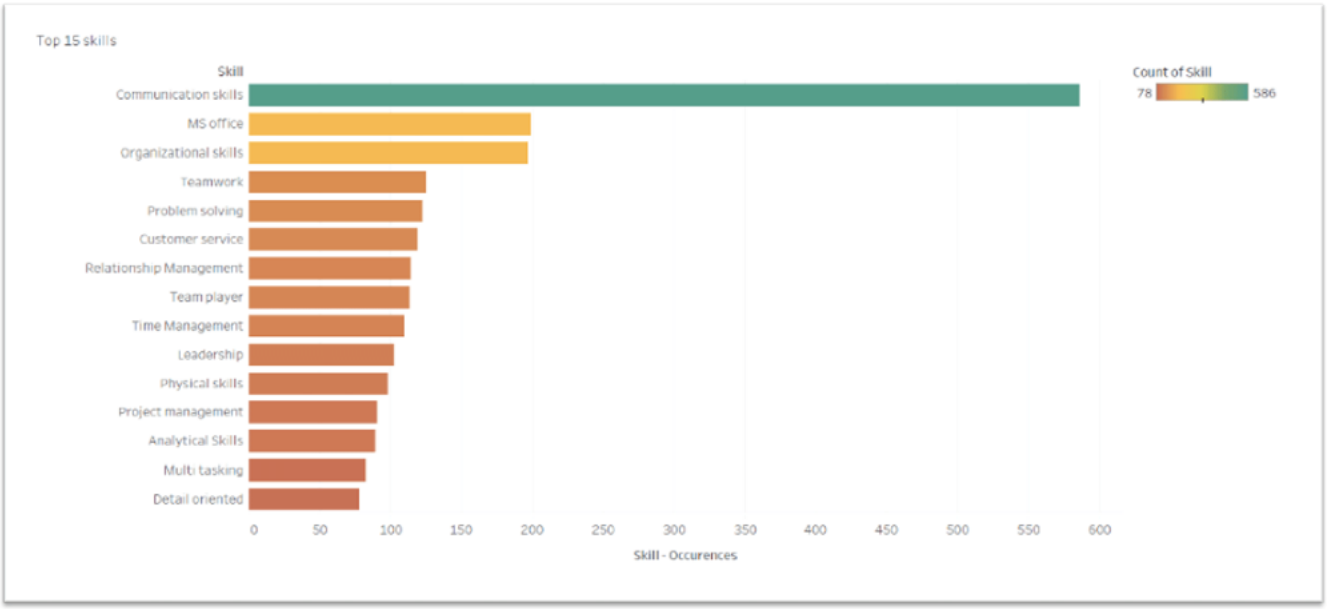

Figure 1. The top 15 skills that were recurring

information on job openings, the patterns suggest a huge demand for entry-level and mid-level candidates, while a limited number of senior-level positions are available. Further analysis of the jobs available vs. the required skills shows a constant ratio required to perform a job among all the four industries. Let's take an example: if we observe the two job titles - 1) .Net/C# Advisory Application Developer and 2) Customer Care representative, a total of six skills for each job title are required to perform the job as per the job posting. We noticed similar patters in all the job postings.

The Provincial Overview chart (Figure 3) shows the total skills required across Canada. Our analysis depicts that Ontario (green) remains the hub for all the industries with maximum job availability (1,196). The skills required also remain highest in Ontario (7,166), followed by Quebec (152 jobs, 1,467 skills) and British Columbia (68 jobs, 420 skills).

Skills Mapping with Programs Offered by Humber

The skills mapping was completed by taking the cumulative top skills in industry and mapping the skills to the learning outcomes defined under Humber programs. A red x denotes the skills gap, and a green tick mark denotes a match. (See Figure 4)

The preliminary analysis shows that Humber covers 51% of the skills in demand with industry. Although further analysis showed that skills offered at Humber match with technical skills required by industry, a closer look at soft skills is required. This analysis can be used for the following:

1. Initiating a conversation around skill-based learning.
2. Competency Mapping for the Canadian Workforce.
3. Rethinking how Educational Institutions work with industry partners to train students.

Number of Skills - Industry vs Seniority

Industry	Seniority Level	
Banking	Entry Level	850
	Mid Level	508
	Senior Level	232
Construction	Mid Level	2,249
	Entry Level	2,056
	Senior Level	532
Logistics	Entry Level	73
	Senior Level	42
	Mid Level	4
Telecommunication	Entry Level	1,304
	Mid Level	950
	Senior Level	458
Grand Total		9,258

Figure 2. Skills in each industry ranked by seniority

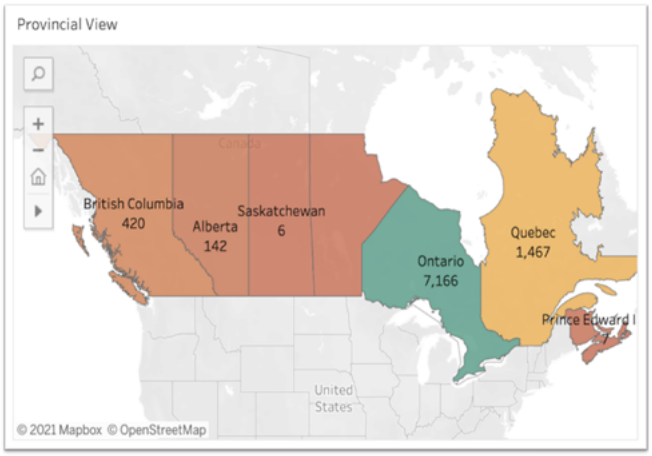

Figure 3. Provincial Overview highlights accumulation of skills

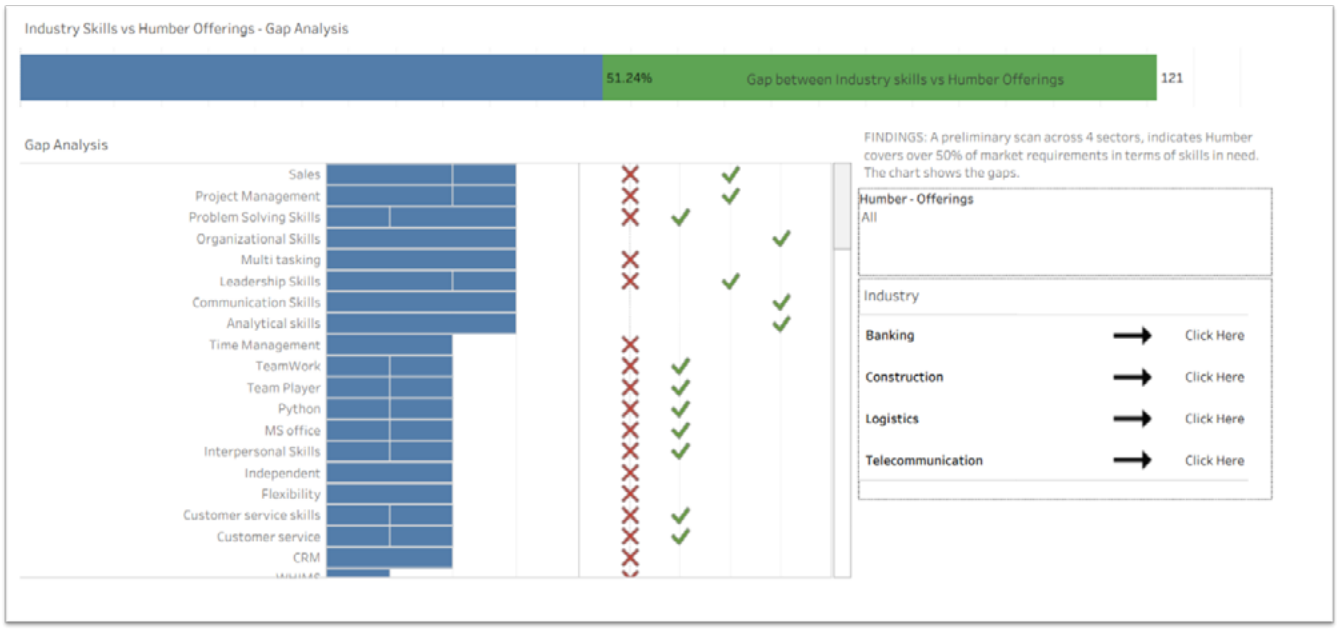

Figure 4. Gap Analysis—Indicates skills that may not be covered by Humber

The current analysis covered four industries within Canada, considering 297 companies that offered 1257 jobs and needed 9258 skills. This analysis can be upscaled to cover a more significant number of industries that will provide further insights into the Canadian job market. A similar skill mapping model can be deployed in other educational institutions that would provide them with a way of upgrading their current educational resources.

Recommendations from This Research

It is important to stress that, in general, some of the certifications could be disregarding the importance of soft skills, which are built and developed through experience and practical knowledge. When practical experience is the primary source for soft skills, it is observed that in some of the outcomes from Humber programs, the focus is more on fundamentals like theoretical skills instead of practical fieldwork with real business cases and applications.

Having said that, we can use this study to assess the skills which are available in-house at Humber and enhance them. In addition to identifying the gaps and bringing them under Humber's umbrella, which in turn will benefit students and allow Humber to strengthen its Unique Selling Proposition (USP).

Further research into Competency Mapping and how educational institutions can support the Canadian workforce could potentially allow students to pick from a buffet of skills and ensure they can strengthen skills of their choice. For example, if we have an engineering graduate who is interested in gaining knowledge in Human Resource practices of Talent Management, Change Management and HR analytics, they will have the opportunity to learn and possibly change career path if they desire.

For that reason, we recommend interviews with industry Partners and go beyond Human Resources guidelines up to the end-users to collect the soft and technical requirements, which will enable us to build on the scope of this study and focus on meaningful results. We can build on the interviews with industry Partners and design training programs like Train the Trainer models to offer informed and enhanced training based on requirements of relevant industry and feedback from PACs to faculty members, thereby presenting the faculty members with an opportunity to stay current with the most recent market trends.

In addition, we believe that implementing a relational communications model, including collecting historical information and analyzing the data against other successful experiences, would be an asset that could lead to creating data repositories that might enhance the use of information as a learning system. Performing this recurrently will create a learning loop–what skills are getting updated or needed in the job market–Humber can use this loop to assess and/or modify their programs to match the industry needs/demands.

Lastly, all these inputs can provide valuable information to build workshops or seminars for enhancing the skills required, assisting faculty and, ultimately, the programs, which will, in turn, enable students to acquire the most required skills and competencies.

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Original Research Paper*

The Online Condition as a Structuration of Feedback

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Abstract
This article offers an analysis of codes of a broad spectrum of feedback situations reported during lockdown online teaching. The article will account for findings and provide explanatory frameworks for solid observations on feedback situations in a broad sense; for instance, there was a notion of Online Supervision having a structuring effect that suited many students' learning; Peer feedback in assigned group work was reported as a central approach to learning at the School and provided the group members with well-being and a sense of belonging; Break-out rooms served as a special occasion for fast peer feedback in randomly assigned groups; and finally, evidence will be provided that Online group work is especially suited for Code script and other disciplines where Screen sharing technology serves as a structuring device.

Keywords
Feedback, Online education, group work, structuration, randomly assigned group discussions

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Introduction

The second COVID-19 lockdown in Denmark in Spring 2021 gave birth to a large student wellbeing initiative at the Copenhagen School of Design and Technology (KEA), a bachelor's degree university of applied sciences. The school's approx. 4700 students were contacted, and a combined wellbeing chat and survey was conducted.

Although the tag line for the chat was the students' social and academic wellbeing, the initiative also provided a rich insight into different aspects of feedback in times of online teaching. More so, the initiative would also hypothesize a relation between the appearance of feedback situations and student well-being in an educational setting.

Danish students experience less feedback from their teacher than students from other Nordic countries, yet they have a marginal higher sense of belonging (UFS, 2021). For a decade, nevertheless, feedback has been on the agenda for higher education, and national compulsory student surveys ask the students to rate if they "receive sufficient amount of feedback." Noteworthy, this restricted use of the notion of feedback, as something that is "given" by the educator to the student, has had some impact on how feedback is framed in the educational sector. I understand feedback as a term introduced to pedagogics from communication theory, and only later, it was given the narrowed meaning of being (official) feedback given by the educator to the student in a formalized manner. Such a narrow definition, however, reduces the learning from feedback to letting the student develop the skill of being able to receive feedback. Broadening the scope of feedback would allow us to include skills like being able to understand feedback, to give feedback, and to dialogue on feedback. Feedback in a broad sense would in the original sense of communication theory be a message that tells the original sender how clearly her message was understood and what effects it had on the receiver (Bloisi, Cook & Hunsaker, 2007). In the UFS-report, students with a higher study activity rate (the importance of) feedback higher than other Danish students.

It is noteworthy that under the COVID lockdown, online education

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in the higher education systems throughout the world ought to be analyzed as emergency education using some techniques and didactics of distance education. Thus, the change brought about in the lockdown period was not an example of a planned intervention. Although management of crisis is an interesting subject, this article will concentrate on analyzing aspects of the performed teaching and learning during the lockdown. Across the sector it is widely recommended to create a stronger and more transparent structure in online teaching. Schools and polytechnics emphasize clear communication on where and what the next interactions are about (Haahr, 2021). The activities to be dealt with during the study day should be structured as you "do not sit in the frame" (as of the school) (ibid). The need for a higher degree of structure in distance learning has consequences on the ideal arrangement of feedback mechanisms.

A study in the EA-sector shows that feedback from peers is not appreciated by students (Haahr, 2021). We expected to find something similar in our study, yet we found the opposite. Peer feedback in a broad sense of the word is a fundamental ingredient in students' social and academic wellbeing.

Method

The student wellbeing initiative conducted at KEA contained phone calls to all full-time students studying at the time. The phone calls were conducted by Psychology students, thus the name of the initiative, Student to Student. The phone calls had a response rate of 53% of the total population with a functional phone number. A sample of the respondents of the survey filled out a satisfaction questionnaire upon termination of the chat. The satisfaction survey showed that the respondents were very pleased with the call; thus 95% of the respondents rated the call to be "fine" or "very fine" (*meget god*). The dataset consists of a large survey report with both open and closed answers. While prioritizing the flow of the chat, the callers had been trained to note the scores for the closed questions and take notes from the open questions. The calls were thus not recorded, and the notes from the conversations should not be seen as direct quotes from the respondents, rather as the caller's memory notes from the chat. In addition, the caller completed a reflection report on finishing calls to a class.

Open-ended answers

The survey contained sections with open answers annotated by the interviewers, which provided a rich qualitative data set. The surveys were imported to a qualitative analysis software, Nvivo, after completion of the interviews. The data was coded by a researcher and a student assistant providing more than 13,000 unique codes. The codes were internally validated amongst the coders and later externally validated with the reflection reports of the interviewers.

The coding was done manually, bottom up; and a pattern of clusters of codes ultimately appeared. The researcher and assistant were immersed in the material, starting the coding from a *tabula rasa*, and letting coding patterns and clusters evolve through repetitive analysis of short fragments of data in a grounded theory sense (inspired in Rosengren & Arvidsson, 2002). The five biggest groups of codes were: Socially Missing Out, Structure of Classes, Group Work, Feedback, and Bad Communication.

The results analyzed in this article come from Feedback and Group Work, representing 14% of all the codes.

Quantitative Data

The quantitative data was accessed with Survey Exact, a survey tool. The interviewers noted the respondents' answers directly into the system giving room for some interviewer bias. Peer learning and heavy instructions of the interviewers, however, point to a low interviewer bias on the quantitative questions. The tool allowed the researchers to make descriptive statistics for the dataset, to control the data quality, and make simple analysis of non-response bias. The results reported here are judged to have a low non-response bias and all differences in values are deemed statistically significant.

Results

Thematic Clustering

Supervision. Lacks and Benefits of Online Supervision.

A thematic cluster that stood out at an early stage of the analysis was that of Supervision. Supervision was, more often than not, conducted via Teams or similar conference tools after scheduling via the LMS or shared spread sheet file. Students report that this setup worked well, and many students value teachers' availability for supervision as well as the possibility of extra slots put into supervision as positive factors. "Online guidance is going well" is a frequently reported statement in the material. Moreover, the possibility of sharing screen with the supervisor is something many students suggest should be continued in a post-COVID scenario. Online supervision was appreciated for several reasons. Amongst them were the practical aspects such as higher availability in lockdown and saving long commutes to campus.

Others were the technical and organizational aspects of Online supervision, such as enabling various persons to look at the same detail of a document, code, or drawing, at the same time. Another organizational aspect students emphasized is the advanced possibility of booking supervision when needed or of being able to ask the teacher to join the "room" where the group is working. As opposed to counselling hours scheduled in advance, it works out well, that you can sign up Online for supervision, when you feel you have the need for help.

The students that have concerns about online supervision primarily complain about the availability of teachers, too little time for counselling or the lack of structure in the feedback process. The structure of most online counselling requires that the student prepare material or questions in advance of the supervision. Some students express that it would be more comfortable for them to have improvised *ad hoc* supervision. The "small help" is more difficult to attain when things are formalized: "Less help from the teacher now when it is online. Difficult when having small problems to get a hold of them (getting teacher's attention)."

Peer feedback

Peer feedback was a cluster of themes that appeared from a wide range of descriptors. The students often missed the talks they had with each other in the breaks between physical classes. These breaks provided a chance to "deliberate things with your fellow students." Some students report that their class is one where "we help each other" and that the helper also learns a lot from that.

Sometimes students have arranged their time to "brainstorm" with peers online. The students that failed to self-structure their time between online classes report that they miss "sparring with peers." The sparring received and given to peers depend on the student's own initiative. One student notes that she has in-depth sparring with "two good fellow students" and sparring with a larger group when it comes to formal issues regarding hand-in assignments.

"They made a knitting club where they could also share knowledge. It was really cozy", a student reports. Virtual "study cafés" are appreciated by the students as it lends a room for both peer feedback and authoritative feedback from the teacher. A group of students from the same study reports that they "demanded" of the teacher and the management to have a study café. Teachers who provide or design a room for sharing of knowledge between students, especially across study groups, are appreciated.

Even though many have established peer feedback mechanisms Online, the missing physical meeting has social consequences: "The student was a lot less motivated—peer motivation was missing." "Sparring with fellow students" is often referred to as having "small academic communities" often giving room to quick, small questions.

Dynamics and natural flow of conversation

A smaller cluster of themes (less than 40 codes) refers to students reporting that they miss the "natural" flow of conversations in a physical setting. Some students refer to the ping-pong of small questions and remarks between the class and teacher that they find in physical teaching. Others refer to this as "dynamics" between teacher and class. Plenum discussions in Online classes are often reported to miss the dynamics and naturalness of a physical debate. This loss also has a social aspect as "Smalltalk means more than you think, talk with classmates you know, natural interaction."

Summative feedback

A very small cluster of codes refers to summative feedback. A few students report that they miss feedback to give them a sense of how well they are doing in their studies. They expect the feedback to measure their performance compared to a standard, preferably within a short time span. According to some students, feedback should show commitment from the teacher towards the students and show how far the students are from the goal according to the teacher. This finding is replicated by Haahr (2021). "What worries the student the most is whether the teachers pay attention to him. He would like to show what he is capable of."

Feedback in group work

From one of two largest groups of clusters in the sample Group work (more than a thousand observations attributed to Group work), we find that many students acknowledge feedback aspects of groupwork as something fundamental to their studies. When study groups are working well, they are attributed positive relational aspects such as "being nice in the group" and "we are having a nice time." A sense of belonging in Online terms is also addressed: "The study group is determinant. Feels more like a part of that than part of the class." It is described that the assignment is the major task the study groups share, and through the work with this, they get to know each other. A student remarks that it works well for him, "Because I am good at conducting a query on what I am insecure about and good at collaborating with the study group." Many address that queries are at the heart of their study group work. "If you have a problem, you do not ask

the teachers, you ask the Internet and then each other." Another student remarks: "I have a good group where we figure things out on our own."

The Online meetings in the study groups are reported to be more focused on the tasks at hand, and less on social aspects, as compared to real life. "You have to be disciplined." When study groups are doing well, students find they are being challenged in the groups.

"When things are like they should be, then it is cool, that you have group work—where you can spare and get different viewpoints, which heightens the academic level (*faglighed*)."

Less than a third of the observations coded as group work are associated with troublesome group work, and again most of the expressions are on study groups. Some speak of the limitations of study groups, e.g., in scope. One student notes that there is a lack of culture in the groups. They work together on the big assignments and hand-ins but fail to do so in more mundane learning tasks. In the student's mentality, "You are on your own." This large group of students acknowledge the advantages of group work but find that it is difficult to "have a meaningful dialogue online."

A recurring issue is the composition of study groups. Some find that the teacher should select the group members and others that they should have autonomy to choose their own study group. The speed of recompositing groups is also debated. Underneath lies the worry that intergroup feedback will not be of good quality in the beginning of a group's life, when they use a lot of effort on discussing how to conduct the group work. At the end of a group's life, consensus and common norms are so well established that they no longer feel challenged.

Some express that reading body language is more difficult online, especially if the camera is off. This results in a lack of "sparring." Such groups do not work well virtually. Some report that they have to "drag help out of the group, instead of it coming naturally."

Break-out rooms

One aspect of group work which was given special attention and which was almost always mentioned in a positive sense was break-out rooms. Break-out rooms are randomly assigned groups in Zoom or Teams where students work and discuss together for a short while, before they are brought back to plenum. The students appreciate the swiftness of the creation of the groups and the dialogue they allow around a teacher-designed problem. Some also note that break-out rooms provide a "flow" in a long on-line day. An important aspect of break-out rooms is that students value the chance to ask questions of a "small" and "personal" nature, which allows for good feedback and "communality (*fællesskab*)." Students see the advantage of small group discussions and advocate for self-organizing or having such groups during breaks as well. Some teachers add a feature to the structure of Plenum—Break-out rooms—Plenum in that they circulate between break-out groups. This allows students to have feedback that is both from peers and later validated by a teacher. Furthermore, this adds to the feeling that students are being "brought on" and listened to. Students note that break-out rooms allow them to ask questions from each other that they would not "dare to ask in class."

Closed-ended survey results

Overall, during the pandemic, students' academic well-being scores a little higher than students' social well-being (2.9 and 2.7, respectively on a five-point Lickert scale). First-year students score a bit higher on academic well-being compared to the general student population.

The quantitative results show that when students "meet" other students outside class, the most popular way to meet is in study groups, far more than social media contacts, private encounters, physical meetings, and others. Across cohorts, 80% of the respondents report that communication with other students is done in the study groups. First-year students tend to strengthen this tendency. Students that report meeting often in study groups score higher than other students on both social and academic well-being.

These results appear across study programs as remarkably identical, a finding that is supported by other studies (Haahr, 2021).

Discussion

You might ask if what we have learned from an emergency situation, as the COVID-19 lockdown, should at all guide us in policy making for a post-COVID educational world? If both teachers and students longed for the time before lockdown, it would certainly be an easy choice to go back to teaching the way we did in the past. However, I find that such a de-route back to the tracks of pre-COVID teaching would be an error of omission. I find that we owe to those students that discovered they possess new learning styles to cater for advanced Blended Learning in the time to come.

A much-cited example (Clarke, 2021) of educators having a moral obligation to learn from the lockdown is from Eric Mazur Balkanski, Professor of Physics and Applied Physics at Harvard University

who noted that the past year was his most successful in his 40-year career at Harvard. Mazur largely attributed this success to the asynchronous teaching practices he employed in remote learning environments, "which enable students to access materials, ask questions, and hone their skills at any time that works for them rather than traditional synchronous teaching, which mandates simultaneous attendance at scheduled meetings or course lectures" (Di Stefano, 2021).

A strong finding of the Student to Student project is that group works can contribute to fruitful feedback situations in an online setting. This is true both regarding peer feedback in the group, especially in study groups, and regarding teacher to student feedback in online supervision.

For study group peer feedback to be effective, the study documents that asynchronous learning should be highly structured by teacher instruction, and learnings needed to be scaffolded in the LMS. This gives students access to materials, as Mazur mentions, but also structures the questions that students ask of the material. The connection between feedback in study groups and student social well-being is one of the key findings of the thematic analysis. Mauss's theory of the gift supports the notion that these feedback situations give rise to academic well-being (Mauss, 2000). Thus, feedback as "reciprocal gift giving" (Benzie, 2015, p. 212) is reported as a sign of successful intergroup feedback.

There is some evidence that organized peer group feedback can improve the timely completion of assigned tasks (Benzie, 2015) or improve students' learning outcomes (Rienecker & Jacobsen, 2021, p. 25). Thus, it would not be adventurous to consider that the "small" peer feedback that does take place in study groups could gain from feedback sensibility and well-defined help structures. What we have learned from the Student to Student study is that valuable feedback in a study group is given when it is needed with the work/utensils/prototypes at hand and in a helpful and constructive manner. More knowledge on how in-group peer feedback is working would be very helpful for educators and it calls for further anthropological, in-depth studies. For a promising research design, see Ramberg, Edgren, and Wahlgren (2021). It might also be worth discussing whether feedback sensibility, e.g., knowing peers' feedback preferences, is enough to secure good in-group peer feedback. Does dialogic feedback occur (Benzie, 2015, p. 201) in the groups when they follow a natural group dynamic? That is, does the feedback reported offer a chance for the feedback giver to engage in a dialogue? Some evidence shows that a skilled facilitator is helpful in bringing about a good structure for feedback in a group and will secure a group success (Benzie, 2015). Furthermore, shown affection (most) and interdisciplinarity (disputed) can lead to group success in delivering good feedback (Benzie, 2015). The first finding is supported in the Student to Student study and likewise, a national Danish survey found that students experiencing support from fellow students affects their learning positively (UFS, 2021). In the present study, only full-time students participated, and appreciation of peer feedback was found more often than misappreciation. However, Haahr (2021) found that only part-time students, already on the labor market, appreciated giving feedback to each other. They found it valuable to have other perspectives on their otherwise "locked" analysis. How come this does not transfer to daytime students? A tempting explanation could be that the Study group culture is not well established in all educational institutions.

Effective teacher to student feedback is reported to be found in online supervision sessions. Whether these are well-prepared Online meetings booked in advance, or the teacher visits the channel in Teams where the students are working, these sessions tend to be more structured and differently structured compared to counselling sessions in a physical setting. In the present study, students represent a variety of disciplines ranging from computer coding classes to designing and sowing classes. The former group finds that these types of classes are especially suited for online education whereas the latter find that tactility of the clothes is not easily transferred to online supervision. By and large, however, online supervision is appreciated across the study. This is not only because of the practicality and timelines of online supervision, but also because of a less obvious structure: the focus. The present study reveals that being able to share screen enables a group and their supervisor to look at the same screen. Taken together with the notion that body language is less well-suited for online communication, this has an indirect pre-meeting structuring function of the supervisions performed in the lockdown period. Students and teachers know they must focus the supervision on something that is shareable on the screen, so students bring questions to the table that are structured around the object they share on the screen. This focus will most probably lower the risk that discussions with the teacher reroute from the problems the students have at hand. Once the supervision session begins, the screen sharing function allows students and teacher to focus on a small detail of the object at the same time. A sentence in a report will, for example, be focused quicker and more accurately than in a live setting. Shorter supervision sessions which focus on fewer problems promise a higher success rate of students acting

on the feedback they receive (Kierkegaard, 2015). Educators at polytechnics and universities of applied science would need to bear this in mind when designing courses post-COVID.

The example of break-out rooms deserves special mentioning. The phenomenon of randomly dividing a class into small groups is somewhat of a novelty in higher education. A totally random assignment of groups in a physical setting is often avoided because of time and space constraints. Instead, when educators would like students to reflect for six to seven minutes in a group, they would ask students to gather up with students sitting next to each other. Although the difference between the two designs might seem minimal, it does suggest that we should be very observant on these differences. In a classroom setting there is both a tendency to sit next to people we know or have similar physical attributes to ourselves. Furthermore, the way we are seated in the first class is almost determinant for how we sit in the following classes. Finding yourself discussing with the same few people is thus more likely to happen in the physical class than in a break-out room. The rapid organization and random assignment are, however, not the only advantages of break-out rooms. Other studies have shown that break-out rooms had a function of social room for students when they followed up on small task assignments (Haahr, 2021). At this school, the students were longing for less frequent shifts of groups and preferred semester-long group durations to avoid getting stressed. In the present study, however, we also find many students that are eager to form new groups and meet across teams.

Many negative connotations to feedback in the present study are associated with large group discussions. Let alone the technical problems, especially with sound, sometimes found when many participants communicate through a conference tool, there seems to be an upper limit to the number of participants for good feedback to occur. A teacher and some five to six students seem to be within the threshold of good online communication. Haahr (2021) found that feedback given by the teacher in plenum does not work well in online teaching, a finding that is supported by our data. It is worth considering if large classroom feedback is suitable under any conditions. Kierkegaard (2015) found that feedback from teacher to students must be highly directed, brief, and given when students need the feedback. Further studies on collective retainment of large auditorium feedback are much needed. Even the negative findings of the COVID-19 lockdown calls for us as educators to reconsider current practices of feedback mechanisms.

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Original Research Paper*

Effect of a Sugar-Free Branched Chain Amino Acid-Containing Sports Drink on Acute High-Intensity Anaerobic Performance

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Abstract

Purpose: BioSteel® high performance sports drink (HPSD) is an enticing alternative to carbohydrate-containing sports drinks that are often associated with side effects such as gastrointestinal discomfort or post-consumption hypoglycemia. BioSteel® HPSD is carbohydrate-free and provides bioavailability of branched-chain amino acids (BCAAs) and other necessary cofactors that aid in BCAAs digestion. Here, we investigated the efficacy of BioSteel® HPSD to improve high-intensity anaerobic exercise performance in young adults.

Methods: A modified Wingate anaerobic test (mWAnT) was performed by fourteen healthy college students. Each subject underwent a total of nine trials, with each trial consisting of four bouts of cycling for 10 seconds/bout. The crossover design had each subject consume either BioSteel® HPSD, placebo, or water 30 minutes prior to the onset of exercise for three trials each, respectively.

Results: Participants consuming BioSteel® HPSD had significantly improved average power output expressed as an average of all bouts and all trials. Analyzing exercise performance as a function of separate 10-second bouts revealed significantly higher power output (bouts 1 and 4) and peak power (bout 1) in the BioSteel® HPSD consuming group. Despite this increased power output, subjects consuming BioSteel® HPSD did not fatigue faster or to a greater extent, as evidenced by the fatigue index. Translation of power output to distance travelled indicated a significantly increased distance travelled by the subjects who drank BioSteel® HPSD.

Conclusion: Collectively, our data demonstrate that BioSteel® HPSD has a positive effect on acute anaerobic performance.

Keywords

BioSteel® HPSD, branched chain amino acid, carbohydrate-free, acute exercise, anaerobic performance

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Abbreviations

AAs	Amino acids	**LSD**	Fisher's least significant difference
ANCOVA	Analysis of covariance	**MP**	Minimum power
ANOVA	Analysis of variance	**mWAnT**	Modified Wingate anaerobic test
ATP-PCr	Adenosine triphosphate-phosphocreatine	**PAR-Q**	Physical activity readiness questionnaire
BCAAs	Branched chain amino acids	**PD**	Power drop
DT	Distance travelled	**PP**	Peak power
FI	Fatigue index	**RPM**	Revolutions per minute
GI	Gastrointestinal	**SD**	Sports drinks
HPSD	High performance sports drink	**SG**	Specific gravity

Introduction

Intense exercise can lead to muscle damage, dehydration, and the depletion of blood glucose, electrolytes, and liver glycogen (Hargreaves et al. 1996; Koopman et al. 2006; Robergs et al.

***Original Research Papers** These papers report on original empirical research with a focus on teaching and learning, research and innovation, and insights and observations resulting from participation in a particular project or case study. We are especially interested in articles that inquire into driving improvement to student-centred academic programming and students' learning outcomes.

1991). To sustain and/or enhance performance, sports drinks (SDs) are commonly used for replenishing energy substrates and metabolites before, during, and/or after exercise. Performance enhancing effects of many SDs are often attributed to carbohydrate content. In general, consumption of drinks with high carbohydrate content has been associated with gastrointestinal (GI) discomfort (Peters et al. 1993; Shi et al. 2004; Van Nieuwenhoven et al. 2005), post-consumption hypoglycemia, obesity, and the development of the chronic metabolic syndrome and type II diabetes (Schulze et al. 2004). The upper and lower GI discomfort can be attributed to the slow gastric emptying rate of carbohydrate-containing SDs, especially those with higher than 7% carbohydrate content (Brouns et al. 1995). As a result, it is possible that the beneficial effects of carbohydrate-containing SDs in the context of exercise are outweighed by absorption limitations. This could limit performance during acute high-intensity exercise, when nutrient bioavailability at the target site, such as the skeletal muscle, is crucial. Furthermore, athletes living with type 1 or type 2 diabetes who consume commercially available SDs that are high in sugar content may experience challenges to effectively and safely predict insulin dose adjustments to avoid hyper- or hypoglycemia pre-, during, or post-exercise (Zaharieva and Riddell 2017).

The growing awareness of adverse effects related to carbohydrate-containing SDs has led to a rise in the development and consumption of alternative carbohydrate-free supplements. BioSteel® High Performance Sports Drink (HPSD) contains branched chain amino acids (BCAAs), which are touted to enhance exercise performance by acting as ergogenic substances and attenuating central fatigue. BCAAs (isoleucine, leucine, and valine) are members of a special group of proteogenic essential amino acids (AAs) with a non-linear aliphatic side chain. BCAAs make up ~35-40% of the daily requirement of all essential AAs (Cynober 2002; Seager and Slabaugh 2013), with the highest daily requisite for leucine (40 mg/kg body weight) and play a key role in protein synthesis and recovery (Harper et al. 1984). When consumed in their free forms, BCAAs bypass the liver and become rapidly available in the blood for metabolism by peripheral tissues such as skeletal muscle, where they can be oxidized to produce Krebs cycle intermediates and ultimately yield ATP (Chua et al. 1979; Monirujjaman and Ferdouse 2014; Shimomura et al. 2004). Previous work has illustrated that BCAA plasma levels are elevated 15 minutes post-ingestion and peak at 30 minutes post-ingestion (Koopman et al., 2006; Koopman et al., 2009). Unlike carbohydrates, there is no evidence of GI discomfort or other adverse effects due to consumption of BCAAs during exercise. Toxicity studies of BCAA using animals have shown BCAAs to be safe when provided in a ratio similar to that of animal protein with a 1:2:1 ratio for isoleucine:leucine:valine, respectively (Betz et al. 1975; Riazi et al. 2003; Iwasawa et al. 1991). BioSteel® HPSD provides a 1:2:1 ratio (536 mg:1184 mg:536 mg) of L-Isoleucine:L-Leucine:L-Valine) in addition to other necessary cofactors such as a blend of B vitamins, biotin, and organic minerals (magnesium, calcium, zinc) that can aid in the digestion of BCAAs, promote optimal hydration, and maintain the acid-base balance necessary to sustain the normal functioning of metabolic pathways (Granell 2014; Gravel and Narang 2005; Karaki et al. 1997; Manore et al. 1987; Manore 1994; Manore 2000; Newhouse and Finstad 2000; Sato et al. 2011; van der Beek et al. 1994; Yates et al. 1998; Zempleni and Mock 1999).

Multiple studies have shown beneficial effects of BCAA on acute exercise performance (Howatson et al., 2012). In a study by Crowe et al. (2006), leucine ingestion resulted in higher peak power and total work completed during a 10-second arm crank test. Matsumoto et al. (2014) determined that fatigue markers such as serum creatine kinase and lactate dehydrogenase, as well as the perception of muscle soreness and fatigue, were lower post-exercise when combined with the ingestion of BCAAs. Exercise duration and time to exhaustion during exercise have also been shown to be prolonged with BCAA supplementation (Mittleman et al. 1998). Thus, our goal was to evaluate the effectiveness of BioSteel® HPSD on improving anaerobic exercise performance and capacity in healthy, young males and females. We postulated that BioSteel® HPSD would provide an ideal supplemental option for enhancing, as well as sustaining, acute anaerobic performance.

Methods

Ethics, Consent and Permissions

The study was approved by the Humber College Research Ethics Board (REB Protocol 0282) and was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki. Participants were informed of the study design, purpose and risks involved before signing the written consent forms. Participants were asked to maintain their regular activity and dietary patterns.

Subjects and Anthropometric Tests

Fourteen healthy and recreationally physically active college students (eight males, six females, 21 years ± 3) were recruited as subjects for this study. All subjects completed a Physical Activity Readiness Questionnaire (PAR-Q) to screen

for health matters that might have presented any risk during physical activity (Thomas et al. 1992). Body weight and height measurements were recorded using a Physician Scale (Detecto). A Beurer BF 220 Glass Body Analysis Scale was used to measure muscle, bone and fat mass, BMI, and hydration level.

Experimental Design

A randomized, double-blind placebo-controlled crossover study was designed to carry out the experiments, as illustrated in Figure 1. Subjects fasted overnight for 12 hours before the start of the experiments the next morning. Each participant received the assigned drink [E: experimental (BioSteel® HPSD), P: placebo or W: water] 30 minutes prior to commencing the modified Wingate anaerobic test (mWAnT). Participants were given either BioSteel® HPSD, placebo, or water on each of the respective trial days with 48 hours in between each trial day, in random order. Body composition, blood and urine profiles were completed before administering the drinks and after each trial. Each subject consumed each respective drink a total of three times; therefore, a total of nine trial days were included in the study.

Test Drinks

Experimental drink (BioSteel® HPSD) and the placebo were identical in all contents, except for the absence of all active ingredients (including BCAAs, AAs, B vitamins and all other cofactors necessary for BCAA metabolism) in the placebo formulation. BioSteel® HPSD and placebo were obtained in powder form from BioSteel®, and the drinks were freshly prepared for each experiment. To provide the same amount of all ingredients present in both BioSteel® HPSD and placebo, accounting for the absent ingredients, a 6250 mg and a 2338 mg dosage was weighed, respectively, and mixed in 250 ml of distilled water. Water was also provided as another control in a 250 ml portion. Drink supplements were provided to each subject 30 minutes prior to mWAnT in opaque cups and lids, as previous research has shown the plasma concentration of all three BCAAs peaks at 30 minutes post-consumption (Koopman et al. 2006; Koopman et al. 2009; Matsumoto et al. 2014). Drinks were consumed in the presence of research assistants in a bolus fashion to ensure consistency in drinking time amongst subjects and to facilitate absorption, as documented previously (Jenkins et al., 1990).

Modified Wingate Anaerobic Test

A modified Wingate anaerobic test (mWAnT) was performed to assess peak anaerobic power, anaerobic fatigue and total anaerobic capacity. Monark Ergomedic 894E Peak Bike was used to carry out the mWAnT, and data was recorded using Monark anaerobic ATS software. Each subject was positioned on the Wingate cycle ergometer, and seat height, handlebar height and position, and toe straps were adjusted. Settings were recorded in order to use the same settings at each subsequent trial. Subjects were instructed to cycle at a slow pace against zero resistance for 5 minutes. To commence the first bout, subjects were instructed to pedal at the maximal rate to ensure optimal power and force production at the beginning of the test and to continue cycling at a maximal speed for the duration of 10 seconds against a load corresponding to 7.5% of their body mass. Each mWAnT consisted

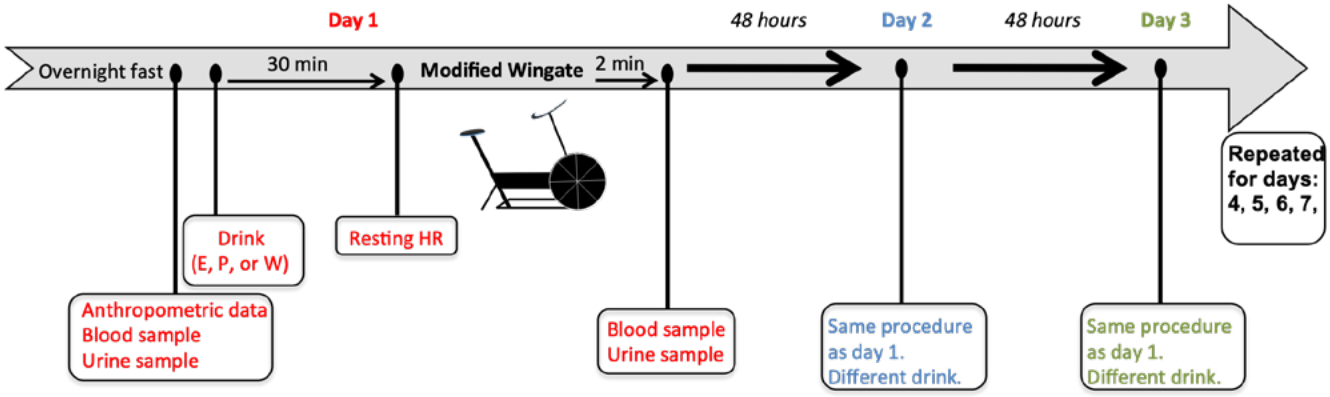

Figure 1 Study Design and timeline. Subjects came to the laboratory after a 12-hour overnight fast on Day 1. Anthropometric measurements, blood and urine samples were acquired at this time. Subjects were given a drink (BioSteel® experimental [E], water [W], or placebo [P] in randomized order) and made to wait 30 minutes. After waiting, resting heart rate (HR) was acquired, and subjects performed a modified Wingate anaerobic test (mWAnT). Two minutes after the test, another blood and urine sample was taken. Subjects returned to the laboratory after 48 hours and performed the same set of experiments with a different drink. This was repeated for the third drink. Each subject performed the same procedure three times per drink (i.e., three trials) for a total of nine visits to the laboratory.

of 4 bouts of 10 seconds with loaded resistance applied at 7.5% of body mass (Bar-Or 1987) with all-out cycling, separated by 20 seconds recovery in between each bout for a total mWAnT time of 120 seconds (see Figure 1). Subjects were verbally encouraged to pedal as hard as they could during each 10 seconds bout. For each of the nine trial days, subjects ingested only one of the assigned drinks, went through the same tests before and after mWAnT (blood markers, urine test, and body composition) and performed the same exercise, mWAnT, as described above.

Blood Tests

Blood samples were analyzed before administering the drinks and 2 minutes after completing the mWAnT to determine the changes in the levels of blood markers. A 2-minute time point post-mWAnT was chosen since it has been shown that the highest blood concentration of lactate post-high-intensity exercise is around 2-8 minutes (Moxnes and Sandbakk 2012). Nova Biomedical StatSensor/StatStrip handheld blood meter devices were used to measure levels of blood glucose, ketone, lactate, and creatinine. Specific disposable biosensor test strips were used to analyze whole blood samples by pricking the middle finger on the right hand of each subject for a blood test before mWAnT and the contralateral middle finger on the left hand for blood tests after the mWAnT.

Urine Test

Urine samples were collected in collection cups and analyzed pre- and post-mWAnT to examine the specific gravity (SG) as a test for hydration level. Phinex 10 Parameter (10SG) Urinalysis Test Strips were used to analyze urine samples by dipping a test strip into the urine in the collection cup. A colour change on each dipped strip was compared to the manufacturer's standard colour chart, and values were recorded.

Power Calculations and Formulae

Power was calculated automatically by the Monark ATS software and is expressed as watts per kilogram of body weight (W/kg). Peak power was determined by using the trial with the highest power output during each bout. The trial with the least amount of power output was used to record minimum power during each bout.

Power Drop (PD)

Power Drop (PD): was calculated by subtracting the minimum power (MP) from peak power (PP) during maximum effort in each bout and is expressed as W/kg.

$$PD=PP-MP$$

Fatigue Index (FI)

Fatigue Index (FI): was determined by dividing power drop (PD) by peak power (PP) and expressing the ratio as a percentage.

$$FI=\frac{PD}{PP}$$

Distance Travelled (DT)

Distance Travelled (DT): to calculate the DT (meters/minute = m/min) for the stationary cycle ergometers, the number of revolutions per minute = rev/min (RPM) was multiplied by six. Generally, one full revolution of the pedals on a Monark cycle ergometer will make a given point on the flywheel to move six meters through space. Therefore, taking this factor into account, we can calculate the distance travelled based on the generated RPMs using the following formula:

$$DT=RPM\left(\frac{rev}{min}\right)*6$$

Given: 1 Revolution = 6 meters

Statistical Analysis

One-way (Figure 2a only) and two-way repeated measure analysis of variance (ANOVAs) was used to examine the effect of different drinks on anaerobic performance. Significant main effect was further analyzed by using a Fisher's Least Significant Difference (LSD) post hoc test to determine which groups specifically expressed a significant difference. Analysis of covariance (ANCOVA) was also used to determine whether any significant differences existed amongst the effects of each drink during the performances throughout all the bouts. The relationship between variables was assessed using the Pearson's correlation test. Finally, stepwise multiple linear regressions were used to determine the best predictors of the time versus power output. A paired student's t-test was performed to analyze the difference in pre-test and post-test blood and urine marker concentrations. All results are expressed as mean ± SD. Statistical significance was set at $p \leq 0.05$. Statistical analyses were carried out using IBM SPSS Statistic 23.

Results

Body Composition

Fourteen recreationally active healthy male (n=8) and female (n=6) college students (age 21 years ± 3) participated in the randomized, double-blind, placebo-controlled, crossover study. Anthropometric measurements including body weight, height, relative muscle and fat mass are shown in Table 1. Comparison of

muscle mass/body weight as well as fat content/body weight did not reveal a significant difference amongst the treatment groups.

Performance Measurements

The average total power output (W/kg) generated by the subjects during the entire 120 seconds (i.e., all trials) of exercise performance is illustrated in Figure 2a. The average total power output was significantly higher in the experimental group ($\bar{x}$=8.11 W/kg) compared to the placebo group ($\bar{x}$=7.80 W/kg, †p≤ 0.001) and water group ($\bar{x}$=7.91 W/kg, *p≤ 0.05). Average power output (W/kg) generated within each respective 10-second bout (across all trials) of mWAnT during which subjects exerted maximum effort is demonstrated in Figure 2b. LSD post-hoc test indicated that average power output was significantly higher in the experimental group ($\bar{x}$=10.02 W/kg) compared to the placebo ($\bar{x}$=9.55 W/kg, **p≤ 0.01) and water groups ($\bar{x}$=9.65 W/kg, **p≤ 0.01) in the first bout. A significant difference in performance was also found in the last bout when comparing amongst groups. Average power output was not significantly different amongst groups during bouts 2 and 3.

The average peak power (PP) output expressed as W/kg achieved during each 10-second bout (across all trials) of mWAnT while exerting maximum effort is summarized in Figure 3a. LSD post-hoc test indicated that average PP output was significantly higher in the experimental group ($\bar{x}$=11.48 W/kg) compared to the water group ($\bar{x}$=11.01 W/kg, *p≤ 0.05) and the placebo group ($\bar{x}$=10.73 W/kg, †p≤ 0 .001) during the first bout. Average PP output during bouts 2, 3 and 4 was found to be not significantly different between any of the groups. Average minimum power (MP) output expressed as W/kg achieved during each 10-second bout (across all trials) of mWAnT while exerting maximum effort is illustrated in Figure 3b. LSD post-hoc test indicated that the MP output was significantly higher in the experimental group ($\bar{x}$=8.77 W/kg) compared to the water group ($\bar{x}$=8.28 W/kg, **p≤ 0.01) in the first bout. Furthermore, LSD post-hoc test indicated that the MP output was significantly higher in the water ($\bar{x}$=5.39 W/kg) and experimental groups ($\bar{x}$=5.31 W/kg) compared to the placebo group, ($\bar{x}$ =4.88 W/kg, *p≤ 0.05) in the fourth bout. No statistically significant differences were found between drink types in bouts 2 and 3.

The average drop in power output in the first bout, as shown in Figure 3c was significantly higher in the experimental ($\bar{x}$=2.71 W/kg) and water groups ($\bar{x}$=2.83 W/kg) compared to the placebo group ($\bar{x}$=2.31 W/kg, *p≤ 0.05). Conversely, during the last bout, the power drop was significantly lower in the water ($\bar{x}$=3.88 W/kg) and experimental groups ($\bar{x}$=3.99 W/kg) compared to the placebo group ($\bar{x}$=4.58 W/kg, *p≤ 0.05). No other statistically significant differences were found between drink types in bouts 2 and 3. Fatigue Index (FI), calculated as the quotient of the power drop divided by peak power, was determined for each 10-second bout (across all trials) and compared across groups (see Figure 3d). LSD post-hoc test indicated that fatigue index was significantly lower in the water ($\bar{x}$=41.74%) and experimental ($\bar{x}$=42.37%) groups compared to the placebo group, ($\bar{x}$=47.88%, *p≤ 0.05) in the fourth bout. No other statistically significant differences were found amongst groups in bouts 1, 2 and 3.

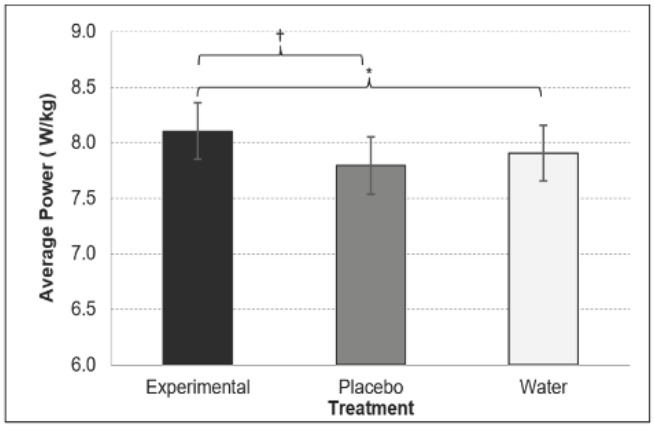

Figure 2a.

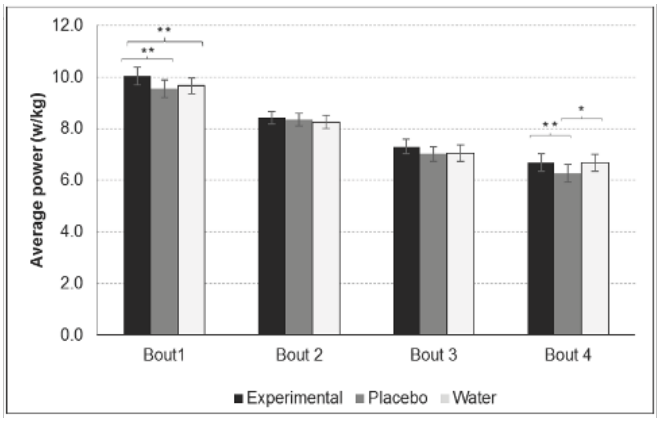

Figure 2b.

Figure 2. Average power output. A) Average total power output (W/kg) generated by subjects during a total of 120 seconds performing the mWAnT. Values represent the subject averages of all three trials for each respective drink and all four bouts of each trial of the mWAnT. Values are expressed as means ± SD; n = 14. *p≤0.05 or †p≤0.001. B) Average Power Output (W/kg) achieved during each 10-second bout of mWAnT. Values represent subject averages of total power output generated during each 10-second bout (i.e., an average of all three trials per bout per treatment group). Values are expressed as means ± SD; n = 14.*p≤ 0.05, **p≤0.01

Table 1 *Subject information and anthropometric measurements*

A. Sample Size

Sex	Female	Male	Total
No of Participants	6	8	14

B. Participants' Biometric

Biometrics	Female Mean	Female ±SD	Female Range	Male Mean	Male ±SD	Male Range	Total Mean	Total ±SD	Total Range
Age (Year)	20.67	2.25	19-24	20	1.85	18-23	20.29	1.98	18-24
Weight (Kg)	58.67	7.42	53-73	78.63	13	68-108	70.07	14.74	53-108
Height (cm)	163.17	5.67	158-172	176.5	5.61	166-185	170.79	8.74	158-185

C. Muscle/Body Weight Ratio (Kg/Kg)

Drink Type	Female Mean	Female ±SD	Female Range	Male Mean	Male ±SD	Male Range	Total Mean	Total ±SD	Total Range
E	0.36	0.014	0.34-0.38	0.46	0.011	0.43-0.47	0.42	0.049	0.34-0.47
P	0.36	0.015	0.34-0.38	0.46	0.014	0.43-0.47	0.42	0.049	0.34-0.47
W	0.36	0.016	0.34-0.38	0.46	0.012	0.44-0.47	0.42	0.049	0.34-0.47

D. Fat/Body Weight Ratio (Kg/Kg)

Drink Type	Female Mean	Female ±SD	Female Range	Male Mean	Male ±SD	Male Range	Total Mean	Total ±SD	Total Range
E	0.22	0.046	0.16-0.3	0.14	0.041	0.09-0.23	0.17	0.059	0.09-0.29
P	0.22	0.045	0.16-0.29	0.14	0.04	0.09-0.23	0.17	0.057	0.09-0.29
W	0.22	0.048	0.16-0.3	0.14	0.045	0.1-025	0.17	0.06	0.10-0.3

Table 1 Legend Data collected on recreationally active male (n=6) and female (n=8) college students (age 21 years ± 3). Total refers to the average anthropometric data of all subjects irrespective of sex. Muscle mass/body weight and fat mass/body weight ratios were measured. Values are expressed as mean ±SD, n=14.

An analysis of covariance (ANCOVA) was carried out (Figure 4) to determine the difference amongst the slopes of regression lines of experimental, placebo, and water groups. The results of ANCOVA indicated a statistically significant difference between the slopes of the regression lines amongst the performance of each group, $F(1, 1676) = 1193.36$, $\dagger p < 0.001$. LSD post-hoc test indicated that the consumption of BioSteel® HPSD leads to a significantly enhanced maintenance of power output throughout the four bouts of mWAnT compared to the water ($*p \leq 0.05$) and placebo ($\dagger p \leq 0.001$) groups.

Distance Travelled

Power output was translated into average distance travelled during each 10-second bout using the formula described in the methods section. The results as shown in Figure 5, illustrate that the consumption of experimental BioSteel® HPSD ($\bar{x}$=13.82 m) leads to a significantly longer distance travelled in comparison to the placebo ($\bar{x}$=13.23 m, $\dagger p \leq 0.001$) and water ($\bar{x}$=13.40 m, $*p \leq 0.05$) groups during the first bout. A statistically significant difference was observed in average distance travelled in the last bout amongst participants in groups who drank experimental drink ($\bar{x}$=9.66 m), vs. placebo ($\bar{x}$=9.09 m, $*p \leq 0.05$) during the last bout. No differences were observed between groups during the remaining bouts.

Blood Profile

Plasma levels of glucose, ketones, lactate, and creatinine were measured before consumption of any drink and approximately 30 minutes before performing a mWAnT (pre-mWAnT), as well as 2 minutes after performing a mWAnT (post-mWAnT). While there were significant alterations in the plasma concentration

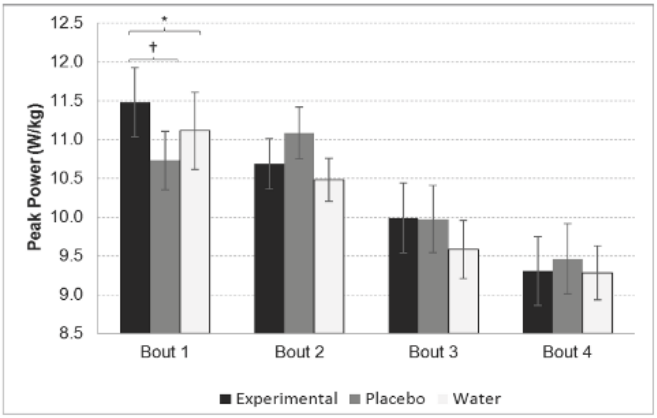

Figure 3a.

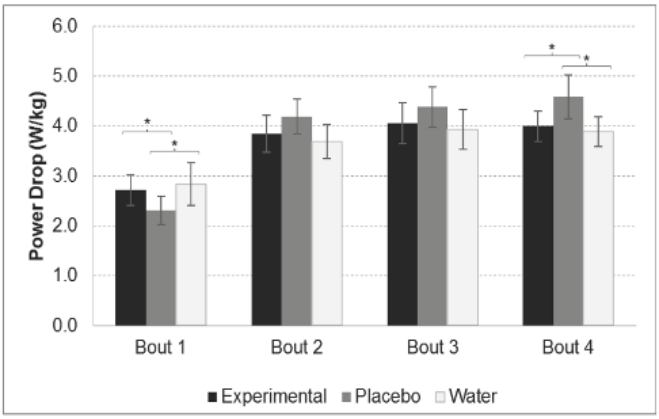

Figure 3c.

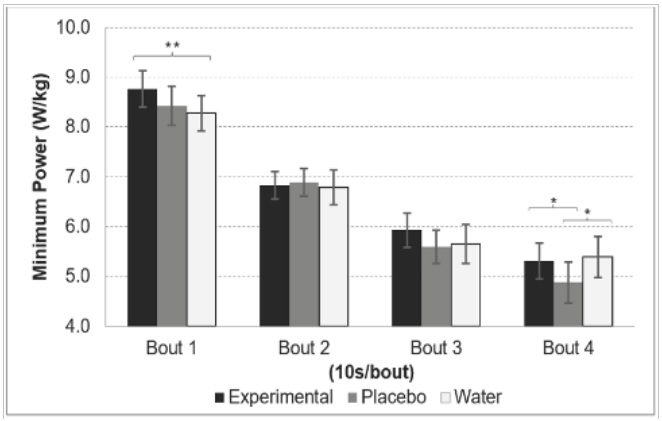

Figure 3b.

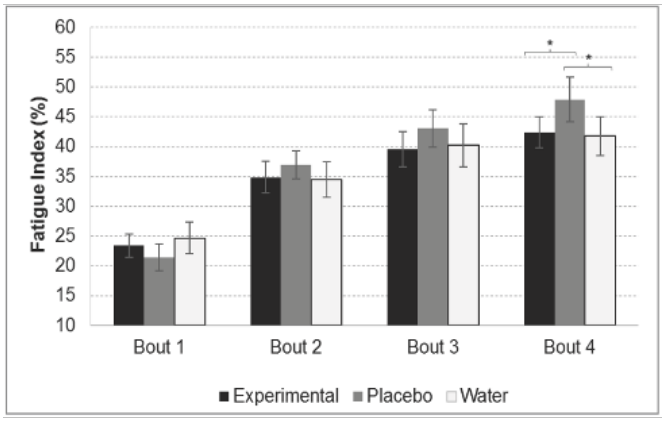

Figure 3d.

Figure 3 Peak power, minimum power, power drop, and fatigue index. A) Average Peak Power Output (PP, W/kg) generated during each 10-second bout of mWAnT. Values represent an average of peak power output (highest power generated during the three trials) by subjects during each 10-second bout of maximum effort. Values are expressed as means ± SD; n = 14. *p≤ 0.05, †p≤0.001. B) Average Minimum Power Output (MP, W/kg) achieved during each 10-second bout of mWAnT. Values represent an average of Minimum Power Output (least power generated during the three trials) by subjects during each 10-second bout of maximum effort. Values are expressed as means ± SD; n = 14. *p≤ 0.05, **p≤0.01. C) Average Power Drop (PD, W/kg) occurring during each 10-second bout of mWAnT. Values represent the average of drop in power output calculated by the difference between peak power and minimum power during each 10-second bout. Values are expressed as means ± SD; n = 14. *p≤0.05. D) Average Fatigue Index (FI, %) demonstrated during each 10-second bout of mWAnT. Values shown are the Quotient of the power drop divided by peak power, thus determining the Fatigue Index (%) during each 10-second bout. Values are expressed as means ± SD; n = 14. *p≤ 0.05

of glucose, lactate and creatinine pre-mWAnT vs. post-mWAnT (*p≤0.05 or **p≤ 0.01, Table 2), there were no differences in these variables between the experimental groups. The only exception was that creatinine blood levels were higher in the experimental BioSteel® HPSD and placebo group vs. water group (*p≤ 0.05).

Urine Profile

Urine samples of all participants were tested for specific gravity (SG) and pH during both pre-mWAnT as well as post-mWAnT time points (Table 3). No differences were observed between the experimental groups. SG of urine decreased significantly in the post-mWAnT time point for all three experimental groups (*p≤0.05 or †p≤0.001).

Discussion

In the present study, the impact of commercially available BioSteel® HPSD supplementation on anaerobic exercise performance in 14 young, healthy, recreationally active college students was assessed. Analysis of results indicated a significantly higher average power output throughout the 40 seconds of a mWAnT by subjects who had consumed BioSteel® HPSD compared with placebo and water. Comparison of each individual 10-second bout across all exercise trials indicated a

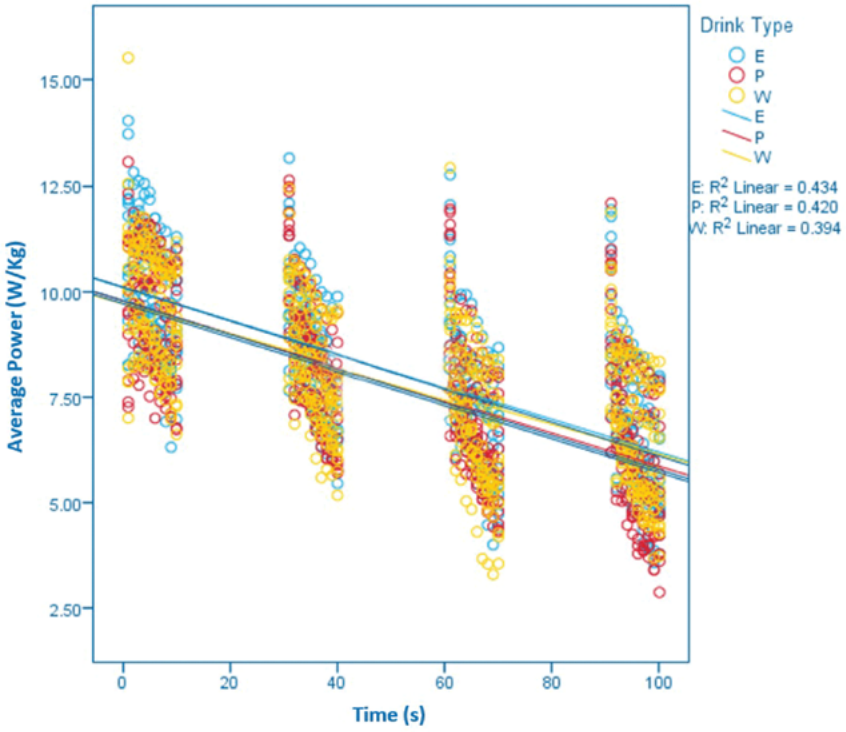

Figure 4 Analysis of Covariance (ANCOVA). Illustrating the correlation between time and average power output during each 10-second bout. Each circle represents one trial by all three experimental groups. Stepwise multiple linear regression analyses were used to determine the best predictors of the time versus power output. The results of ANCOVA indicated there is a statistically significant difference between the slopes of the regression lines amongst the performance of each group, $F(1, 1676) = 1193.36$, †$p < 0.001$. LSD post-hoc test indicated that the consumption of BioSteel® HPSD leads to a significantly enhanced maintenance of power output throughout the four bouts of mWAnT compared to water. Values are expressed as means ± SD; n = 14. *$p \leq 0.05$, †$p \leq 0.001$

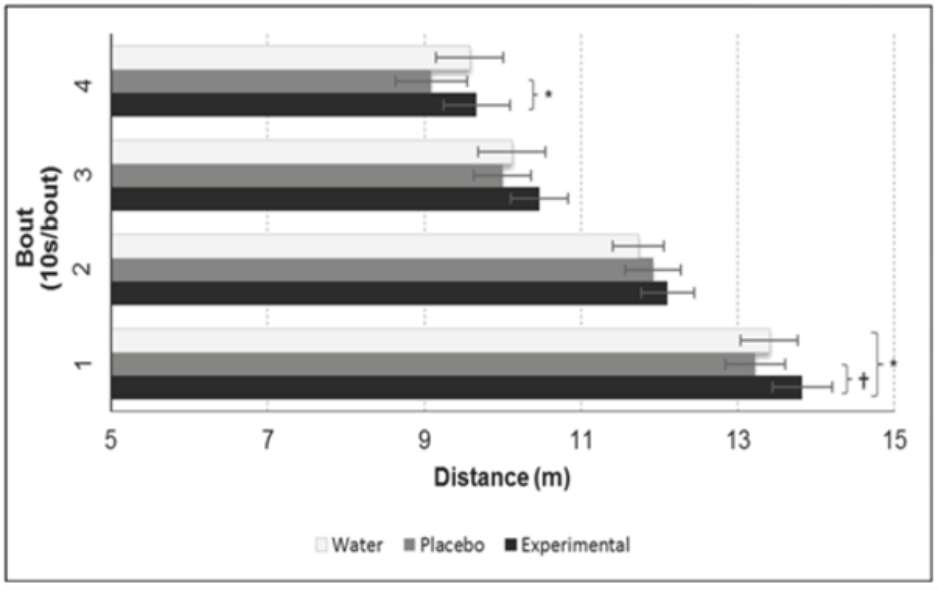

Figure 5 Average distance travelled by subjects during each bout in meters. The average distance travelled during each 10-second bout was calculated using the formula described in the methods. Values represent an average of distance travelled by subjects during each 10-second bout of maximum effort. Values are expressed as means ± SD; n = 14, *$p \leq 0.05$ or †$p \leq 0.001$

Table 2 *Blood Profile*

Blood Marker	Drink Type	Pre-mWAnt	Pre-mWAnt ±SD	Post-mWAnt Mean	Post-mWAnt ±SD	Δ (Pre-Post) Mean	Δ (Pre-Post) ±SD	Sig (Pre/Post)	Sig (Pre)	Sig(post)	Sig(Change)
Glucose (mmol)	E	4.91	0.33	5.47	0.54	0.57	0.36	**	N.S	N.S	N.S
Glucose (mmol)	P	4.86	0.28	5.51	0.67	0.65	0.71	*	N.S	N.S	N.S
Glucose (mmol)	W	4.91	0.26	5.57	0.59	0.66	0.46	**	N.S	N.S	N.S
Ketone (mmol)	E	0.11	0.09	0.08	0.04	-0.03	0.09	N.S	N.S	N.S	N.S
Ketone (mmol)	P	0.10	0.07	0.09	0.04	0.00	0.07	N.S	N.S	N.S	N.S
Ketone (mmol)	W	0.11	0.05	0.11	0.06	0.00	0.05	N.S	N.S	N.S	N.S
Lactate (mmol)	E	2.80	1.08	12.67	1.42	9.88	1.55	**	N.S	N.S	N.S
Lactate (mmol)	P	3.30	1.10	12.85	1.85	9.69	2.13	**	N.S	N.S	N.S
Lactate (mmol)	W	3.27	0.90	12.82	2.27	9.53	2.20	**	N.S	N.S	N.S
Creatinine (mmol)	E	75.38	8.46	91.08	8.98	15.85	5.97	**	* E&W	N.S	N.S
Creatinine (mmol)	P	74.12	8.49	88.07	10.29	13.62	9.75	**	*P&W	N.S	N.S
Creatinine (mmol)	W	79.33	10.49	91.67	11.05	12.74	7.53	**	E&W *P&W	N.S	N.S

n= 14,* p< 0.05, ** p<0.01, E: Experimental, P: Placebo, W: Water, N.S: No Significant Difference

Table 2 Legend Levels of blood markers glucose, ketone, lactate, and creatinine were measured before consumption of any drink and 30 minutes before performing mWAnT (pre-mWAnT) as well as after mWAnT (post-mWAnT). Also shown is the change in values (pre, post, Δ), statistical results comparing pre-mWANT values to post-mWAnT levels of each metabolite, and statistical comparison results between all three groups for each marker at both time points. Values are expressed as mean ±SD, n=14, *p≤0.05 or †p≤0.001.

significantly enhanced average and peak power output during the first bout leading to the overall enhanced average power output. However, the ANCOVA analysis between each group indicated a significantly enhanced performance and maintenance of power output by the BioSteel® HPSD group throughout all four bouts of mWAnT compared to placebo and water. In line with these observations, subjects who consumed BioSteel® HPSD travelled a significantly longer distance in the same period of time compared to placebo and water. This is a substantial finding, especially for time- and distance-sensitive sports such as ice hockey, football, baseball, softball, basketball, and soccer that rely primarily on relatively brief bursts of explosive, high-power output events. The required energy for such activities is predominantly derived from the adenosine triphosphate-phosphocreatine (ATP-PCr) system for muscular contractions.

The ATP-PCr energy store is extremely limited and can provide maximal power output for only 8–10 seconds (Hargreaves et al. 1998). Muscles can continue to contract for longer periods by utilizing anaerobic glycolysis. This system is only about half as fast as the ATP-PCr system but allows activity to continue at fairly high-power outputs for an additional 1.5–2 minutes (Hargreaves et al. 1998; Smith et al. 1992). While the anaerobic glycolysis energy system can allow an individual to perform an all-out exercise for longer than a few seconds, large amounts of lactic

Table 3 *Urine Profile*

Blood Marker	Drink Type	Pre-mWAnt	Pre-mWAnt ±SD	Post-mWAnt Mean	Post-mWAnt ±SD	Δ (Pre-Post) Mean	Δ (Pre-Post) ±SD	Sig (Pre/Post)	Sig (Pre)	Sig(post)	Sig(Change)
SG	E	1.019	0.006	1.015	0.007	0.005	0.004	*	N.S	N.S	N.S
SG	P	1.021	0.006	1.015	0.006	0.006	0.003	†	N.S	N.S	N.S
SG	W	1.022	0.006	1.017	0.007	0.005	0.006	*	N.S	N.S	N.S
pH	E	5.810	0.566	5.786	0.421	0.000	0.340	N.S	N.S	N.S	N.S
pH	P	5.786	0.564	5.845	0.464	-0.060	0.324	N.S	N.S	N.S	N.S
pH	W	5.690	0.480	5.726	0.530	-0.036	0.472	N.S	N.S	N.S	N.S

n= 14, * p< 0.05, † p<0.001, E: Experimental, P: Placebo, W: Water, N.S: No Significant Difference, SG: Specific Gravity

Table 3 Legend Subject urine samples were tested for specific gravity (SG) and pH before consumption of any drink and 30 minutes before performing mWAnT (pre-mWAnT) as well as 2 minutes after mWAnT (post-mWAnT). Also shown is the change in values (pre, post, Δ), statistical results comparing pre-mWANT values to post-mWAnT levels of each marker, and statistical comparison results of all three groups for each marker at both time points. Values are expressed as mean ±SD, n=14, *p≤0.05 or †p≤0.001.

acid accumulate within the contracting muscles, impeding the rate of muscle contraction, before transferring into the blood (Rivoal et al. 1994). Interestingly, we noted that while lactate levels were higher post-mWAnT for all treatment conditions, blood lactate levels were not further augmented in the BioSteel® HPSD group, despite higher power output by this group. This could be due to the presence of magnesium in BioSteel® HPSD, which has been previously shown to accelerate muscle lactate clearance post-exercise (Newhouse and Finstad 2000). This also suggests that the higher power output observed in the BioSteel® HPSD group may, in fact, be directly due to the metabolism of BCAA to produce ATP. Energy production through alactic pathways such as oxidation of exogenous BCAA (supplemented in BioSteel® HPSD) as precursors for ATP production eliminates the need for further lactate production while performing high-intensity exercise.

We also expected to observe a higher fatigue index in the BioSteel® HPSD group due to the higher power production in the first bout of the mWAnT. Interestingly, despite increased power output, the fatigue index was, in fact, lower in the BioSteel® HPSD vs. the placebo group, likely due to the lower levels of lactate production. Furthermore, previous work suggests that central fatigue that can limit the ability of athletes to perform maximally can be attenuated by supplementation with valine. An increase in plasma BCAAs levels has been shown to reduce the rate of transport of free tryptophan through the blood-brain barrier by competing for the binding site on LNAA receptors. This competition for the binding site inhibits the synthesis of brain serotonin, which would normally contribute to CNS fatigue (Fernstrom 2005; Sved et al. 1979; Weicker and Strüder 2001); hence, less fatigue and more power output (Wiśnik et al. 2011).

The analysis of plasma glucose before and after the mWAnT revealed that consumption of BioSteel® HPSD did not lead to hypoglycemia, even with significantly higher energy expenditure as measured by the average power output. Blood glucose levels were significantly higher post-mWAnT compared to pre-mWAnt for all groups, likely due to enhanced glycogenolysis of stored liver glycogen. In the post-absorptive state, when carbohydrate intake is restricted, and energy is needed, ketones can be produced through fat metabolism to be utilized as citric acid cycle intermediates used to ultimately produce ATP through alactic pathways (McGarry and Foster 1980). In this study, examination of blood ketone levels pre- and post-mWAnT revealed no significant difference between any of the groups suggesting no extra energy production through enhanced fat metabolism by BioSteel® HPSD consumption. Both observations suggest that the metabolism of supplemented BCAAs in BioSteel® HPSD is likely the source of the extra ATP that was required for the comparatively better anaerobic performance in the experimental treatment group. Indeed, oxidation of a molecule of leucine can produce 34 ATP compared to 32 ATP produced from the oxidation of a molecule of glucose (Lazo 1981). Lastly, urine SG and pH measurements indicated no significant difference in the hydration levels between different groups even though the BioSteel® HPSD consuming group exhibited a significantly greater power output, suggesting greater maintenance of hydration by subjects that consumed BioSteel® HPSD compared to water or placebo.

Conclusions

The results of this study will have a direct and immediate impact on the sports, nutrition, and exercise physiology fields. As previously stated, the current practice for athletes in sports, which involves repeated anaerobic exercise, is to consume high-glycemic carbohydrate beverages to sustain/enhance performance. However, high glycemic beverages are not tolerated well by all athletes due to GI discomfort and a possible rebound hypoglycemia effect, which can be detrimental to performance. BioSteel® HPSD offers an alternative supplementation strategy that uses BCAAs rather than carbohydrates to provide extended energy in order to subsequently enhance performance and eliminate side effects associated with the consumption of carbohydrate-containing SDs. Furthermore, the performance enhancing benefits of BioSteel® HPSD can potentially be extended to athletes with type I and type II diabetes who are normally not able to consume the commercially available high glycemic, carbohydrate-containing SDs.

Declarations

Funding

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Conflicts of interest/Competing interests

The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethics approval

The study was approved by the Humber College Research Ethics Board (REB Protocol 0282).

Consent to participate

Participants were informed of the study design, purpose and risks involved before signing the written consent forms. All subjects completed a Physical Activity Readiness Questionnaire (PAR-Q) to screen for health matters that might have presented any risk during physical activity (Thomas et al. 1992).

Consent for publication

Participants were informed of the study design, purpose and risks involved before signing the written consent forms.
Availability of data and material. Not applicable.

Code availability

Not applicable.

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Review Paper*

Through and Beyond COVID-19, Promoting Whole Person, Lifelong and Lifewide Learning

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Abstract

The Covid-19 pandemic significantly affected what was originally classed as 'normal' for everyone across the world and will undoubtedly continue to impact on the everyday lifestyle and well-being of the general-public for years to come (Frampton, 2021). All the education sectors were affected, and the polytechnic sector was no exception.

As the Government moves through and beyond Covid-19 with an agenda firmly rooted in developing skills, it starts to raise questions around widening participation, not just in terms of entry criteria, but also in terms of institutional readiness to support such diverse groups of learners using tailored whole person pedagogical approaches (Kim et al., 2021; McCoy, 2021).

Furthermore, with the pandemic's rapid acceleration of automation and ways of working, should the focus just be on skills? (McKinsey and Company, 2020; McKinsey Global Institute, 2020; Shepheard, 2020; The World Economic Forum, 2021). Or should there be a parity of esteem with other aspects and outcomes of whole person learning such as reflective practice, professional identity, attitudes, and behaviours which might be best nurtured and developed through both lifelong and life wide learning? As the world moves to a position of coexisting with Covid-19, could part of the solution to improving learner satisfaction and employability be through more person-centred programmes of study?

This review paper argues that the solution is one that is achieved by increasing learner agency and creating a tailored study programme that is focused on the knowledge, experience, social and emotional needs of the learner. The long-term success of these approaches that are discussed within this paper are dependent on several factors outlined within the paper, which will require further inquiry.

Keywords

Student Success, Curriculum Design, Strategic Approaches, Learner Agency, Employability, Learning and Teaching, Lifelong, Lifewide Learning, Study Programme, Individualised Learning Plan, Whole Person Pedagogy

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Introduction

The COVID-19 pandemic significantly affected what was originally classed as 'normal' for everyone across the world and will undoubtedly continue to impact the everyday lifestyle and well-being of the general public for years to come (Frampton, 2021). All the education sectors were affected, and the polytechnic sector was no exception.

The OECD (2020) reported that Vocational Education and Training (VET) was particularly hard hit by the crisis. In some cases, learners found themselves having to isolate away from home, unable to fully embrace the educational experience, access practical vocational activities, and benefit from face-to-face interactions with their peers and tutors.

Despite the best efforts made by the sector, the pandemic brought to the forefront the many inequities in society (Cowan, 2021; Kernohan, 2021; Wooldridge, 2021), including varying

***Review Papers** Review papers provide a balanced synopsis of the current literature within a specific area of inquiry. These papers summarize the literature comprehensively and identify outstanding questions and areas for future inquiry.

individualized support services, access to broadband and technology, and extracurricular activities (Curnock Cook, 2021).

As the government moves through and beyond COVID-19 with an agenda firmly rooted in developing skills, it starts to raise questions around widening participation, not just in terms of entry criteria, but also in terms of institutional readiness to support such diverse groups of learners using tailored whole person pedagogical approaches (Kim et al., 2021; McCoy, 2021).

Furthermore, with the pandemic's rapid acceleration of automation and ways of working, should the focus just be on skills? (McKinsey and Company, 2020; McKinsey Global Institute, 2020; Shepheard, 2020; The World Economic Forum, 2021). Or should there be parity of esteem with other aspects and outcomes of whole person learning such as reflective practice, professional identity, attitudes, and behaviours which might be best nurtured and developed through both lifelong and lifewide learning?

Whilst skills development may have been the dominant mantra from the government and media since the 1960s with the Leitch report and numerous subsequent policy documents that followed, learners will need far more from education to future proof their employability (Cole and Hallett, 2019; Halfon, 2021). These added requirements might be better addressed through an increased focus on learner agency and the co-creation of the programme offering. As the world moves to a position of coexisting with COVID-19, could part of the solution to improving learner satisfaction and employability be through more person-centred programmes of study? Nottingham Trent University has developed a new, research-informed and practice-based taxonomy, namely '*Employability Redefined*' (https://vimeo.com/632134802). This taxonomy encapsulates person-centred study, individualized learning plans (ILP), and learning for employability. This paper critically highlights the combination of areas of learning that are fundamental to developing a sector-leading, strategic, flexible, and integrated pedagogical approach for the future.

Personalized Learning & Individualized Learning Plans

The experience of COVID-19 has ignited the debate about the value of courses, as highlighted in the OECD (2020) *Impact of COVID-19 on Education* report. This report raised questions about the value offered by education during the pandemic. The HEPI (2021) student academic experience survey also suggests that just over one in four learners (27%) felt that they received good or very good value from their higher education course during the pandemic.

Perhaps, this is purely because of the restrictions that were in place and the move to online learning, or could the pandemic have amplified learners' concerns that were already known (Brabner, Hillman, 2021) before the lockdown measures were put into place?

Either way, as the education sector moves and adapts to a world with COVID-19, there is an opportunity to use the lessons learnt from this 'less than normal' experience. Certainly, the use of digital methods of learning has significantly advanced within the educational landscape (Curnock Cook, 2021; Morgan, 2021), and indeed awareness of how a learner's socio-economic background can influence their engagement with education is now better understood than ever before (Whitford, Threadgold, 2021; Jones, 2021; Boffey, 2021).

Recognizing that the learners' individual circumstances and learning requirements are vast (Galbraith, 2021; Millward, 2021), the challenge to the educational sector is developing courses that are more tailored around the learners. Research by the care provider Bright Horizons (2020) showed that individuals, especially those with caring responsibilities, benefitted from having a culture of flexibility that fitted around their personal circumstances that were created during the lockdown restrictions.

Considerations of the learners' individual circumstances were also highlighted in the Government's Skills for Jobs (2021) white paper, which stated the need to increase access to courses in a more flexible way to fit study around work, family, and personal commitments of learners.

The Education Select Committee (2021) went further in response to the Skills for Jobs white paper by suggesting that the very nature of flexibility means we are moving even further away from a 'one size fits all' approach, with more emphasis now on meeting the needs of a diverse group of learners, to promote engagement in learning, build confidence and/or enhance well-being. The OECD (2018) The Future of Education and Skills Education 2030 report suggests that there should be a sharper focus on 'learner agency', whereby curriculums should be designed around the learners to increase motivation and to recognize the learners' prior knowledge, learning needs, skills, attitudes, and values. The report goes further by suggesting that learners should be offered a diverse range of topic and project options and the opportunity to suggest their own, with the support and guidance they need to make well-informed choices.

Prior to COVID-19, the education sector was already moving towards more flexible and personalized approaches to learning through student-centred pedagogical practice (Beetham and Sharpe, 2013; Gravett, Yakovchuk, Kinchin, 2020). However, the Skills for Jobs white paper and learner feedback suggest that there is still more to do. Brennan (2021) discussed the need for more flexible and personalized learning pathways and rightly pointed out the need to make programmes more accessible, not just in terms of access to courses but also in the course make-up. At Nottingham Trent University, the authors have been exploring how this could be achieved by the personalized co-creation of the components that make up an individualized study programme.

The concept of an individualized study programme was first introduced by Professor Wolf (2011), the main driver being to offer 16-18 aged learners breadth and depth without limiting their options for future study or work. Wolf also recommended that learners should be able to gain genuine experience and knowledge of the workplace to enhance their future employability. A study programme consists of a substantial qualification, English and Math, work experience, and non-qualification related activities that collectively develop a learner's character, attitude, and confidence.

Within higher education, learners participate and engage in a variety of highly valuable social and learning experiences. However, in most cases, there is no clear alignment or knowledge that is holistically discussed, and pedagogical links between these experiences are missed. The lack of awareness of these lifewide components of a learning journey means missed opportunities to utilize this variety of experiences to better capture a learner's progress more holistically across all aspects of the educational experience. The authors' research suggests that by making these aspects more explicit, tutors could then use these experiences to encourage 'real-time' reflection (Tummons, 2019), which, in turn, could then act as a scaffold to support the learner to further develop across the breadth of their learning (Jackson, 2008).

Many FE learners have previously experienced the concept of an individualized study programme. Therefore, to provide continuity and a more personalized learning experience, HE providers could now adopt this concept more widely by recognizing the importance and value of lifewide learning by providing key points for reflection and the subsequent review and assessment of the emotional and social outcomes of learning, and future and short-term targeted goal setting across all components of a learner's study programme.

Acknowledging that individualized study programmes have previously experienced some issues, e.g., an Ofsted (2014) review evaluated how effectively FE and Skills providers had implemented the concept of a study programme to supply individualized programmes for all learners. The review found that whilst a study programme was widely welcomed across the sector, not all programmes that were reviewed supplied a truly 'individualized' study programme, 'tailored' to the learners' future career plans and their developmental needs.

Within the same review, it was also recognized that the use of ILPs was good practice to show how the elements of a study programme combine to equip learners with the knowledge and skills that they need to make progress in their future.

Walshaw (2021) suggests that an ILP helps the learners and their institutions understand what success looks like and how to achieve it. More specifically, an ILP defines a learner's academic, personal, and employment goals, which are separated into individual targets, and then reviewed on a regular basis between the learner and their tutor.

Often the components of an individualized study programme are not coherently viewed as a collective, and, in some cases, learners are not encouraged to reflect on all components outside of the substantial qualification, which results in missed opportunities for the learners to reflect on and better understand the value of the experience of one part of a programme to then influence and link with (and make progress on) other elements of the study programme.

Previously, the benefits of an ILP have not always been made clear to the learners, which then results in a lack of engagement when setting and reviewing targets. This also reduces opportunities to recognize and reward interim achievements (Tummons, 2019) and personal successes across the breadth of the learners' study programmes.

Due to the lockdowns during COVID-19, arguably, this has provided the learners with more agency to direct their own learning, engaging and better utilizing the experiences of self-study needed during these periods. Providers have an opportunity now to continue and build on this, encouraging further advances in learner agency. However, this will require more investment and continuous support to ultimately create an effective culture of learner agency and whole person teaching (Whitford, Threadgold, 2021; Kim et al., 2021).

Through their work at Nottingham Trent University, the authors believe that the co-creation of individualized study programmes

and a more holistic ILP could start the process of improved learner agency. Moreover, fostering mentoring and coaching approaches (Lancer et al., 2016; Hakro and Mathew, 2020) would also support learners to reflect across their study programmes, creating situations that allow them to recognize how potential new knowledge gained relates to their prior knowledge, which may have been developed through their own unique societal and real-life experiences and critically beyond their educational context. Such a view adopts more of a lifewide learning lens (Jackson, 2008). This is a move to a position where educationalists focus more on 'learning how to learn' and moving well beyond the notion of simply 'skill development'.

To ensure learners do not become passive in the learning process and are not relegated to the position of merely becoming listeners (Ward, 2020), more emphasis should be placed on the ILP by all stakeholders in the future. Key pedagogical approaches should be integrated within the ILP process, such as whole person teaching, transformative reflective practice, ipsative assessment (Hughes, 2014), constructive feedback, and the reinforcement of learning across the breadth of a study programme.

This approach together with quality mentoring and coaching techniques (e.g., active listening, facilitation, and goal setting), should result in a curriculum intent (Jones, 2019) that is ultimately shaped by the learner, according to their individual aspirations, learning needs, well-being, and personal circumstances. This, in turn, should then affect and motivate the learners, promoting stretch and challenge, deep thinking, and critical reflection (OECD, 2018; Glass, 2020). This approach would encourage more than just the mere acquisition of 'information' and skill development, instead requiring much more nuanced engagement from the learner to promote the assimilation and accommodation of information into knowledge (Piaget, 1957).

Through the reflection and development of knowledge, learners can shape the curriculum, thus fulfilling their own purpose for education (Coulson, 2021), critically providing them with opportunities to develop more than simply 'skills.' Throughout the learners' educational journey, a study programme and ILP should supply the reflective space and access to resources to enable a learner to develop their professional identity, attitudes, behaviours, and values. The Employability Redefined taxonomy developed at Nottingham Trent University is the scaffold being proposed by the authors here that links these core components together.

Employability Redefined Taxonomy

Commonly misunderstood, employability sits at the heart of all this work outlined. Engaging with the Employability Redefined taxonomy can be of benefit in a range of contexts and at a variety of levels. Based on principles first established by Cole and Tibby (2013), here we consider its value as a tool to support learning for employability within the curriculum design process and as scaffolding for the design of personalized study programmes and ILPs. If used in this way to develop a picture of the desired outcomes of learning at a course level, this subsequently creates a point of reference for all learners on that course to engage with, providing a course-specific framework for more targeted and holistic reflective practice. Applying these same principles, this approach can potentially be conducted at scale, across all courses of study and crucially with all learners.

The taxonomy comprises of several areas of learning that should be considered in combination. These areas overlap and are not discrete; they are connected, and critically, they should be considered at a course level and involve a range of stakeholders, including whole course teams, employers, learners, and the institution's Employability team. It is fully acknowledged that much of this learning will already be in place. However, the question is, have all these areas been considered in combination (and others that may be distinct to a subject or a discipline area)? Critically, do all learners recognize and have opportunities to learn across all these areas, recognizing how they are all equally important to support their future employability and ultimately their success? See Figure 1. Employability Redefined Taxonomy, Cole, D. & Eade, D. (2020)

Each element within the taxonomy developed at NTU will now be introduced. The ability to reflect effectively is essential and underpins everything that is important to employability (Dacre Pool and Sewell, 2007; Yorke and Knight, 2004; Kumar, 2007; Donald et al., 2019; Tomlinson, 2017; Cole 2019). Whilst commonly reflective practice related tasks and assignments already exist, the question remains, how connected are these activities across modules and levels? Is there a planned and coordinated approach to developing reflective practice for all learners that is progressive and structured? If not, might provision be evolved to meet these aspirations?

The two bands around the taxonomy could be considered the glue that holds the rest together. Without these or, in fact, any other of the individual elements introduced in the taxonomy, there is a gap, and this is likely to have a potentially negative impact on a learner's future employability (Dacre Pool and Sewell, 2007).

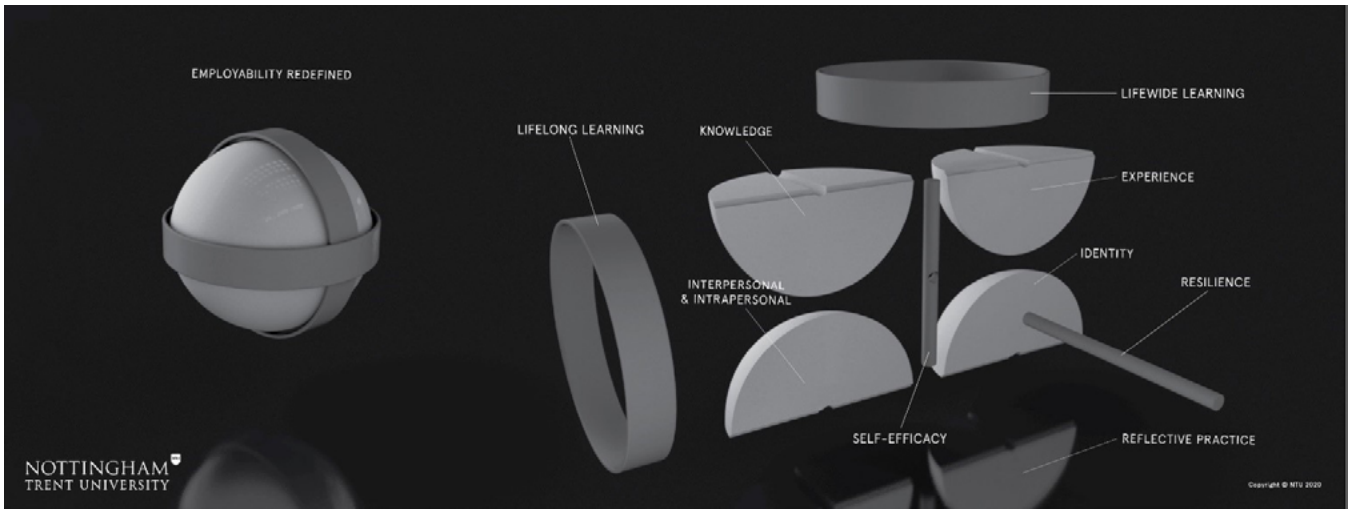

Figure 1. Employability Redefined Taxonomy, Cole, D. & Eade, D. (2020)

First, we want to highlight the importance of Lifelong Learning (Fugate et al. 2004). In an ever-changing world, it is so important for learners' future employability that there is an openness to opportunities to learn in new areas, developing in ways that will support their future ambitions and dreams. COVID-19 has only further amplified the importance of this as a crucial consideration for education. As humans, we never stop learning, and with advances in technology, our commitment to this ongoing development is crucial.

Second, a less commonly discussed aspect here is Lifewide Learning (Barnett, 2011; Cole, 2019; Jackson, 2008), where learning that is already happening simultaneously across multiple spaces in our lives is acknowledged and valued as part of a more holistic view of the individuals' learning and to support their future employability. Here, for example, the value of taking part in sport, volunteering, part-time work and engaging in daily life comes to the forefront, recognizing learning and the outcomes of this that occurs through all these experiences and how this then aligns with learning and the outcomes gained through the formal curriculum. Considered collectively, this presents a much richer and more comprehensive view of learning as well as outcomes that are both possible and needed. Given the impact of COVID-19 on education and the restrictions on face-to-face learning on campus, this aspect of learning becomes even more valuable.

Through effective reflective practice, the more detailed outcomes of learning across both these bands might be better recognized by the learner and course team. Such a practice can ease pressures on the curriculum itself in terms of content and critically support areas of learning that move beyond what a learner knows and functionally can do, to focus on the individual, personal qualities, attitude and behaviour that are not only different to but equally, if not more important than simply 'skills'.

At the core of this taxonomy are two areas that are particularly important at Nottingham Trent University. First, self-efficacy, the belief that you can achieve the goals you set yourself; the greater your self-efficacy, the greater your aspirations (Bandura, 1977, 1982; Luthans et al., 2007). This is important as part of employability and ultimately success more broadly (Donald et al., 2019; Tomlinson, 2017; Fugate et al., 2004; Dacre Pool and Sewell, 2007; Yorke and Knight 2004). This is an area that can be developed through our current teaching and learning practices, and its importance is highlighted here. COVID-19 has created challenges for everyone, challenges that can be extremely complex at an individual level. Self-efficacy in this regard is an essential consideration for the future.

The second axis highlights the importance of resilience (Rutter, 2006). In an ever-changing and competitive world, particularly with the pandemic, setbacks are to be expected. This is about how, as individuals, we respond to these setbacks, which is most important, and together with resilience, the learner again is positioned in the best possible place to respond most effectively when needed.

In the final layer of the taxonomy, four dimensions for learning are introduced (Cole, 2019), each of these being equally important to employability. These inter-connected and research-aligned dimensions (Dacre Pool, Sewell and Tomlinson, 2017; Donald et al., 2019; Kumar, 2007; Fugate et al., 2004) provide an opportunity to reflect on the current opportunities available to all learners, both in the formal curriculum and beyond. Crucially, it requires the starting point to be a focus on what the specific

learning objectives are for each area (based on constructive alignment principles, Biggs and Tang, 2011). What are we hoping learners will gain from learning in each of these dimensions, and what informs this thinking? This should be determined locally at a course level. Each of these four dimensions will now be explained.

Knowledge

The importance of subject-specific knowledge sits at the heart of education and as a critical feature to support a learner's future employability (Dacre Pool and Sewell, 2007; Yorke and Knight, 2004; Fugate et al., 2004; Donald et al., 2019; Tomlinson, 2017). The ability to apply knowledge in a range of contexts is key, particularly in an ever-changing, global, and complex world. This links back to the value of lifelong learning.

Experience

Learners gaining, reflecting, and learning from experience is also a critical dimension. Experience is defined as not only of the workplace, but it also recognizes the value of experience gained through life more broadly (Kolb, 1984; Dacre Pool and Sewell, 2007; Donald et al., 2019; Tomlinson, 2017; Cole, 2019). This entails reflecting again on the nuanced and tangible benefits of learning in these varied contexts and environments, critically being able to effectively articulate this learning, for example, in areas such as practical intelligence and tacit knowledge (Sternberg et al., 2000), and understanding the world of work, the environment, and the diverse communities within it.

Identity

Employability is a lifelong and fluid concept, and as such, there is a developmental aspect inherent to it. Here, the importance of social identity and reflecting on career identity is highlighted (Hinchcliffe and Jolly, 2011; Tajfel and Turner, 2004; Holmes, 2001; Fugate et al., 2004). Learning about who we are as people as well as our motivations, abilities, and personalities is all part of this (Kumar, 2007). This includes not only thinking about who we are now but also reflecting on who we want to be, our future aspirations and ambitions and critically, how this is influenced by others and our external environment. In this area, learners should be thinking about accessing additional support from the Employability team, the Enterprise team, academic tutors, the Students Union, and other stakeholders who may provide insight and guidance as well as practical support on preparing for the future and ultimately their place within this. Here, the context is particularly focused on an employment and work-related perspective. Personal development is at the heart of this as well as the aspect of continuous nature of learning as our lives and careers within it progress and develop over time. This notion of identity has direct and strong links to the final dimension included in the taxonomy, which follows.

Interpersonal and Intrapersonal

Finally, the importance of interpersonal and intrapersonal learning is highlighted, not only from a self-perspective but also crucially, from the perspective of learning how as individuals to best engage effectively with others in society, recognizing and embracing differences in all possible regards (Tajfel and Turner, 2004; Dacre Pool and Sewell, 2007; Fugate et al., 2004; Donald et al., 2019; Tomlinson, 2017; Cole, 2019; Cole and Hallett, 2019; Mayer and Solovey,1997; Gardner, 2003; Sternberg et al., 2000). Learning that is directed at supporting the development of this rich array of personal qualities and dispositions is not only essential and highly valued in the workplace but also vital for life more broadly. For example, qualities such as emotional intelligence, creativity, adaptability, patience, communication, and teamwork, all of which cannot be developed in a bubble and must include due consideration to a range of social factors, the environments we live in and those we interact with on a daily basis.

In this dimension, the role of skills is included, but employability is about so much more than just skills, as has been clearly stated in this paper; attitude and behaviour should also be made explicit with all stakeholders, in particular with our learners. Whilst we may not be able to simply teach all of these areas, we still need to flag their importance, making this explicit with learners, who ultimately have the potential to learn and develop in these respects throughout their lives.

Anecdotally, employers time and time again cite the importance of needing employees who are the *right fit*, with the *right mindset* for the role and organization. Entrepreneurs also cite similar areas of learning as equally important to their ultimate success.

This area, in particular, may often be overlooked as a feature of employability; however, its inclusion is essential and will not only bring value to employability but also potentially impact a number of other strategic agendas in education, including retention, progression and attainment, student satisfaction, and well-being.

In summary, this taxonomy collectively forms a cohesive whole, an integrated approach that redefines employability and puts the spotlight on learning, recognizing, and building on our current activities. It helps provide a consistent point of reference or scaffolding for us to reflect on in our future planning activities,

and with the design of future study programmes and ILPs, it recognises the valuable contribution of each stakeholder, including academics, central services, learners, and others. This taxonomy can potentially be applied in a range of contexts, including within the curriculum design process, offering the potential for a unique, research-informed, future-facing, flexible, and truly integrated approach across multiple levels within education.

Conclusion

The challenges brought by COVID-19 demonstrate the need to consider the learners' social, economic, emotional, lifelong, and lifewide learning needs on an individual basis to ensure that all learners are given equal opportunity to achieve their career and individual aspirations. The approaches discussed not only have the potential to improve graduate outcomes but also empower learner agency through a whole person pedagogy that celebrates diversity and innately promotes equality and inclusive learning. COVID-19 has shown the need for institutions to go beyond widening participation in courses by using person-centred practices to listen and respond more holistically to learners as individuals, thus providing an environment in which social mobility can thrive and be realized. One size does not fit all, but a person-centred based approach as outlined has the potential to work.

To address the original question of, "as the world moves through and beyond COVID-19, could part of the solution to improving learner satisfaction and employability be through person-centred programmes of study?" In response, the authors would argue yes. By using the Employability Redefined taxonomy as a scaffold, by increasing learner agency using an ILP, and creating a tailored study programme that focuses on the knowledge, experience, social and emotional needs of the learner, this will undoubtedly help improve learner satisfaction and potentially support their future employability. The long-term success of this innovative new approach being proposed is still to be established, and whilst solidly grounded in research drawn from across several disciplines, its impact will be dependent on several factors which require further inquiry. We close this paper with some reflection on this point.

Outstanding Questions & Areas For Future Inquiry

Considering the demands that already exist on educationalists, can a study programme interlink be individualized and innately support lifelong and lifewide learning across the breadth of the learning experience?

Recognizing that learners will need space to reflect and develop their lifewide learning, how prepared is education to move beyond the focus of just skills development and embrace the use of a more holistic ILP?

Do these approaches infringe on 'academic freedom,' or do they promote 'learner freedom' through the increase in learner agency?

To what extent are educationalists equipped with coaching and mentoring knowledge, skills, and behaviours to embrace and support this more bespoke approach and focus on learner agency?

Does a personal tutor need to be an educationalist that teaches on a component of a study programme, or should a coach/mentor role be established who can independently support the learners to recognize their own areas of development, remedial actions, and achievements across the breadth of a programme?

Do learners want the agency to design a programme according to their needs, or are their requirements more simplistic, e.g., improved personalized feedback and access to more support facilities?

Can the digital infrastructure of a complex educational institution truly support flexible learning?

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Review Paper*

Pandemic Transition to Online for Healthcare Profession Education: A Web Scrape Seeking Perspectives of Innovation and Digital Equity

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Abstract

For health profession education programs, the pandemic caused a sudden and rapid transition to online, in an attempt to maintain the critical supply of new graduates during a pandemic. In pre-pandemic times, a gap existed between technology-mediated pedagogy and digital health literacy. The gap has been forced to narrow. Health education educators considered digital equity for students and the resultant impact of the digital divide in online environments for competency attainment related to digital health literacy and quality patient care. The research team engaged in an emancipatory action research web scrape of the immediate pivot period to online in winter 2020 to summarize the expertise being shared over social media platforms or teaching and learning excellence podcasts and blogs. The search criteria for the web scrape covered three areas, including changes in: 1) healthcare profession education, 2) innovation, and 3) diversity, equity, and inclusion. The results, in relation to pre-pandemic reflections, were on the future of education and maintaining innovative momentum found during the pandemic, the future of healthcare and being attuned to patient needs despite virtual care delivery, along with the future society and ensuring students attain digital wisdom. This web scrape speaks to what health profession education values going forward, reducing the digital divide for students and patients.

Keywords: action research, digital divide, digital equity, digital health literacy, health profession education, online transition, web scrape

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Introduction

Due to COVID-19, educational institutions implemented social distancing restrictions and moved to an online/remote environment. Technology has already embedded deep roots in health profession education programs. However, the real-world or authentic experience could not be easily substituted into the online environment and required innovative approaches. Health profession education programs have incorporated technology for both pedagogical delivery and digital health learning, such as virtual simulation as a replacement for clinical practice (Nagle et al., 2018). However, as technology becomes more embedded, the elements of education programs that cannot be substituted with technology become increasingly more apparent.

Health profession education must prepare students for a future with technology in patient care (National Academies of Sciences, Engineering, and Medicine (NAP), 2018). However, education and practice may be changing as much from necessity as from the need to innovate. A Canadian nursing study found that the focus

***Review Papers** Review papers provide a balanced synopsis of the current literature within a specific area of inquiry. These papers summarize the literature comprehensively and identify outstanding questions and areas for future inquiry.

pre-pandemic was often on "technology-mediated pedagogy," whereas healthcare was driving the need for competencies in "the delivery and management of health care services"—digital health literacy (Nagle et al., 2018, p. 23). Pre-pandemic, healthcare profession education was contextualized in an inefficient system where technology was expensive and limited (NAP, 2018). The gap between pedagogy and literacy became apparent after educators reported during the pandemic on increasing the use of technology such as virtual simulations, increasing the numbers of educators who have used it for the first time, and increasing its use as a replacement for in-person learning (Canadian Association of Schools of Nursing, 2021). Health profession educators were now being tested on their ability to close that gap and apply the 'just-in-time' pedagogy and digital health learning required for a pandemic.

Transitioning to remote delivery was a challenge compounded by equity and inclusion. Online teaching needs to meet underlying infrastructure requirements to be effective: stable internet connections, hardware, virtual reality (VR) capabilities, software, training, and data management. The ability of students and educators to accommodate the online environment becomes crucial. Equity and inclusion are central points for designing teaching strategies.

Post-secondary education was in a state of preliminary change prior to the pandemic. Institutions reassessed the needs of a diverse student population who were first-generation attendees, parents, or who had low-income and bore the weight of a lifetime of race and gender inequalities (Alexander et al., 2020; NAP, 2018). The hazard in the past was for institutions to assess and deliver support for historically excluded students as an aggregate group, where the year 2020 brought the vulnerability of students to the fore (Alexander et al., 2020). Students may stay on campus because of a lack of means to leave, because it was a source of employment, or for access to computers and the internet. Closing campus increased poverty, food insecurity, safety concerns, and reduced student supports for success (Alexander et al., 2020).

While innovation plays a substantial role in the creation of quality education through remote delivery, equitable considerations need to be made simultaneously. The research team explored the effects of the COVID-19 pandemic on health profession education. The question that guided our web scrape and the development of this paper is: When healthcare faculty were required to move online in the pandemic, what effect did this have on teaching and learning, innovative strategies, and digital equity or inclusion?

Methods

The review used an action research approach (Newton & Burgess, 2008) to generate knowledge, with a goal toward understanding the emancipatory potential of digital equity as a result of converting to online because of the pandemic. An emancipatory research approach encourages healthcare educators to examine the social, political, and economic structures that are reinforced in health and education systems when they should be focused on social justice (Newton & Burgess, 2008). The pandemic forced an opportunity to critique practice, performance, and the social issues related to digital equity that were exacerbated with COVID-19 restrictions.

The research team engaged in an informal web scrape, having considered that the pivot to online learning would not be found in program evaluation or research literature in the short time frame from the inception of the pandemic. Searches were conducted on social media and cultural platforms such as YouTube, Reddit, and Twitter, with increasingly targeted searches beginning with Google and narrowing to known health and education personalities or repositories. The search was limited to January 2020 and beyond to seek resources related specifically to the pandemic change. The search was further limited to non-medical post-secondary experiences to reflect the aggregate experience of the researchers from colleges and polytechnics with different funding models than medical universities.

The research team employed the expertise of our librarian to address a web scrape review framework. We questioned a rigorous approach as the focus of a web scrape is to seek out new innovative knowledge that may be at the beginning of a scholarly innovation cycle. Formal evaluative tools would have excluded all our resources that were embedded in flexible best practices. This is a concern of action research as it is often practiced but not formally reported on or evaluated (Newton & Burgess, 2008). These team decisions reflect the theoretical underpinnings of the program of research with which we engaged.

Findings

Our search focused on three main concept areas: healthcare profession education; innovation; and diversity, equity, and inclusion. We discuss each area while considering the limits of pandemic timing and impact.

Healthcare Profession Education

The COVID-19 pandemic had a critical impact on learning. Along with their own safety concerns, clinical educators and students were potential vectors of COVID. Though most students were

not in the clinical practice setting, the pandemic highlighted the relevance of ethical and professional practice dilemmas that students may experience once in practice after graduation (Rischer, 2020e). The opportunity was to enhance student online learning with teaching strategies such as unfolding case studies. (Rischer, 2020c).

The pandemic influenced practice and education, shifting paradigms (Rischer, 2020a). In the overnight transition of the system, educators realized that not all students had a suitable and supportive home-working environment, recognizing how online learning is experienced and lived within the context of economic status, gender, or race (Almost et al., 2020). Almost et al. (2020) recognized that students might live in small or shared houses; they may have a poor internet connection, limited internet access or limited broadband to access all learning materials; they may have young children or elderly parents whom they are caring for within their home; they may have lost the summer job that would have covered their tuition, rent and food, leading to a precarious financial condition; or they may not be able to afford a new computer to make online learning easier to access.

Lea (2020) identified that the development of virtual learning meant educators were expected to be nimble, which also modified their educational responsibilities. Technology-enabled virtual learning is a progression of the flipped classroom, changing the role of educator to coach and moderator of online discussions and provider of feedback. To argue, simulations may not replace actual patient encounters, but the reality is that clinical placements are shrinking, new technology is engaging, and students require opportunities to get them practice-ready (Lea, 2020).

Rischer (2020b) identified the need for nursing education to prioritize preparing students for the challenges faced in the practice setting. Online teaching was not new, but many health educators who had never taught online now had no choice (Rischer, 2020d). Rischer (2020d) suggested that educators be willing to evaluate students differently, identifying that online teaching strategies also serve as formative and summative evaluations.

Innovation

The initial response to the pandemic from educational institutions focused on completing semesters in progress. Moving forward, Mushtare, Kane, Kernahan & Gannon (2020) identified challenges to adaptation to better engage students once online learning became normalized. Challenges included forums not used for meaningful discussion; the myriad of distractions to students while engaged in video conferencing; and poor engagement with class content.

Virtual reality (VR) was identified as one way to replace hands-on training components for labs and skills. Puri (2020) discussed a partnership between academia and the software industry to produce a gaming experience to replace in-person labs. As discussed by Hennick (2020), VR is advantageous in that memory and attention are closely related, and VR is inherently attention-grabbing, which can enhance the quality of learning. Interprofessional collaboration has been identified as an area that could be well targeted by VR learning, while relational skills and empathy may not be as well taught through VR (Benner, 2020).

Open-source databases collected distance education materials for faculty to adapt and transition to online (Sarac, 2020). The purpose was to support students in "successfully coping with the challenges of emergency online education, building their digital communication skills, and reducing stress associated with technology-related fear and social isolation" (Sarac, 2020). Alternatively, Darby (2020) advocated that an overreliance on existing tools was unsustainable for faculty and inefficient for students in the long run. Darby (2020) also encouraged low-tech communications that everyone could read or watch. Educators suggested well-designed online discussion platforms that prompted high-quality classroom interactions and supported quizzes and integrated assignments as ways to deepen learning and increase engagement (Rischer, 2020a).

Digital Equity and Inclusion

Diversity of race, culture, gender, religion, sexual orientation, and socioeconomic background each contribute to a unique perspective of the world and influence learning. During the period of transition to online learning, limited attention was given to digital equity and inclusion because of the urgent need to pivot quickly and resume educational programming so as not to delay the preparation of healthcare professionals. Institutions loaned laptops or other devices to ensure students could adequately access courses (Mushtare, Kane, Kernahan & Gannon, 2020). The ultimate, misplaced responsibility for access rested with the student, and this requirement perpetuated exclusion (Mushtare, Kane, Kernahan & Gannon, 2020).

Students from low socioeconomic backgrounds faced increased academic challenges while shifting to online learning during the pandemic (Volante, 2020). Concerns such as limited access to the internet are a structural phenomenon known as the 'digital divide,' which reinforces inequities (Mushtare, Kane & Dolmage,

2020). Alternatively, the pedagogical use of universal design promotes access and inclusion for a diverse population of learners during COVID-19 (Mushtare, Kane, & Dolmage, 2020). Educators engaged in seeking out access concerns and developed alternatives to ensure students had opportunities to accomplish course goals.

An inclusive learning structure, one that is not teacher-centric, increases student engagement (Mushtare, Kane, Sathy, & Hogan, 2020). An inclusive approach is desired to overcome oppressive or colonial structural phenomena found in higher education. For example, assigning participation marks for those who speak up in online environments may be exclusionary to those students who favour participation as quiet listening.

Considering differences when establishing learning communities in courses may be accomplished by low-risk activities such as posting pet pictures or allowing time for students to reflect (Mushtare, Kane, Kernahan & Ganon, 2020).

Online learning environments require management to mitigate the potential to expose students that have disabilities, mental health challenges, or individuals that they support in their lives (Mushtare, Kane & Dolmage, 2020). Online platforms force a need for disclosure that would have been unnecessary in a traditional classroom (Mushtare, Kane & Dolmage, 2020). The lasting impact of high-risk activities is the continued stigmatization of groups of students and their exclusion from education.

Discussion

The web scrape focused on the three areas of the healthcare profession education; innovation; and diversity, equity, and inclusion. We consider those three areas in relation to the future of education, society, and healthcare.

The Future of Education

The pandemic presented obstacles to the traditional learning/teaching model rendering the development of competent graduates. The transfer of health profession education to online platforms such as Zoom and vSim was an attempt to maintain standards, but it does not have the authenticity of face-to-face, high-fidelity simulation or clinical practice.

The post-pandemic institution is required to maintain the innovative flexibility found in 2020. Just as educators evaluate new teaching strategies, a cycle is required to sustain innovation at the institutional level (Morriss-Olson, 2020)—in a sense, to catch up to the virtual health practices that arose from the pandemic. Benefits such as free Wi-Fi data, open access instead of pay-walls, and shared simulations related to COVID-19 management ensured the diffusion of learning and science (NAP, 2018). Innovative responses to new education models post-pandemic should be collaborative to prevent a return to siloed education. The pandemic has created momentum for the further integration of technology into health profession programs. But the concern remains that momentum drivers may be reversed, hindering any fruitful change that arose.

The Future of Society

The priority was to produce healthcare professionals. Yet, in a pandemic, set in an age of fiscal restraints, reducing infrastructure to support student success and placing the responsibility for learning on the student (Mushtare, Kane, Kernahan, & Gannon, 2020) put the future of work at risk. The paradox of technology during 2020 was the rationalization of continuing online because, for the majority of the population in wealthy countries, students would adapt (Bates, 2020). The difficulty of moving online, especially with such speed, is that “the intelligent use of technology can sometimes lead to a reduction in inequality, but much more often, it amplifies the status quo” (Bates, 2020). Inclusion—decreasing exacerbating inequities of historically excluded groups—then became the obligation of governmental investment (Bates, 2020). Alternatively, others determined that community colleges and polytechnics needed to revisit their original purpose of serving their local communities (Alexander et al., 2020) to ensure students could continue their education during the pandemic. Technology can be lauded for increasing the skills and learning opportunities for health profession students or being the cause of an increasing digital divide. The issue is that in health profession education, digital equity is also reflected in practice in the interplay of digital health literacy with the social determinants of health.

Students required technology-mediated education to attain ‘digital wisdom’ (NAP, 2018). While students want fun, accessible, and social learning, educators are restricted by time and funding constraints. This highlights the difficulty with change and the ease of sliding back to the status quo rather than embracing a new normal (Rischer, 2020e). For health profession education, digital equity and health literacy gaps are most apparent “in [clinical] placements during school, in the first job after graduation, and in the training-practice transfer of continued professional education” (NAP, 2018, p. 112). These three time points represent years in an individual educational experience where the digital divide may result in an impact on quality patient care.

The Future of Healthcare

The primary focus during the online transition of the pandemic was retaining the past education model, along with the urgency to move forward. This meant that there are inherent barriers for diverse groups of learners which will need to be addressed for worthy elements of pandemic changes to remain. While considering digital health literacy for patient-centred care, learners will be required to address digital professionalism and ethics (NAP, 2018). During the pandemic, patient digital equity became an immediate need and concern as providers moved to virtual clinics. Post-pandemic, as health professionals experience burnout, technology will become a more significant topic of discussion to provide education to an already short workforce.

The argument exists that competency-based education, rather than outcome-based, achieves better success and decreases institutional costs (Alexander et al., 2020). However, the contrasting argument is that students lack empathetic communication skills and decision-making ability on graduation, which impacts patient and interprofessional team outcomes (NAP, 2018). Attunement to patient needs is difficult to teach and convey over virtual reality (Benner, 2020). Subtle changes in patient condition are learned through mentorship and experience in face-to-face environments. A rapid online roll-out was required, but for health profession education to remain sustainable post-pandemic, evaluation should not be far behind. Assessing how competence is met within the limits of virtual innovation needs to surpass more than learner satisfaction.

The process of completing this web scrape addressed and revealed complexity. Our interprofessional team approached this web scrape from a need to advance the teaching initiatives specific to our health profession backgrounds but also meet specific scholarship interests, such as integrating digital health equity, virtual reality, and addressing equity, diversity, and inclusion. Action research, by necessity, has a short timeline to affect change. Applied scholarship often has a longer timeline to design and evaluate outcomes and discover new pathways to innovation. This web scrape attempted to meet immediate needs but resulted in an evaluation of teaching scholarship that had been 'slowly' emerging (Vostal, 2022). The paradox is how to value timely scholarship (Vostal, 2022) yet ensure research teams meet applied research expectations from organizations under the strain of fiscal, human resource, and digital divide restraints. The post-pandemic college and polytechnic cannot afford to address one inequity at a time, especially since the pandemic exacerbated issues that require immediate mitigation for diverse students and faculty (e.g., social determinants of health). The most significant challenge remains the design of deliberate approaches for student success and program progression, i.e., decreasing attrition, increasing retention, and maintaining competencies for health profession students who have chosen patient-centred careers. The answer resides in flexible, competency-based learning pathways that meet student needs. Flexible pathways are often interpreted and acted upon as online and remote education. Yet, current practices in online and remote health education are largely detrimental to health profession student learning and satisfaction. Health profession students require authentic in-person and literally hands-on patient learning experiences with consideration for equity, diversity, and inclusion. Therefore, technology usage should augment, rather than diminish, learning and secure solid opportunities for underserved and at-risk student populations. The future requires emancipatory education and health scholarship. Colleges and polytechnics require cognizance of their responsibility to meet the needs of the community by reducing barriers for those historically excluded and oppressed.

Conclusions

The approach for this review was emancipatory action research focused on the experience within non-medical health professional education programs. We presumed that empirical evidence of innovation in health profession education would not be published but would be reported during the pandemic through social media. This proved *not* to be the case as most resources found in the web scrape reported on commercial applications that already existed or best practices of technology that moved from champion use to widespread implementation. The limitation was that a web scrape approach was less rigorous. However, the process of reduction in the web scrape review has resulted in a reference list of go-to resources for up-to-date integration of educational theory to real-world concerns.

The pandemic highlighted the challenges faced by even those who had significant experience with technology in teaching. There is a need for face-to-face instruction to be augmented with flexible teaching/learning approaches using technology. To accomplish this, identifying and addressing access challenges will be key for ensuring equitable learning opportunities for students from varying backgrounds to reduce the impact of the digital divide. Educational institutions will be required to maintain the technological momentum found during the pandemic. New graduates must be ready with digital health literacy skills for a healthcare environment that is attuned to patient choice either face-to-face or virtually and the commensurate responsibility

to provide appropriate care over digital media. This web scrape delineated what health profession education values going forward: balancing equity and inclusion by reducing the digital divide for students and patients.

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Review Paper*

Pivoting Culinary Arts Education During COVID-19 Part One: Setting the Pedagogic Scene

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Abstract

As culinary educators, we have a long history of teaching our craft within a hands-on, master-apprentice learning environment (Deutsch, 2014; Mitchell, Woodhouse, Heptinstall, & Camp, 2013). Since the dark ages, it has been typical for the trainee chef to physically stand by the side of their master and be guided in the development of their technical and cognitive skills (Stierand, Dörfler, & Lynch, 2008). Through the onset of COVID-19 in early 2020, the traditional 'hands-on' master-apprentice mode of learning was disrupted by lockdown and the inevitable distance learning. In response to this disruption, the Food Design Institute at Otago Polytechnic, New Zealand quickly pivoted its mode of curriculum delivery from on-campus, face-to-face learning to online distance learning.

This paper discusses the move to distance education in culinary arts and produces several strategies and considerations for vocational educators who wish to produce curricula and learning experiences that are student-centred and responsive to online learning environments. With the coronavirus remaining a critical factor within our immediate futures, developing strategies for delivering educational programs via distance is not only practical to develop but also necessary if we are to keep abreast of our learners' educational, social, and individual needs.

Keywords

Culinary Arts, Pedagogy, COVID, Disruption

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Introduction

This is the story of COVID-19 and the pedagogic response from the teaching in the Bachelor of Culinary Arts program at Otago Polytechnic, New Zealand. The story is split into two parts. Part One sets the scene of the Food Design Institute's approach to culinary pedagogy and focuses on a review of literature relevant to culinary education and distance learning. Part Two focuses on the response to COVID-19 as the teaching team transitions their pedagogy from on-campus Project-Based Learning (PBL) to an online connectivist pedagogy.

To begin the story, we return to the early days of COVID-19 and the Food Design Institute (FDI).

> *For weeks we had all watched COVID-19 ravage destruction around the globe. Yet, through our isolation at the bottom of the world, we never really believed COVID-19 would disrupt our daily routines or the ability to teach our students. This would all change at 3pm on Friday the 20th of March 2020, when the FDI staff were summoned to a meeting with a member of Otago Polytechnics teaching and learning team to discuss the possibility of a lockdown and the school's ability to move to distance learning. The mood in the room was fun and relaxed, with many staff only concerned about the perishable food items in the fridges and what would happen to them in the event of a lockdown. There were some initial thoughts bantered around about possibly utilizing Microsoft Teams and Facebook to communicate with the students, but in all reality, we didn't really know what to do, and there was no firm plan in place.*

*__Review Papers__ Review papers provide a balanced synopsis of the current literature within a specific area of inquiry. These papers summarize the literature comprehensively and identify outstanding questions and areas for future inquiry.

Setting the Scene of Traditional Culinary Arts Pedagogy

For centuries, trainee chefs have learnt their trade by standing at the side of their master and observing and mimicking their master's approach to their work (Deutsch, 2014; Mitchell, Woodhouse, Heptinstall, & Camp, 2013). This approach to culinary arts education is heavily applied in nature, with each step of the learning process typically guided by the practices and knowledge of the chef master. Through time, observation, and repetition, the trainee chef eventually acquires the technical and cognitive skills of their chef master (Stierand, Dörfler, & Lynch, 2008).

This approach to culinary arts pedagogy has changed very little throughout the centuries (Emms, 2005), with the master-apprentice methodology directing the learning process in many formal and informal sites of culinary education (Deutsch, 2014; Woodhouse, 2015; Woodhouse & Mitchell, 2018). It is within this learning environment that two critical factors occur in the skill and knowledge development of the trainee chef. The first is the development of the trainee chef's technical cookery ability, whereby trainee chefs apply their tools and techniques to transform everyday food items into commercially viable dishes. This skill is often developed through behaviourist pedagogies overseen by a chef master (Mitchell & Woodhouse, 2019).

The second area of skill acquisition is the trainee chef's cognitive development. This skill is often developed through the trainee chef applying their technical knowledge to solve everyday problems in a contextually appropriate manner. These culinary skills are often witnessed in culinary activities like organizing sequencing and timing of food production as well as having to adapt culinary techniques and recipes in response to ingredient and equipment availability.

Culinary Pedagogy at the Food Design Institute

Since 2007, the culinary programs at Otago Polytechnic have transitioned from the traditional master-apprentice pedagogy to a design-led Project-Based Learning (PBL) pedagogy. Like culinary arts master-apprentice pedagogy, PBL allows for technical skill and cognitive development; however, it allows for greater student agency and independent learning. The adoption of a PBL had been a pedagogic response to criticisms of traditional behaviourist and technocentric culinary education where the sole focus on technical skill development has often been at the expense of culinary arts students developing their creative problem-solving abilities (Hegarty, 2011).

As a teaching and learning strategy, PBL initially commences with a phase of heavy teacher guidance and direction before moving into a phase of students' self-regulated learning and knowledge generation (English & Kitsantas, 2013). In practice, this means the culinary arts teacher introduces technical skills and/or culinary concepts to the student before the student is given the opportunity to explore these skills or concepts independently. The PBL learning process concludes with the student reflecting on their learning (English & Kitsantas, 2013).

Adopting PBL at the Food Design Institute (FDI) has allowed the culinary teaching team to transition their approach to teaching from the sage-on-the-stage culinary master to the guide-on-the-side chef mentor. This is due to the fact that PBL is philosophically situated within the constructivist pedagogies of Dewey (1959), whereby the social and cultural perspectives that are unique to each student are integrated into the student's learning (Bell, 2010). By creating a learning environment that respected the unique nature of each student, Dewey believed that students would take a greater role in the ownership and motivation of their own learning (Swan, Garrison, & Richardson, 2009). As Dewey (1959, p. 20) once stated, "The educational process has two sides—one psychological and one sociological; and that neither can be subordinated to the other or neglected without evil results following."

As an approach to teaching and learning, PBL is an inquiry-based pedagogy that engages students in the acquisition and application of skills and knowledge through real-world projects that eventuate in authentic workplace artifacts (Thomas, 2000). Through this pedagogic approach, PBL has been proven to be effective in developing students' technical skills as well as their soft skills such as communication, collaboration, and creativity (Warren, 2016). These skills are often referred to as the 21st Century Skills and are considered fundamental to acquire if one is to successfully operate within the contemporary workplace (21st Century Schools, N.D.). It is within the PBL pedagogic environment that the culinary student is able to develop the full suite of professional skills and knowledge required to practice as a chef (Mitchell & Woodhouse, 2019).

Developing a PBL environment requires the educator to create authentic and real-world learning environments for the student to develop their soft skills (Warren, 2016). This means that PBL projects (and their associated assessments) require culinary students at the FDI to operate in a collaborative and creative manner to solve everyday, real-world culinary problems. FDI culinary arts projects often require students to undertake desktop

research (such as exploring new food culinary trends and culinary techniques via the internet) as well as applied research practices in the commercial kitchens where they create dishes and food products that are served to real-world customers.

As a student-centric pedagogy, PBL allows the FDI teaching staff to act as student learning facilitators while, at the same time, enabling the student's agency within their learning. FDI culinary arts students are encouraged to bring their cultural identity and food passions into their food projects, which help to socially and culturally develop students' culinary aspirations within the wider food landscape (Mitchell & Woodhouse, 2018).

PBL projects at the FDI typically culminate in students integrating their technical skills, culinary problem-solving skills, and collaborative skills to create culinary outcomes that have a real-world purpose within the community. This can be seen in culinary outcomes such as running food trucks at large events, designing and cooking food for pop-up dinners for charities, and developing new food products for the local artisan food community. When assessing the multiplicity of skills demonstrated by the culinary student, a holistic assessment philosophy is applied as it is a recognized means to value the diversity of skills evident in the student's work (de la Harpe & Peterson, 2008).

> *On the 25th of March at 12.21pm, the jovial mode within the school ended abruptly as the New Zealand government announced a national emergency and placed the country into a four-week lockdown. As hospitality professionals, we set about emptying the fridges and distributing the food amongst our students and community. Soon after, questions arose about our students and how we would best manage their learning via distance delivery?*
>
> *Our immediate response was to connect with those within our teaching community who had previous experience in distance learning. We contacted Dr. Selena Chan, an ex-bakery lecturer and recognized leader in blended vocational education at Ara Institute of Canterbury, for advice. Selena provided us with some initial ideas to quickly transition our teaching, but more importantly, she pointed us in the direction of relevant distance learning literature to inform our teaching going forward.*

The insights from the advice we were given included the following.

Distance Education and Connectivism

Whether it is a book, radio, television or the internet, educators have used various mediums and modes to facilitate distance learning throughout the generations. Distance education (DE) has been a responsive means for teaching learners who, for various reasons, cannot engage in the traditional, on-campus learning environment. Throughout history, the various iterations of DE have been socially and culturally situated within the technologies and pedagogies of those who have developed it (Anderson & Dron, 2011). As technological advancements have evolved throughout time, the pedagogy of DE has also evolved in parallel (Anderson & Dron, 2011).

In recent times, DE has predominantly moved online and adopted interactive technologies, such as audio chat, digital text, video, and real-time web interaction. The transition of DE to online delivery modes has allowed educators to adopt connectivism, a pedagogy, where it is the educator's role to guide students to open-source information and help them navigate their way through this information (Anderson & Dron, 2011; Siemens, 2005). Within a connectivist pedagogy, students work in connected learning communities to seek out information online and share new knowledge with their peers (Siemens, 2005). As such, connectivist pedagogy is premised on the belief that the learning process is situated within a process of building networks of information, contacts, and resources that can then be creatively applied to real-world problems (Siemens, 2005). Furthermore, a connectivist pedagogy assumes that information is accessible and plentiful and that the learner's role is not to memorize or even understand all of the information. Instead, connectivism pedagogy believes that students need to develop the intellectual capacity to find and navigate knowledge and use it where and when it is required (Siemens, 2005). As Pecina and Marinič (2021) argue, while connectivism is still emergent within vocational education, its ability to facilitate constructivist pedagogies and problem-solving skills within online learning environments provides it with radically reformed vocational education.

An important aspect of connectivist pedagogy is that the decision-making process is based on rapidly changing foundations. Underpinning this position is the concept that new information is always entering the knowledge landscape; therefore, it is important to learn to draw distinctions between what information is and is not important (Duke, Harper, & Johnston, 2013).

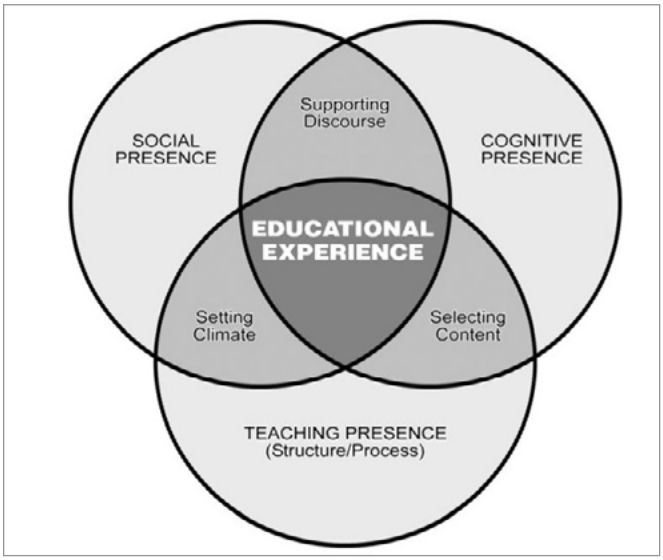
The Importance of Developing Students' Social and Cognitive Presence in an Online Learning Environment

One of the pedagogic challenges identified with distance learning is for the educator to design a learning environment that enables the development of the student's social and cognitive presence

(Lowenthal, 2010). As Archer (2010) argues, developing the student's social and cognitive presence within all educational contexts is important; however, it is particularly important within online DE environments due to the student's physical dislocation.

According to Garrison, Anderson, and Archer (2001), the construction of the social presence occurs when students connect with their respective learning community and engage in meaningful, open, collaborative, and cohesive discussions. Likewise, the construction of the cognitive presence occurs when students are able to construct new knowledge and meaning through shared discussions and debates (Garrison, Anderson, & Archer, 1999). Central to the development of a successful social and cognitive presence is the teaching presence of the educator (Garrison et al., 1999). Through the development of the teaching presence, the online educator is responsible for the design of the cognitive and social presences through facilitated discourse and instructional management systems (Garrison et al., 1999).

When developing online and blended educational experiences, Garrison, Anderson, and Archer (2001) recommended that effective educational design occurs when the social, cognitive, and teaching presences successfully overlap. Garrison et al. (2001) have framed this theoretical position as the Community of Inquiry (CoI) model whereby students learn to work collaboratively to create new meaning and mutual understandings through open dialogue and critical reflection.



(Online Community of Inquiry Model from Garrison et al. 2001)

Similar to PBL, the CoI pedagogic model is situated within the philosophy of Dewey and consistent with a constructivist approach to learning (Garrison, 2007). Dewey's perspective on pedagogy was that the social and cognitive aspects of a student's learning were central to their success (Dewey, 1959). Students' social and cultural considerations are evident within a PBL environment (Bell, 2010) as well as the CoI model of practice (Swan et al., 2009).

Online Student Motivation and Feedback Mechanisms

Motivation has been described by Turner and Paris (1995, p. 217) as the 'engine' of learning. Motivation can influence what students learn, how they learn, and even when they choose to learn (Schunk & Usher, 2012). Ryan and Deci (2000) further argue that motivated learners are more likely to undertake challenging learning activities, be actively engaged in class, and adopt a deeper approach to their overall learning. By tapping into a student's motivation, teachers often witness enhanced student performance, task persistence and expressions of creativity (Ryan & Deci, 2000). Nevertheless, keeping students engaged and motivated within online learning environments has been identified as one of its most significant challenges (Hartnett, 2016).

Online students are more intrinsically motivated than their on-campus counterparts (Wighting, Liu, & Rovai, 2008), yet online learning still has a higher student dropout rate compared to similar face-to-face courses (Park & Choi, 2009). One of the key reasons for higher dropout rates within online learning environments is that students often experience feelings of isolation (Paulus & Scherff, 2008). One of the best ways to alleviate feelings of isolation in online DE is to provide regular and personalized feedback to learners (Savvidou, 2018). Savvidou (2018) suggests that this feedback should focus on the students' strengths and accomplishments while at the same time offering constructive criticism for student improvement. Savvidou (2018) further comments that accessible, focused, and motivating feedback is also critical for student success in an online learning environment.

Discussion

The following literature is only but a fraction of the knowledge which exists within the domain of distance education. It is the immediate literature that we drew upon as we hastily moved our teaching into an online mode. Still, it provided us with a pedagogic direction as we were forced to transition our pedagogy from PBL to connectivism within a rapidly changing world. What, at first, appeared as a threat to 'our way of doing things' soon turned into an opportunity to reposition our future teaching and learning practices. As a teaching team, we quickly realized that there were many overlaps between our traditional on-campus PBL pedagogy and online connectivism pedagogy. Central to these overlaps was

the CoI pedagogic model, which provided us with the theoretical framework to redesign our students' projects to ensure their social and cognitive learning needs continued to be met.

The online learning literature taught us that we needed to develop strategies to foster student interaction and critical debate and that timely, responsive teacher feedback was important in maintaining student engagement. Subsequently, research by Mulyatiningsih, Palupi, Ekawatiningsih, and Firdausa (2021) on culinary arts students' satisfaction with online synchronous and asynchronous learning during COVID-19 in Indonesia also noted that 93.6% of students preferred the blended learning approach to traditional face-to-face learning. This insight also supports the research of Brown, Mao, and Chesser (2013), who conclude that offering asynchronous (in this case, watching dish demonstrations online before class) and synchronous (students preparing the dishes in the classroom with lecturer supervision) options increase student satisfaction and outcomes.

Finally, with the hospitality sector in New Zealand now turned upside down, our attention needed to focus on how we could redesign our culinary projects so that students could still possess a sense of purpose and a sense of direction within their chosen profession.

In Part Two of this narrative, we recall the response from culinary teachers to meet the learning needs of the students and the changing priorities of the industry using a story-telling approach. As the classrooms emptied and the students dissipated to the solace of their homes, it was time to reimagine what 21st Century culinary education might be.

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Review Paper*

Pivoting Culinary Arts Education During COVID-19 Part Two: Embracing Disruption in a World of Change

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Abstract

This work follows from the article Pivoting Culinary Education During COVID-19 Part 1: A Review of Distance Learning Literature, whereby culinary lecturers from the Food Design Institute, Otago Polytechnic, New Zealand, tell the story of their response to the COVID-19 pandemic and the move to online distance learning. Through a story-telling approach, the lecturers recall their response to the management of their culinary learners' cognitive, social, and individual needs in a distance-learning environment.

Throughout the course, the lecturers continue to balance the students' motivational, social, and academic needs, factors which they know are important in a distance-learning environment (Maddrell, Morrison, & Watson, 2017). This article provides invaluable insights and learnings for culinary educators who are having to reimagine culinary education in a world of continued lockdowns and changing consumer purchasing and consumption behaviours.

Keywords

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Introduction

This work follows the article *Pivoting Culinary Arts Education During COVID-19 Part One: A Review of Distance Learning Literature*, where culinary lecturers from the Food Design Institute, Otago Polytechnic, New Zealand, consider their response to the COVID-19 pandemic and how they moved into online learning. Using a narrative approach, this story speaks of the response of the teaching team to the management of their students' cognitive, social, and individual needs within a distance-learning environment. It explores connectivism as a response pedagogy in a disruptive education sector and an internet web of exploding information.

Throughout the course of the pandemic, the lecturers have to continue to balance the student's motivational, social, and cognitive needs—factors which they know are important to achieving student success within a distance-learning environment (Maddrell et al., 2017; Savvidou, 2018). Please note all student names have been changed to protect their identities, and the personal narrations are not actual recordings. Instead, the narrations are creative interpretations of the events that unfolded, which allow the reader to enter the classroom and feel as part of the changing landscape.

Setting the Scene

It is one day since the country was placed into lockdown, and the students have returned to their homes. Prior to lockdown, the Food Design Institute had used Moodle as its academic platform for curating course materials and Facebook for its 'just in time' information and class chats. Earlier in the year, a couple of lecturers had started to use Microsoft Teams (MST) for recording student presentations, but MST was not routinely used by the teaching team as an educational delivery tool. The story continues with Tim Lynch (a culinary arts lecturer) connecting with the students for the first time on MST.

***Review Papers** Review papers provide a balanced synopsis of the current literature within a specific area of inquiry. These papers summarize the literature comprehensively and identify outstanding questions and areas for future inquiry.

Tim: Can you guys see me on the screen...can any of you hear me as well? Richard (a student), you need to turn your microphone on; you are talking, but we can't hear you. Can we also just check that we are all here? Who's missing?

Sophie: I think Jane is meant to be here, Tim. I messaged her on Instagram, and she said she was struggling to get good Wi-Fi at her parents' house.

Tim: No worries, I think I've managed to figure out how to record this session, and Jane can watch it later, if required. If you guys are OK with it, I'm going to hit the record button now. First of all, I want to say I've had lots of messages from you about your studies and how are we going to manage things. Rest assured that we have devised a plan, and I want to talk to you about this. You will also notice that there is a lot of negative media reports about the future of hospitality. The teaching team has been reflecting on these reports, and we have come up with a plan to reposition your project so that it is applicable to the current situation. If you guys just sit back and listen for the next few minutes, I'll explain the plan we devised.

For the last eight years, second-year Bachelor of Culinary Arts students have worked with local food producers to develop new artisanal food products for their businesses. Within this project, students would define the brand values of the artisan food business and develop food offerings that reflected the business values and market segmentation. Typically, these new food products would be available for sale at farmers' markets or bespoke food retail outlets.

In 2020, the project was initially conceived to involve two local food producers that the students could develop new artisanal products for. Early conversations with the food producers indicated that they both wanted a selection of their low-value food commodities (such as low-value meat cuts) to be redesigned to increase their value proposition. The first food artisan was a local pork producer whose focus was on sustainability and animal welfare, while the second food producer produced high-quality meat products through regenerative framing practices. Both industry partners were excited about working with the students and what new products could be offered alongside the existing product range.

In the two weeks prior to lockdown, students were introduced to the project brief and had commenced the process of researching the food producers' brand identity and market positioning. From this initial research, the students focused on identifying the underlying factors which influenced the purchasing behaviours of the respective business's customers. At the time of lockdown, students had finished this market research and were enthusiastic about heading into the kitchen to develop some initial product prototypes to present to the food producers for feedback.

Unfortunately, physically making artisanal food products would no longer be feasible because lockdown restrictions meant students would no longer have access to the commercial kitchens. In response, the teaching team redesigned the project to ensure the students could meet the course's learning outcomes and project deliverables. The catalyst for this redesign was to embrace the changing landscape of COVID and reframe it as a design opportunity for the students. At Alert Level 4 (the highest level of COVID restriction in New Zealand), many food outlets could not be physically open, but some food producers could still sell their products online via contactless delivery. To ensure that the students' skills within product development were contextualized within the current climate, the lecturers shifted the definition of 'new food product' from an artisanal food item to a new system of artisanal food delivery.

Developing Social and Cognitive Presence through Student Motivation

Tim: OK, we are having to pivot the project due to COVID, and we will need to redirect our creative attention away from making food. We cannot get into the kitchens to design these food products, and even if we could, the food producers would be reluctant to take on a new product line due to the staffing pressures and the state of flux. With most people purchasing online during the lockdown, the lecturers have decided that the new product that you need to design is not a food product; instead, it's a new means to experience artisan food at home.

John (student): So, you mean we aren't making food in the kitchen anymore; instead, we are making food delivery boxes or something like that?

Tim: Yes, you're correct, John. A product can be a physical artifact or a new way to experience that artifact. Think of a taxi as an example of this. The product offering is an on-demand transportation service. However, when Uber entered the market, they provided a new way to experience the existing product. In essence, people are still getting the same product they always wanted; it's just they are getting it delivered in a different way. I'll give you a food example of this. Take soup, for example. You can experience eating soup on an a-la-carte menu, degustation menu or a buffet

offering; whichever way you experience the soup, it's still just soup. It's just that the way it gets offered to you and the experience around the soup is different. Online food deliveries are just another way people can experience soup.

John: Ok, I get it now. That's a bit of a shame because the sausage recipe that I conceived, I really wanted to test out. But I guess it would be hard for a new sausage to be introduced into the business right now with so much other stuff going on.

Tim: I think the important thing to note right now is that the hospitality industry is in a state of disruption, and this means things will end up looking different moving forward. As culinary teachers, it is our responsibility to prepare you for this disruption. I know many of you are a little worried right now, but this is an opportunity to do things differently. With that in mind, the first task that I have set you is to go out onto the internet and explore how other businesses are providing online delivery services. To get you going, have a look at Lashings bakery in Wellington. They offer an online brownie delivery service and have a few different models that people can opt into. In tomorrow's session, we will break into our groups to discuss our individual findings.

A key consideration when pivoting the project was the stimulation of the students' social and cognitive presences through the actions of the teacher (Garrison, Anderson, & Archer, 2001). We attempted to achieve this by placing the students' concerns about their future careers at the centre of the project and used this to stimulate their enquiry skills and group debates and discussions.

The second consideration was to utilize the principles of connectivism pedagogy to guide students toward possible relevant information and to allow them to have opportunities to critically consider its appropriateness to the task on hand (Siemens, 2005). The principles of connectivism can be seen when Tim (the teacher) directs the students to relevant sources of knowledge; in this case, Lashings' bakery website. As Siemens (2005, p. 5) notes, "Connectivism is the integration of principles explored by chaos, network, and complexity and self-organisation theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual." The shifting sands of COVID had created chaos within the food and beverage sector, which meant that the product offering of the past (physical face-to-face purchases) was no longer relevant. Therefore, the students needed the skills to navigate through mass information and find relevant sources of knowledge to inform their new product offering.

Fostering Critical Thought and Debate

Tim: So, it looks like everyone is back online, great news. In today's session, I am going to put you into your groups via the breakaway function, and I would like each of you to present to your peers what you discovered from yesterday's research exercise. I am keen for you to discuss what businesses you thought had effective delivery models and what negative aspects you found in others.

Tim sends each team into their respective breakout groups.

Tim: Who would like to go first in the group and discuss what they found?

Jane (student): I can, Tim. I looked at the bakery website you recommended. What I liked was the ability to order what you wanted from their product range, but you could also subscribe to a monthly delivery service where they sent you a surprise selection of brownies at the beginning of each month.

Tim: Yes, it's a very interesting model—the subscription model. It's becoming quite popular with other businesses as well. Did you look at any other websites, Jane?

Jane: Yes, I did. I looked at a local café that specializes in local food, and they had moved from just selling their café food to also selling local eggs, milk, and vegetables from the suppliers they use. They had morphed their business from serving just café food and beverage to also providing pantry items.

Tim: Based on what you have seen, Jane, what possibilities might exist for the producer that you are working with? How might the practices used by these businesses inform what might be possible in your project?

Jane: I guess this initial research indicates that if you have people who are loyal to your business, you could utilize this to create a subscription model. Likewise, what the café is attempting to do is to work within their existing supplier networks to ensure all of the business's stakeholders can benefit from the delivery platform. I also think that by taking this approach, it allows the customer to feel that they are supporting the wider food community.

Tim: (turning his attention to another student) Sarah, what do you think about Jane's ideas?

Sarah: They sound like really good ideas, and I also found another business like the café Jane described. It was a restaurant that had teamed up with a meat supplier to sell their meat. The restaurant was providing recipes they had

designed to go with the raw meat, so people could cook delicious food at home. I guess it just depends on the customers' wants and needs. I suspect some people buying online just want a prepared convenience product, so the raw meat and recipe concept might not appeal.

Tim: This is a great discussion. So the question is, "Of the information you found, what is the most useful to adopt into the project?"

Jane: I guess the best thing to do would be to consider these ideas in relation to the project deliverables. Maybe we could present some of these ideas to the food producers for feedback. That way, we can use their input to come up with a workable outcome.

As a connectivist educator, the pedagogic intent is to help the student navigate and make sense of this information through a critical lens (Duke, Harper, & Johnston, 2013; Siemens, 2005). Hence, in the narrative above, when the teacher asks the student to present the information they have found, they also enact their critical-thinking skills as they ask them to draw connections between the information sourced and its relevance to the project's deliverables. Central to the decision-making process within connectivism is to embrace the diversity of opinions within the student classroom. As Duke et al. (2013, p. 6) comment of connectivism, "The core skill is the ability to see connections between information sources and to maintain that connection to facilitate continual learning." This approach to teaching and learning, therefore, sees the teacher's role as the initial instigator of these discussions, often acting as an agent provocateur.

As the weeks of COVID lockdown unfolded, the students continued their project online. Throughout, they were introduced to other food producers who shared their reactions and responses to COVID while also continuing to observe new ways of delivering food products to consumers online. The literature review had taught the team the importance of providing regular and personalized feedback to the students, ensuring their students stayed motivated and engaged (Savvidou, 2018). This feedback included using a combination of class, group, and individual weekly feedback sessions, with teachers ensuring everyone received personalized feedback within the confines of a small group project. Throughout, the teachers ensured that the social and cognitive presence of their students was at the forefront of their minds.

Through desktop research, engaging in the stories of others, and feedback from the industry partners, the students eventually developed a series of concepts that were pitched online to the food producers. These concepts included a series of cooked and raw product offerings for various market segments, a-la-carte and subscription pricing models, and an umbrella digital platform for artisan producers to sell collectively. In total, six concepts were pitched, and one of these was integrated into lamb producers' business operations. Taking inspiration from the café business that transitioned from its primary offering to also selling products in its supply network, the lamb producer developed an overarching brand that brought together a collection of bespoke New Zealand food offerings on one online platform.

Reflections and Implications for Culinary Education in the Future

In Part One, we provided an overview of the traditional master-apprentice pedagogy, which is still taught in many culinary programmes around the world. In New Zealand, it is still common to see a master-apprentice pedagogy in the initial phases of culinary education; however, Project-Based Learning (PBL) has become the dominant pedagogy in the final year of study. In 2014, the Bachelor of Culinary Arts teaching team was nationally applauded for its use of PBL as a pedagogically responsive means to develop trainee chefs' technical, cognitive, and soft skills. Indeed, the success of PBL has started to raise questions in New Zealand about its possible adoption into all levels of culinary education.

Yet, the immediate future for hospitality in New Zealand continues to look unstable and constantly moving. At the time of writing this article, COVID is somewhat under control within our communities; we still live under a cloud of doubt that things will never be the same again. The reality is that the world has only become more complex due to COVID, and the future requires students to have the the ability to navigate this complexity. As culinary educators, COVID has provided us with the opportunity to critically examine our philosophy of PBL and realize that while it is an effective tool for on-campus, applied learning, there are similar pedagogies such as connectivism that we can apply effectively within an online environment. What we know for sure is that we can no longer rely on our traditional, face-to-face teaching methodologies. As a team, we are learning to let go of our face-to-face instructional pedagogy and are reassured by research that flexible and blended learning approaches within culinary education are not only appreciated by students (Mulyatiningsih, Palupi, Ekawatiningsih, & Firdausa, 2021) but, in fact, achieve higher performance outcomes (Holik, 2019). As Tien, Lin, Yin, and Chang (2020) note, offering online blended and flexible culinary education is a student-centric approach to 21st Century

education with the added benefit of increased student motivation and creativity.

As we review our BCA programme in 2022, we have already made the decision to redevelop it to include on-campus, blended, and fully work-based delivery models. Pre-COVID, we had already commenced discussions about new delivery tools and methods; however, COVID accelerated these discussions by forcing us to enter the world of online education.

COVID has also been an opportunity to examine what defines the skills and knowledge to practice as a chef. Do our culinary technical skills need to expand beyond the traditional repertoire? With chefs posting every day on social media platforms to increase their business profiles, should media skills now be part of the culinary toolkit? Likewise, when chefs wrote menus in the past as drawcards to invite customers on the streets into their establishments, then maybe chefs need to acquire a basic level of digital marketing skills?

What COVID has forced us to do was reflect on everything we took to be true. Like our peers in the industry who are having to reconceive their business models, those of us involved in culinary education must re-examine our pedagogic delivery models and the skills and knowledge we believe to be true. If there has been one positive to come out of COVID, it is that we have learnt to embrace disruption and change.

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