

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

Tom Carey^a, PhD, and Janet Zlotnik^b

^bBritish Columbia Institute of Technology, ^aUniversity of Waterloo

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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Author Note

Thomas Carey PhD is Co-Principal Catalyst with the Workplace Innovation Network for Canada and a former Professor and Associate Vice-President at the University of Waterloo.

Janet Zlotnik MA is Project Lead, Academic Support Planning, British Columbia Institute of Technology.

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

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***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 (Brenzitz 2021, p. 62). However, private-business R&D, labour productivity, patents and intellectual property rights tell a different story. And as Brenzitz 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 Brenzitz'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). Brenzitz 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 capabilities¹ 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 specialists².

- 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., Wadhvani 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

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).

innovators should precede teaching future entrepreneurs.”

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 emerging⁴. 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).

are our own as authors and are not intended as a statement of institutional direction.)

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