Essay

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A Conceptual Continuous Improvement Framework to Examine the "Problems of Understanding" Applied Research

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Abstract

Objectives: Improving performance to meet strategic priorities, such as teaching balanced with increased applied research activities, has developed into a central, though contentious, discourse for faculty in Ontario colleges. The aim of this article is to analyze and better understand why faculty are not engaged in applied research practices.

Method: This article draws from social cognition theory and a social constructivist perspective. The literature review examines the evolution of colleges in Ontario, including the political factors and symbolic artifacts that shape values and organizational practices. This study sought to explore how a conceptual continuous improvement (CI) framework might advance our understanding of the policy shifts between applied research discourses within Ontario colleges in Canada and barriers that faculty face to enact applied research practices.

Results: Underpinned by a set of simple principles, including improving through communication, learning through collaboration, and changing through coordination, the conceptual CI processes and systematic method provide opportunities to bridge the different contexts and unveil the varied on-the-ground realities of faculty teaching and research tasks.

Conclusions: The findings reveal developmental needs and adaptive institutional challenges related to applied research practice changes have been influenced by political, cultural, and socio-cognition contexts and tasks.

Implication for Practice: The inventive conceptual CI framework provides a viable means to analyze the fragmented state of applied research practices across Ontario colleges, which may ignite conversations and inform decision-making as well as suggest approaches to change at other global postsecondary education institutions. The innovative conceptual CI framework analysis tool will be of interest to faculty, institutional leaders, faculty unions, and policymakers.

Keywords: *applied research, teaching colleges, continuous improvement*

Introduction

The context of college education is changing, and solutions to today's challenges require new ways of communicating, collaborating, and coordinating to adapt to change. Applied research is a key feature of higher education in the early 21st century, and Canadian colleges are no exception to this global trend. Consequently, amid the complex and highly competitive knowledge-based global economy, applied research has been adopted at Canadian postsecondary education (PSE) institutions as a high priority and is among their top four strategic mandates (Colleges Ontario, 2019). For college faculty, the meaning of applied research continues to be a core issue, necessitating the right understanding (Skolnik, 2013). As a faculty member enacting applied research practices within an Ontario college, I contend that many faculty members struggle to comprehend the meaning and value of applied research as it pertains to their work. Vlaar et al. (2006) referred to these challenges as "problems of understanding" (p. 1618) rooted in uncertainty associated with differences in contexts and tasks. Santoro (2021) argued that understanding the developmental needs of faculty who want to conduct applied research is a necessary precursor to supporting and building research practice and retaining faculty. Yet, there is little previous research examining the barriers and gaps that impact college faculty engagement in applied research practices.

As a scholar-practitioner working in a Canadian college institution without positional authority (or power) in governance functions, I set out to better understand the fragmented state of applied research practices. I argue that engagement, along with structural and process strategies for applied research, requires exploring unconsciously held values to better understand the developmental needs of faculty. In addition to reviewing the published literature, I consulted with faculty with positional authority in the area of curriculum and instruction working in diverse disciplines at a large Canadian college located in Ontario. I asked them about the barriers that prevent faculty engagement in applied research practices. The three most common responses from faculty included: "It is not clear to me how research performance fits in with my teaching workload given applied research is not clear-cut" (K. Stoker, personal communication, April 5, 2021); "the main need is time to conduct research," (R. Bissoondial, personal communications, April 5, 2021); and "I already experience increase administrative work demands, making research practices difficult" (C. Arts, personal communication, April 6, 2021). Similarly, in another study investigating research productivity, "workload pressure, lack of time, and administrative work demands" (Fawzi & Al-Hattami, 2017, p. 224) were identified as the three main factors affecting faculty research productivity. A recent college Ontario report reaffirms that these same three individual developmental factors remain major determinants impacting faculty research performance but that institutional factors are also involved (Colleges Ontario, 2019).

This analysis focused on examining the "problems of understanding" and what prevents faculty from engaging in applied research practices within the Ontario college context. As a starting point, there are two definitions of research that are used to understand the systematic effort to increase knowledge in an area. Applied research consists of concrete and practical objectives and is usually conducted to resolve a community, public sector, or business issue/problem that may result in new knowledge to increase competitive and organizational effectiveness. It is most often conducted in colleges and polytechnic institutions (Haimowitz & Munro, 2010). This is unlike pure research, which consists of theoretical or experiential work with objectives to acquire new or increased knowledge. This type of research is exploratory and uses different research applications that may result in disruptive innovation, which traditionally has been in the university purview (Skolnik, 2013).

Literature Review

The framework used to structure this literature review is outlined in Figure 1. As illustrated in Figure 1, to provide context, the article begins by describing the historical Canadian PSE system, including the ideology of managerialism that is examined through political factors and symbolic artifacts in relationship with teaching and research tasks. Next, using a social constructivist perspective, the literature review examines social cognition theory and continuous improvement to better understand the research question and the study focus.
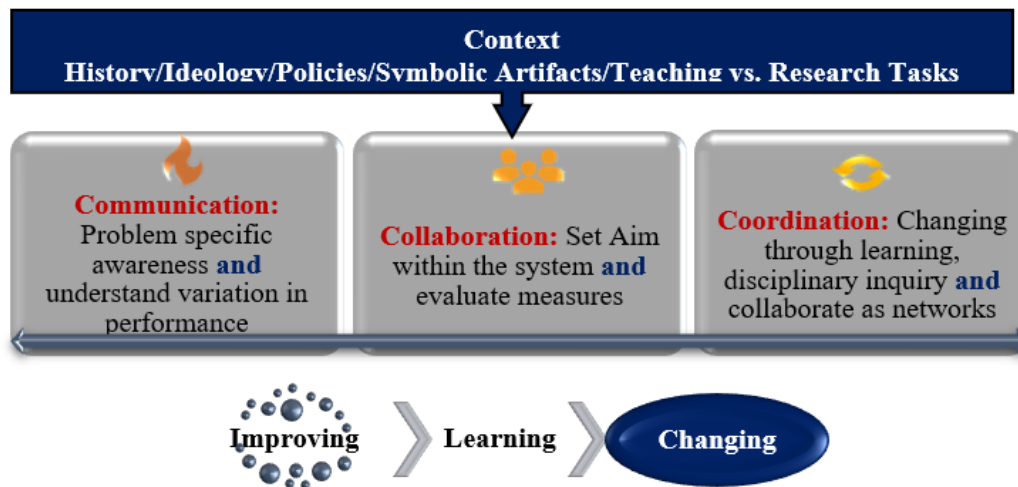

Figure 1. A continuous improvement methodology informed by social cognition theory to accelerate learning. An illustration loosely adapted from Six Core Principles of Improvement Framework by A.S. Bryk, "Accelerating how we learn to improve." *Educational Researcher, 44*(9), p. 468. Copyright 2015 by Educational Researcher.

Context

Although applied research has become an increasingly important policy and strategic mandate in Canadian PSE institutions (Skolnik, 2013), it is important to understand Canada's political history and the cultural contexts in which Ontario colleges reside. In Canada, the Constitution Act of 1867 is a fundamental policy that granted provinces exclusive jurisdiction to construct laws in relation to education (Jones, 2004). Across all 13 provinces and territories, education in Canada is generally divided into primary, followed by secondary and postsecondary institutions. Canada's PSE institutions consist of publicly funded colleges, universities, and private institutions. Given the complexity of structures and credentials within each province, I focused this article on the context of Ontario's 24 publicly funded PSE colleges.

The Ontario college system was established in 1967 in response to the federal shift from a resource-based economy to an industrial, service-based economy that would "foster leadership and citizenship in students and strengthen the workforce as well as the economy" (ACAATO, 2004, p. 1). Currently, Ontario colleges are subsidized by the federal and provincial government and are legislated under the Ontario College of Applied Arts and Technology [OCAAT] Act of 1965. The Ministry of Colleges and Universities (MCU) is the ministry of the government of Ontario responsible for the laws, policies, program direction and financial negotiated support to PSE institutions. Each college operates in a unionized environment with an established strategic mandate agreement (SMA) with the MCU. The SMA is a document that is negotiated each year between the college and the MCU to communicate priorities and identify areas of institutional focus. The SMA is guided by a set of performance metrics, which include research outcomes (Ontario, 2020). To better understand why

Ontario colleges are under increased pressure to incorporate applied research into their traditional programs, it is essential to understand their historical roots and political influences. Accordingly, this section begins by first tracing the ideology of managerialism practices. In addition, I explain the contextual factors, specifically policies and symbolic artifacts that have shaped the understanding of applied research in the college system before addressing the key tasks of teaching versus research.

Historical Ideology of Managerialism

With increased demands to extend colleges' strategic mandates, there has been a dramatic shift in college education in Ontario, affected by a desire for knowledge production. Under these circumstances, Ontario colleges have faced increased pressures to strengthen their research function, especially since the federal and provincial governments view research as a source of knowledge and innovation (Capano, 2011). To remain viable and sustainable, colleges have undeniably taken on the values and ideology of managerial practices promoting and closely tied with the new public management (NPM) approach, which promises utopian visions of research generating revenue (Pollanen, 2016). Austin and Jones (2016) proclaimed NPM as a style of governing and managing that takes a top-down management approach and utilizes hegemonic practices that promote "business-like management, client-centred and market-like competition" (p.171) and support managerialism. This ideology, to align with managerialism practices, has resulted in organizational change that may challenge the existing values within faculty members. These values are further evaluated through the political factors and symbolic key artifacts that have emerged both at a system and institutional level to shape and direct applied research practices.

Political Factors

Within the knowledge economy, the changing environment in college education has been mainly prompted by new aggressive policies that promote applied research as a strategic catalyst to further economic and social development (Holmes, 2017). In efforts to attain financial savings and economic stability, the provincial government introduced Bill 26, the Savings Restructuring Act of 1995, which reduced government public transfers to colleges (Bezanson & Valentine, 1998). Subsequently, a series of policy shifts occurred in 2000 and 2002, providing colleges autonomy to pursue new revenue streams in a competitive market (Jones, 2004).

First, the Postsecondary Education Choice and Excellence Act of 2000 authorized colleges to offer post-graduate certificate programs, 3-year advanced diploma programs, and, like universities, degree designations (Government of Ontario, 2000). In April 2007, the Council of Ministers of Education Canada (CMEC) endorsed the Ministerial Statement on Quality Assurance of Degree Education in Canada that included a degree qualifications framework. The framework included standards and procedures for reviewing proposals for new degree programs within colleges (Postsecondary Education Quality Assessment Board, 2019). Therefore, all colleges seeking ministerial consent to offer a degree program (like a university) are obliged to undergo a program quality review to determine whether the proposed program meets the board's standards and benchmarks. Second, changes to the OCAAT Act 2002 mandated that colleges increase their applied research activities (Holmes, 2017). Within these policy reform directives and with an emphasis on public service and economic objectives, the OCAAT Act changed governance arrangements, setting out principles and expectations for the colleges to become more entrepreneurial, market-driven, and research-oriented (Government of Ontario, 2002).

Subsequently, in 2013, the Ontario provincial government established the Ontario Differentiation Policy Framework as the primary policy driver to accelerate quality, competitiveness, accountability, and sustainability of the province's publicly funded PSE system (Skolnik, 2013). The college and university SMAs are key policy documents that include the government's accountability and transparency objectives, school's priorities, and alignment of the province's goals. The previous SMAs proceeded from 2014−2017 and 2017−

2020 and were highly tied into enrollment funding, with a small portion (1.2%) fixed to performance outcomes. However, the 2020–2025 SMA eliminated the traditional enrollment-based funding and introduced a new performance-based funding mechanism where 60% is tied to metrics that reflect institutional strengths and differential roles in the PSE system (Ontario, 2020). In view of this, individual college and university institutions are required to align their performance metrics with the government priorities. Despite these expectations, most colleges do not have a research tradition or research infrastructure equivalent to universities (Skolnik, 2013). Moreover, while the OCAAT Act allows colleges to pursue research activities to differentiate themselves, fund transfers from the government do not include revenue for research as they do for universities (Doern, 2008). Thus, an incongruence may exist between strategic mandates to increase applied research practices and the on-the-ground realities that faculty endure in their everyday work. Correspondingly, when used effectively, symbolic artifacts or symbols can set expectations and meaning for faculty work (Manning, 2018).

Symbolic Artifacts
Bolman and Deal (2017) contended that symbolic artifacts generate an understanding of values among people who share a culture. Comparatively, Schein (2017) views culture at three abstract levels: observable artifacts; values; and underlying assumptions. These assumptions determine employees' psychological reactions and behaviours at work. In this regard, culture acts as a control system that defines acceptable and unacceptable behaviours, attitudes, and values (Manning, 2018). Notwithstanding, one of the most difficult challenges facing a leader striving to engage faculty in applied research is comprehending the underlying values and congruency of shared forms of artifacts that ultimately influence and guide organized action. This process to gain a better understanding of underlying values is unlikely to be systematic but instead iterative as it requires understanding culture and cognition. Manning (2018) purported that culture and cognition cannot be separated since agents reside in complex environments where the cognitive capacities of different cultures and subcultures influence social learning among individuals.

Similarly, Schein (2017) claimed that supportive cultures provide artifacts that allow individuals to derive meaning from their work and contribute to teamwork. In Ontario colleges, examples of the symbolic artifacts that carry the most value and meaning for faculty work include the collective agreement (CA) and the standard workload formula (SWF). The CA is negotiated provincially between the College Employer Council for the College of Applied Arts and Technology (CAAT) and the OPSEU (OCAAT, n.d.). Conclusively, the CA is a legally binding contract that specifies the rights, duties, and obligations of faculty and the employer.

The SWF, on the other hand, is a formula unique to all 24 Ontario colleges and is governed by the CA. To support processes, the SWF serves as a standardized and objective way to assign, measure, and monitor the workload of a faculty member. That said, the SWF is negotiated each semester between the associate dean and the faculty. However, Fisher (2010) identified that the SWF lacks language related to applied research and is dependent on whether faculty receive internal or external grant funding. Relatedly, Rosenkrantz (2013) posited that there are not always clear processes in place for SWF release time to support faculty research activity, leading to inconsistency and fragmentation in communication and work outcomes across the college. Both artifacts are visual and inform faculty of their performance expectations.

According to Manning (2018), artifacts that are meant to include can inadvertently exclude, which has the potential to lead to confusion. A complex issue for colleges is that their most symbolic artifacts have not set expectations and unfortunately in this way have generated confusion for faculty to engage in applied research. Although the CA is negotiated provincially between the College Employer Council for the CAAT and OPSEU, the CA does not address the instructor's duties and responsibilities as they relate to applied research practices. Consequently, the absence of language in the CA and corresponding space in the SWF to conduct applied research has led to mixed messages. Moreover, for faculty, this creates additional challenges and misperceptions regarding the relationship between teaching and research tasks.

Tasks: Teaching Versus Research Context

A task is defined as a workable analytical unit of human activity that provides purpose, meaning, and value (Huvila, 2008). As with the environment, the relationship between teaching and research is complex and multi-faceted. Both terms are also extremely difficult to measure. Furthermore, teaching and research tasks are context specific and require different skills and personal attributes. The tasks also differ between universities and colleges, but the latter tasks are not easily understood. At the same time, very little research has been done to compare the roles of faculty at universities versus colleges and on the professional leadership preparation and development that exist to fulfill faculty's professional role (Doern, 2008; Nguyen, 2007). Consequently, an understanding of the relationship between teaching and research in current academic practice is necessary if one is to make sense of how PSE is conceived, delivered, and experienced by faculty (Gibbs, 2002). Broadly, teaching is the facilitation of learning to develop and enhance students' abilities (Brew, 2003). Research, on the other hand, includes applied activities that engage industry partners toward commercialization of new products and services and pure research that focuses on scientific theoretical work to increase knowledge and prediction of natural phenomena (Skolnik, 2013).

Studies of the relationship between teaching and research reveal that there are benefits to the students, professors, and to the PSE system as a whole to engage faculty in the scholarly teaching and research functions (Nguyen, 2007). In a study examining the interconnectivity between teaching and learning and research, Nguyen (2007) argued that teaching should not be seen as an activity separated from research but that teaching and research co-exist and interrelate to one another in the act of learning. Nguyen (2007) also proposed that since "teaching and learning are interwoven towards the needs of the students and the demands of the knowledge-based economy, systematic construction and investments should begin with institutional policy" (p. 3). Moreover, to enhance the potential relationship between teaching and research, Gibbs (2002) advocated that faculty members involved in both teaching and research require clear articulation and understanding of tasks and formal/informal structural arrangements. These authors point out that enhancing a college's capacity in research activities requires faculty learning new knowledge and skills, which studies suggest may be supported by social cognition theory (Hatemi & McDermett, 2012; Kezar, 2014).

Social Cognition Theory

Social cognition theory is closely connected to self-efficacy theory or organizational learning theory in that individuals learn by doing or acquire new knowledge and behaviors by collaborating with others (Bandura, 2001). To learn and change, however, "organizational members must be skilled in understanding the assumptions, frameworks, and norms guiding current activity and be able to challenge and change when necessary" (Morgan, 2006, p. 89). Crucial to this endeavour is nurturing and sustaining a professional culture of continuous improvement and learning (Bryk, 2015; Deming, 1986; Morgan, 2006).

Thus, social cognition theories are focused on changes occurring within the mindset of individuals through learning (Kezar, 2014). For faculty, however, engaging and implementing applied research practices require understanding underlying values, assumptions, structures, and processes for change to occur (Schein, 2017). This process is unlikely to be linear as "people need to understand the nature of the change while reconciling new ideas with their old mental models" (Kezar, 2014, p. 161), which becomes a shared mindset among team members. While there are many benefits associated with social cognition theory, there are also limitations and difficulties to operationalize the theory on its own without a framework. Another limitation is that the theory tends to be too broad and assumes that changes in the environment will automatically lead to changes in the person (Hatemi & McDermett, 2012). Similarly, the theory highly depends on the dynamic interplay between personal factors, behavior, and social environment, known as reciprocal determinism (Bandura, 2001). Therefore, it might be more accurate to accept that an individual's cognitive abilities and behaviours are influenced by collective learning in tandem with a framework for understanding change (Bandura, 2001; Senge, 1990). According to Morgan (2006), frameworks are rooted in individual thinking that allow us "to

find fresh ways of seeing, understanding and shaping the situation that we want to organize and manage" (p. 6). As faculty interact with their work environment, a contextual continuous improvement framework is explored for examining the relationships between hard (i.e., strategic mandate of applied research) and soft (i.e., faculty, shared values) variables.

Conceptual Continuous Improvement Framework Context

Continuous improvement (CI) or improvement science (IS) is a disciplined methodology approach in organizational performance that involves ongoing effort to improve processes and outcomes (Deming, 1986; Lewis, 2015). Characterized as discovery, framing, and action, CI in the educational context supports faculty, administrators, and researchers in collaborating to solve specific problems of practice (Bryk et al., 2015). Rooted in healthcare and management, CI as an applied science emphasizes innovation, testing change ideas, and social learning to produce improvements (Bryk, 2015). Therefore, a CI approach to change builds capacity by combining the power of investigation with subject area expertise across multiple disciplines. In addition, CI also uses knowledge of design principles that are iterative in nature along with systems thinking to organize information gathering and sharing to improve decision-making (Lewis, 2015).

A review of the literature provides many examples of the use of different CI approaches in PSE that are focused on institutions becoming more responsive, efficient, competitive, and profitable (Carlucci et al., 2019; Padró & Sankey, 2018; Sunder, 2016). For instance, the high-level steps of define, measure, analyze, improve, control (DMAIC) in the application of Six Sigma tactic steps have been used to improve quality assurance and quality management in PSE institutions (Sunder & Mahalingam, 2018; Temponi, 2005). In contrast, the LEAN Six Sigma (LSS) method combines LEAN and Six Sigma as a customer-centric quality improvement methodology that focuses on workflow improvement, becoming more responsive to students' experiential learning (Haerizadeh & Sunder, 2018). While Six Sigma focuses on eliminating variations in the delivery of customer expectations, LSS involves analyzing workflow and removing waste to improve organizational performance to support increased customer satisfaction (George, 2002). Together Six Sigma and LSS have the same goal of eliminating waste and creating the most efficient outcome, but they are different in approaches in that they identify the root cause of waste contrarily. Doerfel and Bruben (2002) asserted that Six Sigma and LSS methodology frameworks are beneficial to use in PSE institutions for the purpose of improving communication, benchmarking, emphasizing organizational strength, and determining areas of improvement. However, the authors also argued that Six Sigma and LSS strongly rely on faculty and administrators working as a team on focused departmental changes.

In light of this brief explanation of diverse CI methodologies used in PSE institutions, it is important to highlight that faculty within Ontario colleges rarely work in teams with administrative leaders and have little involvement in academic governance decision making (Skolnik, 2013). Therefore, it is important that administrative leaders implement and maintain methodology frameworks that can increase participation and engagement from faculty members where they also feel involved in the decision-making process. Currently, the Carnegie Foundation for Advancement of Teaching is challenging educational leaders to develop and refine methods for improving quality and productivity using CI in diverse educational settings, including PSE institutions (Bryk et al., 2015).

Given that this article adopts social cognition theory to inform a small incremental approach to change, the strategic model combines the Carnegie Foundation's Six Core Principles of Improvement (Bryk, 2015) systematic methods and Nadler and Tushman's (1980) problem-solving analysis steps into one conceptual framework as an analytical tool. I contend that the Carnegie Foundation's Six Core Principles of Improvement Framework be used given the key aspects of this collaborative model, which includes planning, assessment, analysis, strategy, testing, and reengineering through a learning process. Alternatively, Nadler and Tushman's (1980) open system congruence model, using problem-solving analysis steps, is aligned with systems thinking

and based on evaluating a comprehensive picture of an organization and the congruence between elements. Nadler and Tushman (1980) argued the management of organizational behaviour is central to understanding tasks and "patterns of individuals, groups and organization to predict and make sense of the terrain of organizational behaviour" (p. 36).

Research Question

The key question addressed in this article is how faculty engagement in applied research practices in a large comprehensive Ontario college in Canada can be improved. However, this requires understanding and analyzing the barriers and challenges of engaging faculty to enact applied research practices. Despite the diffuse structure of power and authority among actors within the institutional culture, Nguyen (2007) claimed faculty are key leaders in significantly improving and understanding task-related and team-shared beliefs in research activities. Arguably, influencing applied research practices among faculty within a college institution is complex, relationship-dependent, and multi-dimensional. Moreover, applied research practice as it is conceived in its current state is uncoordinated (Holmes, 2017). What is known and offered as applied research practices mostly focuses on prescriptive written policies transcribed in strategic and academic plans (Fisher, 2010).

Undeniably, a debate continues to dominate the engagement discourse, leading to a state of confusion given the right understanding needed to support faculty undertaking of applied research. Furthermore, applied research practices have also become critical for survival given the unprecedented challenge colleges face in differentiating themselves from other PSE institutions (Skolnik, 2013). This is coupled with the recent demands from the government to strategically align with community impact and economic priorities in generating human capital and skills for Ontario's workforce (Colleges Ontario, 2019). Within PSE institutions, however, "we go fast and learn slow—we consistently fail to appreciate what it takes to make some promising idea work reliably in practice" within context (Bryk, 2015, p.6).

Methods

The aim of this article is to explore how a conceptual CI framework might advance our understanding of the barriers and challenges of engaging faculty to enact applied research practices. This aim was achieved through interrelated parts. First, a qualitative search of the education and social science literature databases was conducted using Scopus, ERIC, JSTOR, PsychInfo, SocIndex, and the Canadian Public Policy Collection. The search yielded 114 articles for inclusion that are thematically aligned with applied research in the college PSE context. The key words and reasoning used from the qualitative literature synthesis included research, teaching, colleges, policy, social cognition theory, and CI that took into consideration an incremental and thoughtful approach to change.

Second, the design of this study was exploratory, where potential causal relationships between variables are explained (Creswell & Creswell, 2018). The analysis was framed with social cognition theory and a social constructivist interpretive perspective on how conceptualization of applied research has evolved over time. Social cognition theory relies on an approach designed explicitly to accelerate "learning by doing," which is iterative in nature (Bryk, 2015). Conversely, Patton (2002) noted that social constructivists perceive their world from their own understanding of reality where knowledge is formed through interaction with others. As individuals interact within the context of their political environment and are influenced by specific tasks and roles, social cognition theory and a conceptual CI framework are utilized to help facilitate a deeper understanding of the complicated barriers that faculty face to enact applied research practices within current organizational processes. Creswell and Creswell (2018) posited that a theoretical framework is essential to a study, as it sets out how the researcher will test and scaffold the theory through a structure. In this case, the CI

methodology framework is used to analyze the variables of political factors and key cultural symbolic artifacts between applied research discourses within Ontario colleges in Canada and the realities experienced by faculty.

The framework used for this study is underpinned by three simple principles: Improving through communication; learning through collaboration; and changing through coordination. That said, the Carnegie Foundation's Six Core Principles of Improvement (Bryk, 2015) and Nadler and Tushman's (1980) problem-solving analysis steps are combined into an important conceptual framework to examine the barriers and gaps that impact college faculty engagement in applied research practices. This conceptual CI framework analysis tool shifts from many of the common and traditional ways of looking at change to understanding variations.

Specifically, the six-step conceptual CI framework is a methodology that helps define the symptoms, drivers, and forces at an organizational level that faculty members would buy into, believe, and understand. This article, therefore, offers a practical and innovative conceptual CI framework, analysis, and perspective to examine the problems of understanding the developmental needs and what prevents faculty engagement in applied research practices. The article concludes by outlining implications and highlighting key considerations to inform approaches to change in process, structure, and attitude at other PSE institutions.

Results

As colleges continue to grow to serve diverse populations and meet labour market needs while facing increased institutional responsibilities towards improved performance (Pollanen, 2016), the conceptual CI framework six-step analysis tool lends valuable insight and analytical reasoning into understanding organizational change. To successfully effect strategies to influence applied research practices among faculty and cultivate a CI approach, a learning and changing culture depends on the congruency between core elements and a deeper analysis of the multiple steps used to examine organizational behaviour. Relatedly, the model emphasizes the complex interactions among variables but does not imply cause and effect relationships between them or suggest a linear path for action. Instead, the conceptual CI framework analysis tool provides an unambiguous pathway to attend more directly to symptoms and drivers at multiple levels. This approach helps the reader better learn the problems of understanding and what prevents faculty from engaging in applied research practices. I discuss each of the six components of this framework individually below.

Step 1: Identify Symptoms/Awareness—Problem-Specific Awareness
Nadler and Tushman (1980) identified that symptomatic data may provide clues to more conclusive information on existing problems. This begins with the first question of engagement among faculty who are closest to the work: *What specifically is the problem we are trying to solve?* In pursuit of answering this question, Bryk et al. (2015) claimed that individuals suffer from *solutionitis*, "which is the propensity to jump quickly on a solution before fully understanding the exact problem to be solved" (p. 24). This results in a narrow view of the situation and an incomplete analysis of the problem, which may result in resistance to change. It is important to address "five key beliefs underlying recipients' motivations to change" (Armenakas & Harris, 2009, p. 127) before understanding what needs to change to engage faculty to enact applied research practices.

These beliefs of organizational and individual receptivity to change are examined from a social constructivist perspective of a faculty member grounded in a CI approach. These five key beliefs consist of discrepancy, appropriateness, efficacy, principal support, and valance. Discrepancy is the belief that change is necessary. Appropriateness is the belief that the change is aligned and accurate. Efficacy is the belief that the change is implementable. Principal support is the belief that the administration is committed to success, and valance is the belief that the recipient benefits from the change.

Unlike funded research universities, Ontario colleges were developed without a research mandate under one legislation imparting executive authority to the provincial government (Jones, 2004). Consequently, apart from competing for external research grants, currently there is no consistent internal allocation of resources or processes for research activity. Similarly, the competitive political transformation reinforcing research in Ontario colleges has not been correlated with improved advancement in operational funding or clear processes for faculty (Doern, 2008). Consequently, discrepancy exists given the ambiguity of how applied research practices will fit within the current faculty workload formula. Despite the institution's overall attitudes towards increasing applied research, there is no clear language within the CA nor within the SWF. These entrenched artifacts shape the tasks of faculty whose focus is on delivering teaching excellence but are absent for applied research. Therefore, the CA and SWF have not appropriately kept up with the external environment or the desire or aspirations of faculty. While the institution publicly values applied research, the efficacy of this expanded role being assumed remains ambiguous for faculty. Equally important, there are no apparent monetary supports for faculty to engage in applied research, which makes it difficult to factor measures into workload. Moreover, cultivating a climate to support applied research while leveraging technical expertise to develop successful research proposals requires realistic strategies underscored with a feasible allocation of resources (Doern, 2008).

I contend that what faculty desire, in short, is ideological and material support from administrators within their departments to value applied research. What this means from an organizational perspective is that more principal support is needed from administration to commit to this change by providing faculty adequate release time on their SWF to conduct applied research (Fisher, 2010; Rosenkrantz, 2013). At the same time, faculty and administrators must have valance that this change results in benefits and aligns with the broader institutional mission and stance.

Step 2: Specify Inputs—Understanding the System and Attending to Variability
Four inputs determine how an organization is impacted by change, including environment, resources, history, and strategy (Nadler & Tushman, 1980). Influenced by the knowledge-based economy, the college environment is distinguished by climate change, wide-ranging industry disruption, and demographic shifts (Colleges Ontario, 2019). The college environment has also been challenged with policy instrument changes, such as deregulation of fees, competitive funding, and outcome-based performance benchmarking (Doern, 2008). Moreover, as colleges move towards differentiation, they face significant pressures to build a culture of teaching and research scholarship within the community (Skolnik, 2013). There is also increased emphasis on training students with enriched research experiences to support workplace skills such as creativity, complex problem solving, critical thinking, interdisciplinary teamwork, and leadership (Colleges Ontario, 2019). The instability and unpredictability of funds through provincial and government grants have created limited capacity for colleges to engage and invest resource allocated funds in applied research (Doern, 2008).

Additionally, research data within the college context is difficult to measure given that neither the meaning of applied research nor the variability of how research is performed is well understood among faculty members. Nonetheless, attending to variability, evaluating parts of the system, confirming clear language, and learning through disciplinary inquiry for improved social learning are all essential to espousing values that allow for the enactment of applied research (Bryk, 2015). This approach draws attention to a shared mindset that is supported by a clear understanding of applied research, flexible vision, collaborative leadership, and cross-departmental teams working in networks assessing performance measures and examining variables that are specific to college applied research.

Step 3: Identify Outputs, Problems, and Components— Set Aim Within the System and Evaluate

Nadler and Tushman (1980) postulate that outputs relate to services that meet mission-related goals at the "individual, group, and organizational level" (p. 49). These include performance outcomes and indicators to measure the organization's achievements. However, it is difficult to measure the outputs of applied research without first evaluating the relationship and interdependent components of the organization (Senge, 1990). There are four organizational components of organizational functioning: tasks; individuals; formal organizational structures; and informal organizational structures (Nadler & Tushman, 1980). A further evaluation of these four structures and the interactions of their interrelated elements that involve understanding organizational dynamics, complexity, and organizational behaviour are examined below.

Task

The first element is the task (otherwise known as work) to be completed by the organization and its subunits in alignment of the organizational strategy (Nadler & Tushman, 1980). However, colleges operate in a fiscally constrained and regulatory environment. In addition, the programs of instruction are the colleges' core business, where the specific task/work functions are outlined in the Ministry's Binding Policy Directives, which are established and governed by the OCAAT Act, 2002. Accompanying these directives are the funding and terms for the colleges to meet provincial economic and community societal priorities (Ministry of Training, Colleges and Universities, n.d.). Program standards apply to each of a colleges' programs of instruction and include "vocational learning outcomes (VLOs), essential employability skills (EESs), and general education as outlined in the Credentials Framework set out by the Ministry" (MTCU, n.d., p. 1). A key task, therefore, for faculty serving as ambassadors within their discipline is ensuring students reliably demonstrate the acquisition of the VLOs and EEEs before they graduate. The summary of work responsibilities by the ministry and colleges is clear. What is lacking for faculty is the language, infrastructure, and processes within this accountability to continuously meet all criteria as well as undertake applied research in course and curriculum development teaching work. Arguably, the task requires a shift in faculty's mindset from teaching VLOs and EESs to including applied research within their workload. This change will affect how faculty currently perform in the classroom, requiring new technical skills and knowledge within their role. Arguably, this will require training and education and creating networks within each school and each program to review faculty's SWF's.

Individuals

Considering the complexity of this shift to include applied research as well as the diversity of mindsets and values among individuals, there are several important interest groups to examine. The second element, therefore, involves examining *individuals* who perform *organizational tasks* and their key knowledge, skills, and characteristics that may influence their behaviour (Nadler & Tushman, 1980).

Faculty. Fisher (2010) postulated that college faculty are first and notably teachers and are remunerated for their labour. At the same time, other studies have argued that research has been shown to support faculty teaching instructional methods that are aligned with the knowledge and learning skills students require to adapt and implement in the 21st century (Fisher, 2008). However, teaching duties, inadequate funding to address release time for applied research, and appropriate infrastructure with clear language are identified as the primary barriers to faculty engagement and enactment of applied research in colleges (Colleges Ontario, 2019). Relatedly, Rosenkrantz (2013) contended that, unlike universities in which there may be tenured faculty with time divided among teaching (40%), research (40%), and community service (20%), full-time faculty in colleges may have higher teaching loads and currently receive no remuneration specifically related to conducting research. Instead, college faculty often use their own free time to conduct research (Fisher, 2010). Without clarity of workload tasks, allocated time, and work processes, faculty resistance to applied research will persist (Colleges Ontario, 2019; Fawzi & Al-Hattami, 2017).

Union. Arguably, unlike universities that may empower a single body called the senate to represent academic matters and faculty interests, colleges do not have a formally recognized group to represent faculty interests (Skolnik, 2013). However, the OPSEU has a vested interest in protecting faculty as it relates to an allotment of time for various academic functions, which are part of faculty's workload calculations (Doern, 2008). Despite the CA dictating faculty tasks whereby formal working conditions are structured through individual SWFs, the union has remained silent when it comes to accommodating research undertaken by faculty (Fisher, 2008).

Students. Although this article focuses on college faculty, "it is worth noting that there is the expectation that college students will also participate in applied research led by a professor" (Fisher, 2010, p. 2). College students, however, also face similar constraints learning new technical skills to fit research into their course work (Colleges Ontario, 2019). As colleges evolve in aligning with a global PSE leader in enhancing Canada's productivity to deliver in-demand skills including applied research, faculty will require training solutions that equip them and students with the knowledge, skills, and research expertise needed to succeed in their daily work while supporting students.

Associate Dean. The departmental associate dean has an important role in protecting the interests of the college. Since the associate dean controls faculty appointments, space, and discretionary research within a specific department, their cooperation is crucial to the efforts to enhance the overall research environment. The nature of the relationship between faculty and an associate dean is also critical, given that reporting lines depend on a harmonic relationship. Ideally, the associate dean would have an immense interest in collaborating with faculty to negotiate research on faculty's SWF. Pragmatically, this relationship must be based on trust. Dirks and Ferrin (2002) asserted that trust is built when we make ourselves vulnerable to others whose subsequent behaviour we cannot control. Additionally, Dirks and Ferrin (2002) recognize that "without trust in leadership" (p. 395) and proper consultation, rallying faculty support and cooperation can be very difficult, thus jeopardizing the chances for improved outcomes.

Formal Organizational Arrangements

The third element is formal organizational arrangements, which represent the structure, processes, and methods that support individuals to perform their tasks (Nadler & Tushman, 1980). Currently, the CA and its corresponding SWF are contractual arrangements that represent the formal organizational structures represented by the faculty's programmatic work. Currently, administrators utilize the CA to address workload duties for faculty. Within Article 11 of the CA, faculty total workload assignment is not to exceed 44 hours in any week. The specific tasks and workload factors that make up the 44-hour workload for a faculty include teaching scheduled working hours; attributed hours for preparation, evaluation, feedback; and complementary functions detailed on the faculty's SWF (OCAAT, n.d.). The formula for working hours also takes into consideration whether the faculty member is teaching the course for the first time or not. The SWF, however, does not rely on a precise measure of the workload at a discipline level but rather focuses on capturing relative averages across disciplines. The SWF also does not consider variable conditions occurring each semester. For instance, not all research that is undertaken by faculty is identified on the SWF workload. Applied research occurs on an ad hoc basis and remains uncoordinated across most colleges with no guidelines outlining cost recovery in research (Rosenkrantz, 2013).

Informal Organizational Arrangements

The fourth element is informal organization arrangements that are usually implied and that emerge as part of the organization's performance. Nadler and Tushman (1980) postulated that within an organization there are informal arrangements of emerging structures and processes that influence individual behaviours, work, and communications. Given the link between knowledge and economic activity, applied research is a central theme across colleges' strategic mandates and is deemed by executor leaders to be an essential component of programs.

To better understand the informal organizational arrangements, Nadler and Tushman (1980) suggested assessing whether individuals' needs are met and whether the use of individual resources is consistent with informal goals and structures that facilitate task performance. Within these informal organizational arrangements, the effect of values supporting applied research practices is mediated by norms (Schein, 2017). However, integrated within the organization's structure, there is a distinction between values and norms (Manning, 2018). Values represent social principles and an adaptable foundation that pinpoint guidelines for everyday behaviour (Manning, 2018). Conversely, norms characterize specific practices, organizational routines, and behaviours expected from individuals. Within the social context of college culture, values communicated with clear artifacts have a causal effect on behaviour (Schein, 2017). Artifacts, therefore, represent visible and observable social beliefs and habits by which behaviours become routine.

As stated earlier, the CA and the SWF represent the most powerful artifacts for communicating and endorsing values that reinforce the importance of expected behaviour for faculty. Therefore, a realistic conjecture of applied research enactment is likely to develop if the CA and the SWF, representing key artifacts used to communicate the organization's underlying norms and values, had clear and consistent language that aligned with the college's strategic mandate. Overall, evaluation of these four interrelated system structures and current outcomes against measurement, however, requires orienting and engaging faculty, given that applied research is a planning process that requires a collective will through a unified vision (Senge, 1990).

Step 4: Assess Congruence-Evaluate Measurement
Underpinned by a continuous effort to improve, learn, and change, the goal of engaging faculty to enact applied research requires a systems perspective and interrelated elements (Nadler & Tushman, 1980). Assessing congruency also includes assimilating measures of key outcomes and processes to track if the change results in an improvement (Lewis, 2015). At the same time, the rate of improvement of faculty enacting applied research practices relies at least in part on faculty who are implementing the change in practice (Kezar, 2014). Currently, there is a lack of congruence between on-the-ground realities of what is occurring to what is needed for an intended outcome for faculty to engage in applied research practices.

Step 5: Generate Ideas and Identify Causes-Anchor Practice Through Learning
It is imperative to understand the probable causes, gaps, and barriers to determine which practice is causing the incongruent conditions (Nadler & Tushman, 1980). Learning patterns of incongruence provides opportunities for faculty to explore strategies to enact applied research practices. Realistically generating ideas and strategies to learn through improvement requires developing a culture where learning and collaboration are supported. The structure of teams will be critical for encouraging collaboration given a significant component of the improvement depends on faculty openness to change.

Step 6: Identify Action Steps-Accelerate Improvement Through Collaboration
While my goal my goal is to break down silos using a social constructivist CI approach that anchors collective problem-solving, this goal is not without challenges. Nonetheless, it is important to recognize that most of the organized activities be undertaken by precarious steps playing a critical improvement-related function in the collaborative work of the team. The organizational analysis as presented serves to unveil the on-the-ground gaps, symptoms, and drivers that affect faculty engagement in applied research practices. The conceptual CI strategic analysis model approach illustrated in Table 1 was inspired from my social constructivist perspective as a faculty conducting applied research within the community. However, I contend the conceptual CI framework analysis tool lends valuable insights into understanding any problem and provides insight and improvisation to other PSE institutions effected by continuous change.

Table 1. *A Conceptual Continuous Improvement Framework*

		Carnegie's Change Framework Six Core Principles of Improvement		Nadler & Tushman's Problem Analysis Steps
Communication (Improving)	1	Awareness: Make the work problem-specific/user-centered	1	Identify symptoms/Awareness: Identifies what needs to change and why
	2	Understanding the system and attending to variability	2	Specify inputs (Key aspects): Environment/Resources/History/Strategy
Collaboration (Learning)	3	Evaluate the system and current outcomes	3	Identify Outputs Individual/Group/Organization
			4	Identify problems (desired and actual outputs)
			5	Identify Components of the Organization • Task/Work • Individual (faculty) • Formal organizational arrangement • Informal organizational analysis
	4	Embrace/evaluate measurement	6	Assess congruence (fit)
Coordination (Changing)	5	Anchor practice through learning	7	Generate ideas and identify causes
	6	Accelerate change through collaboration	8	Identify action steps

Note. This table combines two critical organizational analysis frameworks as a strategic contextual analysis tool to understand the problem of engaging faculty in applied research practices. Utilizing the key principles of communication, collaboration, and coordination, the six-step strategic contextual analysis tool highlights the interactions occurring within the system where the tensions and behaviours may emerge. Adapted with permission from Six Core Principles of Improvement Framework by A. S. Bryk, "Accelerating how we learn to improve." *Educational Researcher, 44*(9), p. 468. Copyright 2015 by Educational Researcher. Also adopted from "A Model for Diagnosing Behaviour," by D. A. Nadler and M. L. Tushman, 1980, *Organizational Dynamics, 9*(2), p. 48. Copyright 1980 by Elsevier.

Discussion

The conceptual CI framework that informed the analysis of this article combines the Carnegie Foundation's Six Core Principles of Improvement (Bryk, 2015) and Nadler and Tushman's (1980) organizational analysis steps. This pragmatic conceptual CI framework is not meant to solve the problem of engaging faculty in applied research practices, nor does the framework advocate a one-size-fits-all approach. Instead, the innovative six-step conceptual CI framework provides a strategic contextual analysis tool to highlight the interactions occurring within the system where tensions and behaviours may emerge. The practical CI

approach is designed explicitly to accelerate learning that is iterative in nature and relies on evaluation, reflection, and adaptation. Particular emphasis is placed on knowledge building and illuminating approaches for learning by understanding differences in practice with an importance on process improvement rather than a focus on outcomes (Bryk, 2015). Therefore, this conceptual CI framework provides a pragmatic opportunity for faculty, institutional leaders, unions, and policy makers, whether they have traditional authority or influence (or not) to make small incremental change that can prompt big effects (Morgan, 2006). As Patton (2002) noted, how things get done is at least as important as what might be achieved.

In this context, what is different in the conceptual CI framework from the Six Sigma and the LSS CI methodologies is the intention for thinking and learning about colleges as systems defined by their interrelated organizational processes. The framework achieves, through its systematic analysis steps, a deeper understanding of gaps and barriers between applied research discourses and on-the-ground realities faculty face to enact applied research practices. As with any methodology, the success of using the conceptual CI framework depends on the organization's consistency to embrace a systems approach (Bryk, 2015; Senge, 1990). Overall, the conceptual CI framework offers possible insights into some of the ontological bases for individual differences and organizational contexts and tasks processes.

Despite the leitmotif of CI in postmodern education, the self-realization of this continuous improvement journey of understanding the on-the-ground realities of teaching and research is dependent on understanding political, cultural, and social-cognition specific contexts and tasks. From a political perspective, change includes social legitimacy and survival (Jones, 2004). From a cultural perspective, change includes shifting identities, artifacts, values, and traditions (Schein, 2017). From a socio-cognition perspective, change includes domain-specific learning and understanding of tasks (Bryk, 2015). The ideology of managerialism practices, the role of colleges, and faculty relationship between the teaching-research scholarly functions, while achieving political and performance expectations is proving to be a delicate balancing act in the college context. The main findings suggest changes in process, structure, and attitude, which are further discussed below.

Process: Improving Through Communication and Engagement

One of the critical future considerations of this article is addressing the relationship between teaching and research, specifically, how to improve faculty engagement in applied research practices. This relationship is multi-faceted given the limited articulation and understanding of roles, structures, and appropriate resources. Hence, one critical next step is to create sustainable organizational learning that goes beyond the traditional teaching system and to structure institutional language for applied research within the CA and SWF, which is beyond the scope of this article. The situation of faculty enacting applied research is complex, and the context is changing rapidly where work duties are not fully defined within the SWF. This situation perpetuates unclear communication as it relates to workload, time, and administrative tasks (Colleges Ontario, 2019). Equally important is understanding the system and attending to variability between the tasks of teaching and research. These tasks cannot easily connect given their dependency on institutional policies, resources, and structures.

Structure: Learning Through Collaboration

While Ontario colleges in Canada have adopted the political rhetoric of applied research, many of the institutional efforts to convert such rhetoric into reality for faculty continue to fall short of expectations. Undoubtedly, changes in managerialism practices and policy changes in the early 2000s sparked uncoordinated and unsystematic dramatic growth in the colleges' research culture (Fisher, 2010). To a large degree, in the haste to get on with tasks, colleges were compelled to act without considering the challenges and limitations to their own contexts, teaching, and understanding of applied research structures (Fisher, 2010; Rosenkrantz, 2013).

As we have learned from the recent COVID-19 pandemic, adaptive challenges and the tensions between individuals and organizational competing priorities are problems that require continuous learning and agility. Sanders (2014) argued that as organizations increasingly face dynamic and complex situations, there is an increasing need for individuals not in positions of authority to be involved in decision making and acting on opportunities that rely on innovative processes. Kezar (2014) asserted that navigating the dynamic and complex terrain of the 21st-century work environment requires new approaches to structures, policies, and procedures. Equally important are frameworks that support an agile workforce and CI within different levels of the organization (Temponi, 2005).

Nonetheless, the problem of engaging faculty in applied research practices within the Ontario college structure has proved to be difficult but not impossible to overcome. As a scholar-practitioner without positional authority, I argue that it is critical to understand the developmental needs experienced by faculty who want to conduct applied research practices (Santoro, 2021). Learning how to understand developmental needs, however, requires communication, collaboration, and coordination that depend on organizational development at both the system and individual level. Thus, the conceptual CI framework offers organizations a strategic analysis tool to identify barriers, adaptive challenges, and the tensions between individuals and organizational competing priorities.

Reinforcing these perspectives, Morgan (2006) contended that while successful strategies should foster conditions for small incremental change, they must at the same time tackle the cultural underpinnings of values, beliefs, and assumptions (Schein, 2017). As a result, this kind of small incremental change should also focus on learning the simultaneous interactions and engagement between faculty and administrators in addressing the "problems of understanding" that are often influenced by attitude (Morgan, 2006).

Attitude: Changing Through coordination

At the same time, change efforts fail because cognitive structures constrain attitudes, understanding, and support of the change initiative (Kezar, 2014). The past two decades marked significant changes to the Ontario college system philosophy and structure. The provincial government made changes to permit colleges to self-govern applied research activities. This began with the changes to the Ontario Colleges of Applied Art Technology Act 2002 and the creation of the Post-Secondary Education Choice and Excellence Act 2000 that laid the foundation for institutional change towards applied research. More recently, SMA 2020-2024 with the MCU assumes trajectories of differentiation across colleges. However, as highlighted in the components of work tasks, faculty obligations, and informal/formal arrangements, faculty are faced with challenges related to workload and adequate time to conduct research while attending to additional administrative responsibilities.

In addition, faculty make sense of their work within the norms, values, and practices of the organization (Kezar, 2014). Thus, improving faculty engagement in applied research practices requires understanding the commonly held beliefs, values, and goals of the institution as a whole and the individuals within the college. Consequently, if there is no change to address applied research practices in the CA or the SWF, the organizational norms and the contractual agreement between faculty and the college will result in incongruency. Arguably, a future consideration is also investigating faculty's attitudes and examining underlying conditions or mental models that limit faculty to enact applied research. This may require incentives for faculty to change as well as investment into faculty receiving time for professional learning, mentoring, and skills training while addressing workload and the complex challenge of modernizing classroom pedagogy. Lastly, as highlighted earlier in the article, developmental needs for faculty rely on the validation of five key beliefs of discrepancy, appropriateness, efficacy, principal support, and valence at both the individual and institutional level (Armenakas & Harris, 2009).

Implications for Theory and Practice

Overall, CI is not research; rather, it is a strategy that organizations can use to discern what works for addressing a specific problem within a particular culture using systematic and problem-solving analysis methods. This new inventive conceptual CI framework provides a viable means to analyze the fragmented state of applied research practices across colleges. The findings reveal that understanding the on-the-ground realities of faculty engaged in applied research is dependent on political, cultural, and social-cognition specific contexts and tasks. The conceptual CI framework and findings may inform decision-making and approaches to change at other global PSE institutions. The innovative and strategic conceptual CI framework analysis tool will be of interest to faculty, institutional leaders, unions, and policymakers.

Conclusion

Inspired by improving faculty engagement in applied research practices, the conceptual CI framework is meant to spark conversation and provide PSE institutions valuable insight into the problems of understanding the developmental needs and institutional factors that prevent faculty within an Ontario college from engaging in applied research practices. From my social constructivist perspective and without positional authority as a scholar-practitioner, I purport that the changing dynamics and political climate necessitate that academic faculty leaders working at the front-line keep abreast of innovative applied research skills as part of their tasks. However, this takes an understanding of current workload pressures, time, and clearer work processes. Moreover, I contend that faculty require greater articulation and understanding of tasks and formal/informal structural arrangements through key symbolic artifacts. This will bring stronger linkages between teaching and applied research, consistent with CI in collective accountability and learning.

An important challenge, however, is how to develop a culture conducive to the adoption of CI mindset where key principles of improving through communication, learning through collaboration, and changing through coordination are critical. This would require faculty and administrators working together in an iterative process, sharing openness of collective and new knowledge with small incremental changes to respond to workload pressures, time, and administrative work demands. These adaptive practices aim to turn challenges into opportunities to improve overall CI teaching and learning practices.

Creating and cultivating an applied research culture within a large Ontario college institution, however, requires congruence in mindsets and the development of a shared compelling vision. This strategy invests in connecting agents within design spaces where the vision is translated into action for change. Adapting to change, however, takes trust and transparency with the understanding of task-related and team-shared goals among faculty. Over time, this process of development becomes part of one's professional identity and social cognition, where the journey of CI leadership never ends. This article connects individuals with a viable CI strategy analysis tool that may inform approaches to change in process, structure, and attitude at other global PSE institutions.

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