Ontario's Postsecondary Cooperative Education in a National and a Global Context: a mixed-methods exploration into its strength and issues

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Abstract: Postsecondary cooperative (PSE co-op) education is a structured method of combining classroom-based education with practical work experience, for which Ontario is termed a "hot bed." Adopting a mixed-methods design, this study explores the status and characteristics of Ontario's PSE co-op in the national and the global contexts through the knowledge map analyses. Then, with three case studies at University of Waterloo, Brock University, and University of Victoria, it examines particular aspects of Ontario's PSE co-op concerning some significant questions such as what exactly distinguishes PSE co-op in Ontario, what can be done—especially with new "work-integrated learning" ideas and approaches--to continuously improve this type of experiential education, and how co-op education can be steered to better meet the changing needs in the 21st century.

Keywords: Ontario PSE Co-op; Status and Characteristics and Position; National and Global Contexts; Mixed-Methods Analysis

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Introduction

Postsecondary cooperative (or co-op) education is a structured method of combining classroom-based education with practical work experience for the students in universities and colleges. A co-op education experience provides academic credit for structured job experience (Groenewald, 2004), and it is believed to provide benefits for students (including motivation, career clarity, enhanced employability, vocational maturity) and employers (labour force flexibility, recruitment/retention of trained workers, and input into curricula) as well as educational institutions and society (Braunstein & Stull, 2001; Bramwell & Wolfe, 2008; Bayard and Greenlee, 2009; Morris, 2010; Reid, 2010; Sattler et al, 2011; Peters et al, 2014). Research shows students with co-op experience outperform non-co-op peers: they are more active in learning, more realistic in terms of expectations, clearer about their own abilities, more confident, as well as more competent in terms of "soft skills" that feature cooperative effect (Van Gyn, 1997; Blair & Millea, 2004; Noyes & Gordon, 2011). In the 21st century, co-op education takes on new importance in helping young people to make the school-to-work transition, and build experiential learning initiatives (Grosjean, 2003; Haddara & Skanes, 2008).

Canada is commonly regarded as the leader of offering co-op education in postsecondary stage (Axelrod et al, 2003; Tamburri, 2014). The first Canadian PSE co-op program was launched in 1957 at the University of Waterloo in Ontario (Barber, 1968; McCallum & Wilson, 1998; Haddara & Skanes, 2007). Ever since, Ontario is termed a "hot bed" of co-op education (Reid, 2010), with 24% of Ontarians with postsecondary education reporting participation in co-op (compared to 17% nationally) and 37 colleges and universities (out of a total of 47) in Ontario offering co-op programs. Naturally, this phenomenal co-op presence in Ontarian universities and colleges should be reflected in research literature. As such, this paper explores the status and characteristics of Ontario's PSE co-op in the national and the global contexts through the lens of research literature, via a bibliometric analysis or more precisely a knowledge map[†]

[†]Knowledge map is here an approach to applying knowledge graph and virtualizing bibliometric analysis. In this study, we use keywords in PSE co-op education literature to imbed nodes (demonstrating research topics), and co-existence of nodes to determine coverage area in constructing a knowledge map, which in turn depicts the

analysis. Arguably, a bibliometric analysis based on a knowledge map has never been applied to studies of PSE co-op in Ontario as well as Canada. Then, this paper examines particular aspects and questions concerning Ontario's PSE co-op, resulting from the knowledge map analysis, such as what in real world distinguishes PSE co-op in Ontario, what can be done to continuously improve this particular type of experiential education, and how co-op education can better meet the needs of an increasingly knowledge-based economy in the 21st century and in the meantime forge the principle of equality and equity. The second strand of this study is conducted through three case studies respectively in University of Waterloo, Brock University, and University of Victoria.

Context of This Study and Literature Review

Now co-op education is described as part of a work-integrated learning (WIL) spectrum (Sattler et al., 2011). WIL describes a range of educational activities that unites what is learnt in an academic setting with what is experienced in a practical working environment. Co-op is not to be confused with other WIL forms such as practicums, work-study positions, placements, internships, apprenticeships, or job shadowing (McRae & Johnston, 2016; Reinhard et al., 2016). These branching ideas differ for reasons such as their purpose, context, nature of integration, and curriculum issues (Sattler et al., 2011). With that regard, co-op is defined as a progressive and formal integration of a student's academic studies and work experience in a structured and educational manner. As such, co-op education is equipped not only to prepare students for workplace but also nurture good citizens (Hall et al., 2011). It bears the potential of being compatible with liberal arts education (Ricks, 1990), and supporting growth of critical thinking (Bygrave & Gerbic, 1996), as well as benefitting disadvantaged social groups, e.g., visible minorities and females (Metghalchi et al., 2013; Samuelson & Litzler, 2013; Raelin et al., 2014; Taylor et al., 2015).

knowledge network and characteristics of the field of PSE co-op education studies in a specific jurisdiction or beyond.

Areas for improvement in PSE co-op education has become a research focus (Schaafsma, 1996; Haddara & Skanes, 2008). McRae and Johnston (2016) suggest that the future of co-op programs needs to be oriented towards reflection of learning and work experiences. Such reflection can validate purposes outlined in curriculum through the generation of authentic feedback from the learner. Through a series of constant reflection, students should be able to make connections between their experiences and learning objectives. Although opportunities to reflect are now incorporated in co-op curriculum, students often neglect making these connections and enhancing their experiences (Garavan & Murphy, 2001; Jones, 2007). This is largely because they don't know what objectives were initially set, thus have no idea how to make sense of these connections. Without fully understanding the significance or meaning behind the theoretical component of practice, students may lose interest and motivation in their co-op experiences—which might be unintended effects of co-op education. By the same token, a formal assessment of experiences acquired through placements can contribute to evaluating the effectiveness of experiential learning too. It is problematic, however, that written goals in co-op educational guidelines often do not recognize employers as potential co-learners (Schaafsma, 1996). As such, employers can be left unaware of the learning objectives set out for students working in their organizations. Such a scenario often makes individual employers feel disconnected to the students learning experience or as though they have irrelevant responsibilities, hence tarnishing the meaningful knowledge that students are encouraged to gain through experiential learning (Fleming, 2015). Such literature concerning areas for improvement is important yet scattered, and needs to be synthesized systemically.

Research with respect to co-op programs used to be predominated by quantitative methods (Jones, 2007), e.g., surveys that gathered data about co-op experiences and student perceptions in order to examine the benefits and disadvantages of co-op education (Coll & Chapman, 2000). As such, research findings tended to be too generalized and tenuous for other academics to extend conclusions. Subsequently, researchers become attracted to qualitative research methods because of its ability to probe answers and insights for in-depth inquiries (Coll & Chapman, 2000). Researchers have also suggested that blended methods of quantitative

and qualitative research are valuable strategies for studies in the realm of co-op learning because they can enrich the data collected (Schaafsma, 1996; Coll & Chapman, 2000). Insofar, PSE co-op research draws primarily on case study. Most research about co-op programs commonly pertains to their design, providing insights into co-op education curriculum and administration (Schaafsma, 1996; Coll & Chapman, 2000).

The Research Design and Methods

As such, this study adopts a mixed-methods approach/design, drawing on strength of both quantitative and qualitative studies. It starts with a quantitative strand, a knowledge map analysis of academic journal articles regarding PSE co-op education worldwide, pooled via data crawling with the words “cooperative education,” “co-op education” and “co-op” in four major databases of scholarly publications, namely, Web of Science (WoS), ERIC, Springer and SSRN. We searched in both standard keywords and/or article titles—in case there are journals not requiring the use of standard keywords—to crawl data for the knowledge map analysis. Succinctly, the data consist of all the standard keywords and titles used in those selected journal articles. This analysis aims to position Ontario nationally and globally in terms of its research level, research contribution and shared research hotspots, as detected in academic literature. Here, research level is defined by such characteristics as research extent (topics covered) and research cohesion (collateral relations between topics), manifested in the country-specific knowledge map as number of nodes (keywords/research topics) and connection between them. Put succinctly, a greater number of nodes means more research topics covered and a larger research extent, and more linkages between nodes indicate a stronger research cohesion shown by a country’s PSE co-op studies. Research contribution is based on a global knowledge map of PSE co-op studies, and determined by the share of a specific country vis-à-vis the total. In practice, this is done through a cluster analysis applied to the global knowledge map of PSE co-op studies that generates 7 thematic areas, then discerning shares contributed by researchers from different jurisdictions in each and every thematic area. Finally, shared research hotspots are explored to shed light on correlations

between jurisdictions investigated and thematic areas identified, through constructing a knowledge map of the most shared research topics. Specifically, this process determines hotspots worldwide regarding PSE co-op studies, which are the most popular and arguably cutting-edge research topics, and in turn Canada's and Ontario's relations to those hotspots. Technically, such knowledge maps are constructed with assistance of the computer software instrumental and available such as CiteSpace, Pajek and BICOMB (Bibliographic Items Co-occurrence Matrix Builder). For technical reasons, Canada is compared with other jurisdictions mostly in the quantitative strand or knowledge map analysis, then Ontario is examined against the rest of Canada. Put succinctly, Canada is used as a medium to project Ontario on a global knowledge map. Given the nature of a wide-scope and a large-scale inquiry of this task, a quantitative strand stands out as an appropriate approach, and such quantitative research design and process are illustrated in Figure 1 below:

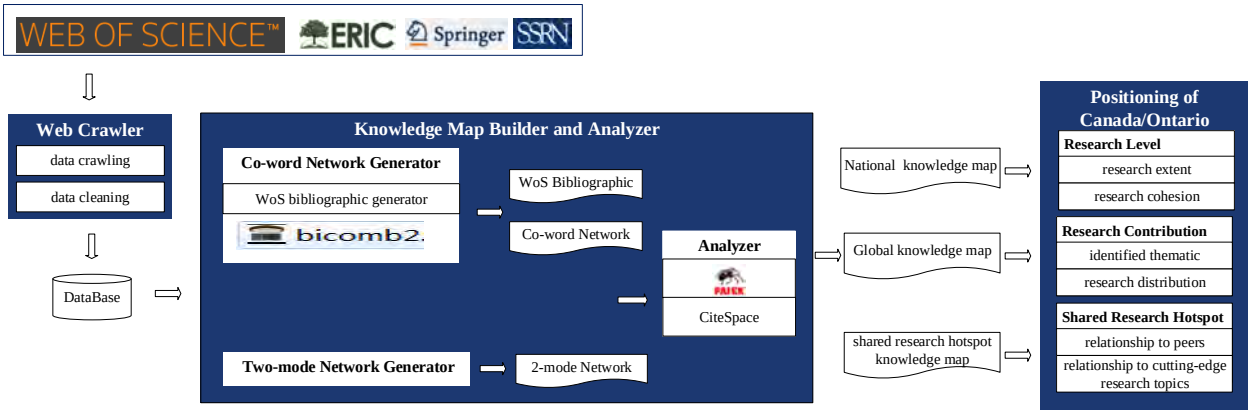

Figure 1: The Research Design of Knowledge Map Based Analysis

While the knowledge map analysis may empirically position Canada's PSE co-op education on a global knowledge map, hence project Ontario's in a global context (via revealing its status in Canada), it has no capacity to shed light on the reasons and factors behind the scene, and more importantly to elucidate the current dynamics for change. As such, a qualitative strand featuring in-depth interviews with insightful informants is added to explore the specific factors that explain the characteristics of Ontario's PSE co-op as depicted on the knowledge map, and by so doing to relate those characteristics to the ongoing changes in Canada. As such, the

qualitative strand fits well to further and substantially probe the strength and gaps of Ontario's PSE co-op in a national context, which is implemented with three case studies conducted in Spring 2017: University of Waterloo and Brock University in Ontario, and University of Victoria (UVic) in British Columbia. The University of Waterloo is chosen because the university is best known in Ontario and Canada for providing co-op opportunities across all programs of study. It now operates the largest postsecondary co-op program in the world: almost two-thirds of its undergraduate students, approximately 19,000, are enrolled in more than 120 co-op programs and on co-op placements with 6,300 employers. While the university's undergraduate enrolment grew 38% between 2004 and 2013, its co-op enrolment grew 58% in the same period. Brock University presents a different case from Waterloo (in terms of curricular strength and program offerings), and the third largest co-op program in Ontario, with one of the most diverse choices of co-op program areas. In addition, it features nearly 100% placement rate for students across all programs, which represents one of the highest and most consistent placement rates in the country. The University of Victoria is selected as a benchmarking case in the national context. Located closer to the booming Asia-Pacific economies, it has seen a steady increase in placements since 2008. Now, it operates the largest co-op program in western Canada, offering 224 co-op programs for almost every academic program of the university (which open doors to international students) and placing over 3,500 students with 1,200 companies and organizations. Altogether 5 informants were interviewed in three case study universities, all with portfolios in charge of the co-op program in their own universities. In addition, 4 informants working with the Higher Education Quality Council of Ontario (HEQCO), the Ontario Universities Council on Quality Assurance (the Quality Council) and the Canadian Association for Co-operative Education (CAFCE) were interviewed for specifically relevant questions and for the purpose of data triangulation. The interview sessions were semi-structured, with assistance of a list of questions informed by both outcome of the knowledge map analysis and the literature itself.

The Status and Characteristics of Ontario PSE Co-op in a Global Context as Evidenced in Research Literature

Data collection and data synthesis

The data in this study, journal article keywords, were searched in and collected from Web of Science (WoS), ERIC, Springer and SSRN. Such an approach to data collection has an obvious advantage regarding data quality, yet limitations concerning non-English data, e.g., literature in German and Chinese. Altogether there were more than 2,000 journal articles that were identified as relating to co-op education. Among them, however, there were 578 articles concerning co-op in high schools, which had to be left out. There were another 52 articles excluded due to missing information about the authors' institution and geographic location. In addition, some countries had very few articles about their PSE co-op education, which would not only contribute little to this study but also potentially skew the analysis. Therefore those countries together with their articles were removed from this study. As a result, a total of 7 countries each with 15 or more articles entered the dataset and analysis in this study, as described in Figure 2 below:

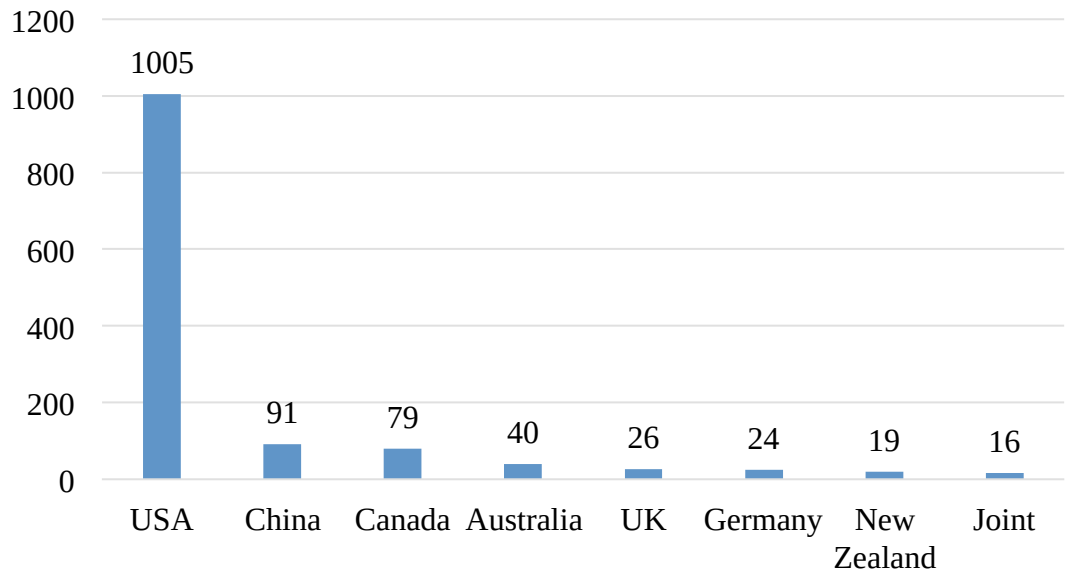

Figure 2: Countries and Their Articles Included in This Study[‡]

Positioning Canada and Ontario on knowledge maps

Figure 2 tells us that articles concerning PSE co-op education in Canada don't quantitatively dominate the relevant literature body. Canada's visibility in the literature came next to the USA and China, though, this might be reasonable given that postsecondary education sectors are much larger in the USA and China than Canada. Notably, among Canada's 85 articles (a number after adjustment for joint authorship), Ontario has the largest share of 48.2% or 41 articles. Albeit the size disadvantage (compared with that of the USA, China, the UK, and Germany etc.), Canada and Ontario are characterized by a high research level but a modest research cohesion with respect to PSE co-op studies, as shown in Table 1. In this table, as explained earlier, nodes refer to keywords or research topics. In order to get a clean picture, keywords are filtered, and only those with high frequency (constituting 50% of each country's total keywords) are retained as the nodes to construct national knowledge maps. Table 1 essentially shows structure and characteristics of those national knowledge maps: average density is the ratio between actual number of connecting lines and the possible maximum, average distance is the mean of all the lines between those nodes, and cohesion index is used to measure level of bundle between the keywords. These indicators combine to describe research level of the selected systems.

Table 1: Research Level of PSE Co-op Studies in Major Jurisdictions

Jurisdiction	Selected Nodes	Average Density	Average Distance	Cohesion Index
USA	162	0.4939	1.50610	0.61211544
China	67	0.0882	2.79964	0.38025210
Canada	149	0.1404	1.89080	0.37910821
Australia	80	0.2430	1.78734	0.49002474
UK	54	0.2257	1.83788	0.48309662
Germany	27	0.4387	1.57846	0.73178295
New Zealand	35	0.4286	1.57143	0.62605549

[‡] Joint authorship is then adjusted for analysis, through adding one (1) article to the jurisdiction of each and every co-author.

Ontario	71	0.2285	1.77666	0.47530422

Canada possesses the second largest number of nodes (research topics), only next and quite close to that of the USA, despite of the huge difference in size of PSE in the two countries. Ontario has the fourth most nodes, accounting for 47.7% of Canada's total and slightly behind Australia. These figures attest that Canada enjoys a rich and a wide range of PSE co-op practices, and Ontario contributes almost half of Canada's research articles and research topics in this regard. Such an abundancy regarding research topics and outcomes arguably manifests the status of development and maturity of PSE co-op education in Canada and Ontario. However, neither Canada nor Ontario seems to stand out in terms of research cohesion. Among the three indicators pertaining to research cohesion, Ontario is ranked the 5th and Canada the 7th on average density, which indicates a relatively low level of collateral studies between those research topics; Canada has the 2nd highest average distance value while Ontario is the 5th on this indicator, which shows Canada as a whole suffers from a considerably sparse distribution of research topics/ideas (distant from each other) but Ontario appears to be relatively better, i.e., Ontario has a more balanced coverage of research topics than the rest of Canada; Ontario is placed the 6th and Canada the 7th on cohesion index, which points to a poor bundle of those research topics in Canada as well as Ontario. Altogether, these indicators prove aspects of PSE co-op education are studied quite sparsely and not much in a related manner in Ontario and Canada, though Ontario seems to be better than the rest of Canada. A follow-up cluster analysis reveals both Canada and Ontario lean towards Australia and the UK in terms of research level. In spite of a sizable pool of research topics (next only to the USA), Canada is far behind the USA, Germany and New Zealand with respect to research cohesion; so is Ontario. Put succinctly, many of those research topics tagged to Canada and Ontario are quite convergently studied, rather than being cross-examined.

As such, there is a need to find out what specific aspects of PSE co-op education are convergently studied in Canada and Ontario. For this purpose, a global knowledge map is constructed employing most frequently used 200 keywords (which account for 52% frequency

of use of all keywords)[§], with assistance of CiteSpace (particularly the thematic clustering and jaccard index), as displayed in Figure 3. As a result, seven thematic areas are spotted from this pool of keywords, each based on a considerable amount of core concepts. Specifically, Thematic Area #1 (T1) "Program Administration" consists of the core concepts such as "program descriptions," "program design," "program development," "program evaluation," program implementation," and "cooperative planning"; Thematic Area #2 (T2) "Federal Aid" pertains to "federal legislation," "federal program," "financial support," "grants" etc.; Thematic Area #3 (T3) "Teaching and Instruction" includes "behavioral objectives," "competency based education," "instructor coordinator," and "curriculum guide" and so on; Thematic Area #4 (T4) "Stakeholders' Attitudes and Co-op Outcomes" relates to "administrator attitudes," "college credits," and "cost effectiveness"; Thematic Area #5 (T5) "Impact on Education" has "academic achievement," "educational change," "educational improvement," and "educational innovation"; Thematic Area #6 (T6) "Co-op Influence Based on Institutional and Student Characteristics" centers on "educational finance," "enrollment," "institutional characteristics," "student characteristics"; and Thematic Area #7 (T7) "Career Development" focuses on "career choice," "career counseling," "career guidance," "career planning," and "career development." Table 2 records more details regarding those identifiable thematic areas.

[§] Effectively 98 keywords contributed to constructing the global knowledge map, after leaving out those indirect or nonspecific words about cooperative education such as postsecondary education, higher education, university, college, community college, two year college, adult education, college student, college graduates, college faculty, advisory committees, engineering education, business education, trade and industrial education, foreign countries, etc.

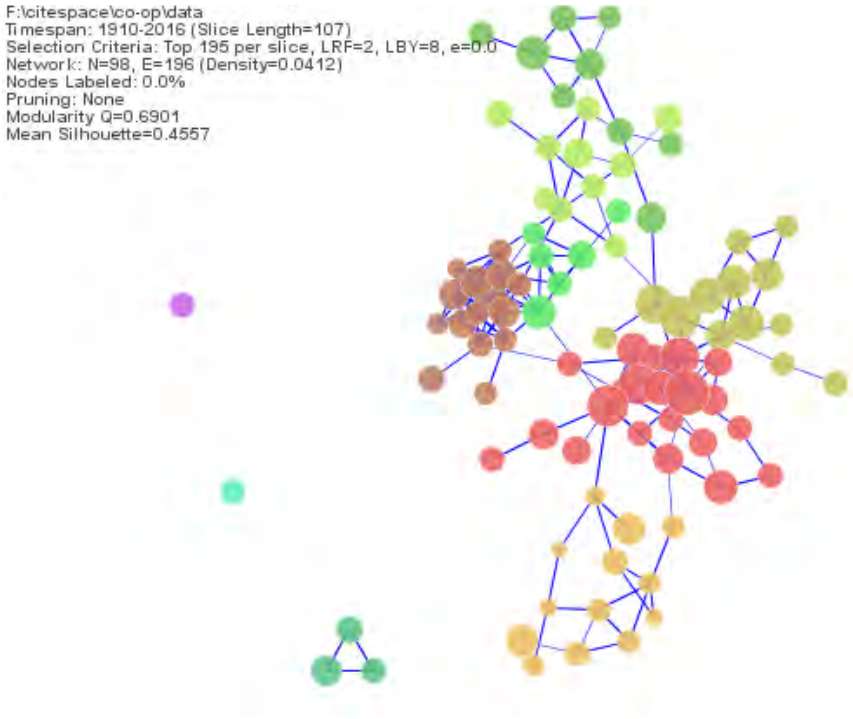

Figure 3: A Global Knowledge Map Regarding PSE Co-op

Table 2: Identified Thematic Areas on the Global Knowledge Map Regarding PSE Co-op Education

Theme	Description	Amount of Core Concepts
T1	Program Administration	21
T2	Federal Aid (policy, financial support)	15
T3	Teaching and Instruction	13
T4	Stakeholders' Attitudes and Co-op Outcomes	10
T5	Impact on Education	12
T6	Co-op Influence Based on Institutional and Student Characteristics	6
T7	Career Development	9

Table 3 shows that, like many other jurisdictions, Canada devotes the largest portion of its research topics (35%) to co-op program administration, i.e., how to plan, design, implement,

and evaluate co-op program. Next to program administration, Canada pays relatively a great attention (32%) to stakeholders' attitudes and co-op outcomes, which is in turn a phenomenon worth attention in this study. Another significant area is career development, in which Canada shows the largest share (12%) relative to all other peers in this study. When converting such contributions into percentage as shown in Table 4, Canada excels among all but the USA: enjoying a larger contribution in all the thematic areas, particularly in Thematic Areas #4 (T4) "Stakeholders' Attitudes and Co-op Outcomes" and #7 (T7) "Career Development." Table 5 reveals Ontario's contribution to Canada's overall accomplishment: while Ontario focuses its own attention on Thematic Areas #4 and #7 as well, it dominates Canada's performance in Thematic Areas #4 through #7, prevailing the contribution ratio as from 42.86% to 100%. As such, it might be fair to say Ontario remains Canada's leading place with respect to PSE co-op education practices and research, as evidenced in academic literature.

Table 3: Keyword Contributions in Each Thematic Area (in frequency of the total & percentage of the own)

Jurisdiction		T1	T2	T3	T4	T5	T6	T7
USA	*f*	865	401	279	448	183	223	151
	%	**34**	16	11	18	7	9	6
China	*f*	2	0	3	3	6	0	0
	%	14	0	21	21	43	0	0
Canada	*f*	47	8	7	42	9	4	16
	%	**35**	6	5	**32**	7	3	**12**
Australia	*f*	35	1	5	26	8	3	0
	%	**45**	1	6	33	10	4	0
UK	*f*	12	1	6	17	5	3	2
	%	26	2	13	37	11	7	4
Germany	*f*	13	0	1	3	2	2	1
	%	**59**	0	5	14	9	9	5
New Zealand	*f*	7	3	1	16	1	4	0
	%	22	9	3	50	3	13	0
Total		981	414	302	555	214	239	170

Table 4: Keyword Contributions to Global Knowledge Map (in percentage)

Jurisdiction	T1	T2	T3	T4	T5	T6	T7	Total
USA	88.18	96.86	92.38	80.72	85.51	93.31	88.82	88.70
China	0.20	0.00	0.99	0.54	2.80	0.00	0.00	0.49
Canada	**4.79**	**1.93**	**2.32**	**7.57**	**4.21**	**1.67**	**9.41**	**4.63**
Australia	3.57	0.24	1.66	4.68	3.74	1.26	0.00	2.71
UK	1.22	0.24	1.99	3.06	2.34	1.26	1.18	1.60
Germany	1.33	0.00	0.33	0.54	0.93	0.84	0.59	0.77
New Zealand	0.71	0.72	0.33	2.88	0.47	1.67	0.00	1.11

Table 5: Ontarian Contributions in the National and Global Context

	T1	T2	T3	T4	T5	T6	T7	Total
Ontario Frequency	11	3	2	18	6	4	12	56
% of Ontario Total	19.64	5.36	3.57	**32.14**	10.71	7.14	**21.43**	100
% of Canada Total	23.40	37.5	28.57	**42.86**	**66.67**	**100.00**	**75.00**	42.11
% of Global Total	1.12	0.72	0.66	3.24	2.80	1.67	7.06	1.95

Finally, based on the global knowledge map previously constructed with frequently used keywords, a country dimension is added to construct a knowledge map of shared research hotspots. This knowledge map takes the form of a 2-mode network[**] and is used for two purposes. One is to identify degree of keywords (research topics) shared by the countries studied, as displayed in Figure 4. Canada is depicted to share most research topics with the USA, 60 in total. Figure 4 further reveals that Ontario shares 31 research topics with the USA, while the rest of Canada shares 41 with the USA. On the other hand, this process of analysis also sheds light on what keywords are most shared, and 16 are identified as being shared by 5 or more jurisdictions. Table 6 records them, and fits them to the previously discovered thematic research areas. It indicates that Thematic Area #1 ("Program Administration"), #3 ("Teaching

[**] A 2-mode network has two sets of nodes, and ties exist only between nodes belonging to different sets (De Nooy et al., 2011, p.103). In this study, the two sets of nodes are keywords and jurisdictions, and a jurisdiction is linked to a keyword if it appears on the jurisdiction's national knowledge map (a 1-mode network). Two-mode networks are often transformed into 1-mode networks for analysis, because most network measures are solely defined for 1-mode networks (Latapy et al., 2008), as demonstrated in Figure 4.

and Instruction"), #4 ("Stakeholders' Attitudes and Co-op Outcomes"), #5 ("Impact on Education") and #7 ("Career Development") are studied by researchers in most jurisdictions, thus contain the cutting-age topics in the terrains of PSE co-op studies. As discussed above, Canada and Ontario perform well in such cutting-edge research terrains as "Program Administration," "Stakeholders' Attitudes and Co-op Outcomes" and "Career Development," yet underrepresented in those of "Teaching and Instruction" and "Impact on Education."

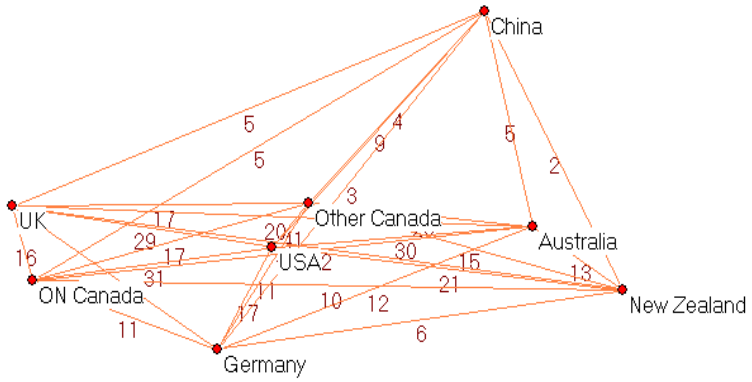

Figure 4. Level of Shared Research Topics between Countries.

Table 6: Cutting-Edge Research Terrains and Topics

Most Shared Keywords	Theme #	Thematic Description
school business relationship, school community relationship, program descriptions, partnership in education, program administration, program evaluation	T1	Program Administration
teaching method	T3	Teaching and Instruction
education work relationship, outcome of education, employer attitudes, student attitudes, program effectiveness, experiential learning	T4	Stakeholders' Attitudes and Co-op Outcomes
educational change, educational policy	T5	Impact on Education
job placement	T7	Career Development

In sum, Canada (including Ontario) poses as contributing modestly to scholarly literature with respect to PSE co-op education (accounting for only 4.63% of the total), though, this modesty should be corrected by the size of Canada's PSE sector, particularly in comparison with that of USA and China. Subsequent to such correction, Canada as well as Ontario seem to perform well, relative to such peers as the UK, Germany and Australia, in terms of research extent or sum of research topics covered in the literature studying their PSE co-op education. Besides, Canada and Ontario are present in a majority of the research terrains containing the cutting-edge topics. The real problem seems to stem from rather poor research cohesion or a lack of collateral relations/connections between those research topics, especially for Canada as a whole, while Ontario appears to be in a slightly better position. Arguably, many issues regarding PSE co-op education might be intrinsically related, thus need to be cross-examined. As such, a high degree of research cohesion should be viewed as an indicator of healthy development and growth about PSE co-op research and practices. For Canada and Ontario, attention seems to be convergently focused on certain selected areas, e.g., stakeholders' attitudes and co-op outcomes, and career development. While this pattern sheds light on uniqueness of PSE co-op education in Canada and Ontario, it also ushers in the necessity to pay due attention to cross-examining the issues from multiple perspectives and in an interconnected manner.

The Status and Characteristics of Ontario PSE Co-op Education in a National Context as Illustrated with Three Case Studies

The knowledge maps analysis, while depicting the characteristics of PSE co-op education in Ontario as expressed in scholarly literature, leads to further questions such as: What exactly distinguishes Ontario as a PSE co-op education leader in Canada? How can co-op education program be improved in Ontarian universities in the changing context? Specifically, how can co-op education provide students with a structure within which they can reinforce employability skills, examine larger issues about work and society, and undertake the crucial activities of critical reflection? Or, how can co-op education in Ontarian universities prepare students for

the both roles as workers and citizens in the 21st century? How can co-op education in Ontarian universities employ active participation approaches and forge principle of equality and equity? Arguably these are the important questions resulting from the study based on knowledge maps or derived from the research literature directly, which cannot be addressed by the quantitative analysis.

As such, three case studies are introduced, as explained previously, in University of Waterloo and Brock University in Ontario, and University of Victoria in British Columbia. Five informants were interviewed in the three universities[††], who provided responses and inputs based on their work experiences as well as reflections of co-op education in Ontario, Canada and worldwide. In addition, four informants working with HEQCO, Ontario Quality Council and CAFCE were interviewed to address relevant questions or verify the data. Their responses and inputs shed light on themes elaborated in the remainder of this paper.

Ontario remains a leader of PSE co-op education, yet there is a need to boost the research

Albeit modest (and sparse) coverage in PSE co-op research and rather low research cohesion as indicated in academic literature, Ontario remains a leader of co-op education at university level, according to the key informants at University of Waterloo and Brock University. A number of reasons and factors arise from their responses. First and foremost, there is a high level of consensus concerning co-op education in Ontario and the universities as to what it entails, and how it is organized and practiced, which is not necessarily the case in many other places. Specifically, co-op education means a program that alternates periods of academic study with periods of work experience in appropriate professional fields in accordance with explicitly and concisely shared criteria among all the stakeholders such as: both work and academic terms offered in full time and following a formalized sequence (the total amount of co-op work experience is normally at least 30% of the time spent in academic study), work terms exposed

[††] Initially the researcher meant to interview more informants in the case study universities, but then found the centralized (and a hierarchical) structure of administration regarding co-op program made it unnecessary, as 1-2 top administrators possess and control all the details needed for this study.

to the work environment during more than one season of the year, students receiving remuneration in the work term, students' performance in the workplace supervised and evaluated by the employer, etc. Behind this approach is an educational philosophy that stresses experiential learning, rather than the idea of putting in place a job placement mechanism. To a large extent, such an approach of enhanced experiential learning is supported with a strong institutional commitment in the case study universities, all with a centralized structure supported by a good size of staff and budget. While this is the case across Canada, Ontario stands out enjoying a large employer base (partially due to the economy size) and enormous support from co-op program alumni grown over the years. In many senses, the value of co-op education is embedded in a supportive culture in Ontario, in which there are clearly understood long-term expectations with all sides, e.g., universities, employers, students, etc. (Grubb & Badway, 1998). Such a culture featuring explicit expectations for co-op education "may be more powerful in the long run than a complex set of regulations and bureaucratic requirements" (Grubb & Villeneuve, 1995, p. 27). This in turn perhaps explains why Ontario dominates Canada's research literature in such thematic areas as "Stakeholders' Attitudes and Co-op Outcomes" (T4), "Impact on Education" (T5), "Co-op Influence Based on Institutional and Student Characteristics" (T6), and "Career Development" (T7).

Nonetheless, Ontario now faces competitors and challenges, as well as the issues. Internationally, Australian universities involve academics in administration and management of co-op program—as opposed to full-time staff in Ontarian universities—which in turn boosts scholarly explorations of this particular type of experiential learning. In Canada, British Columbia rises with significant emphasis and distinctive strength with respect to co-op research and pedagogy, which will be elaborated with details in the following sections pertaining to PSE co-op education quality control for continuous improvement and especially co-op education catering for the both roles as workers and citizens in the 21st century. Within Ontario, in spite of widespread co-op program in the universities, research is hardly systemic, but rather ad hoc, largely resulting from the practitioners' individual pursuit. This situation should explain why Ontario's research literature concentrates on co-op program administration and stakeholders'

perspectives as well as co-op outcomes, as they mostly come from co-op practitioners' reflections of their work experience or as required by the accreditation process, while faculty researchers of higher education studies don't necessarily view co-op education as a conventional area of scholarly exploration. This situation certainly ushers in limitations for co-op education research in Ontario, and across Canada as well. In this regard, an informant expressed her frustration:

> *"there is a handful of us in Canada….these are practitioners who have started our PhDs and started doing research, so really there are handful of us….but it is very odd ad hoc and based on individuals. Where you will see a difference is in Australia…"*

Furthermore, "it is a class structure of whose knowledge counts. And if it is not done by faculty researchers then it is not really legit….I did accomplish a doctorate but I am not in a tenure-track position."

When asked how to boost research about co-op education in the universities, the informants in the case study universities came up with two interesting ideas. One is from a key informant at University of Victoria particularly, that community engagement might be a hook to get faculty researchers on board: co-op education used to be viewed as a kind of

> *"sidebar industrial model….but when I start using the community engagement language and this is how we have mapped it out at the University of Victoria….then all of a sudden faculty members are interested. And I think that is the hook."*

Indeed, co-op education can be held as a form of community engaged learning, which is in turn an important part of community engagement strategy. As the "anchors of creativity," postsecondary institutions are now indeed expected to become community players that support growth through the exchange of knowledge and career developing opportunities (Bramwell & Wolfe, 2008, p.1176). The other idea is shared by a number of informants that the

escalating interest in Work-integrated Learning (WIL) could help heighten the status of co-op education as a core form of experiential learning. Traditionally, co-op education "somewhat lives between the administrative world and the academic world," while WIL now helps confirm "we are an academic program," as observed by an informant. Notwithstanding, staff and faculty associating with co-op education need to pay close attention to the articulation and integration between the curriculum in classroom and the experience in workplace. As an informant asserted, "I believe that the learning that students do in the workplace is extremely powerful learning….but we don't take advantage of that ourselves as a learning organization," while another informant in a different university echoed "I would say the biggest challenge in the centralized system is maintaining the connections to the curriculum in the faculties."

Quality control has gaps, especially for the sake of continuous improvement

Canada, including Ontario, enjoys a unique strength of having in place an accreditation policy and mechanism, which is not matched by any other jurisdictions in the world. The accreditation is composed of eight parts, and requires enormous details with respect to structural criteria, co-op education in the institutional context, criteria of institutional commitment, criteria of quality program delivery, and criteria of monitoring and evaluation. Accreditation standards are developed to establish co-op program "as an educational strategy and to provide leadership in ensuring quality co-op programming" (CAFCE, n.d.). Arguably, this is responsible for a convergence of research literature on co-op program administration, stakeholders' attitudes and co-op outcomes, as co-op education practitioners often possess and also need to update such details periodically as a result of the accreditation exercises.

Nonetheless, an accreditation cycle is of six years. What happens within those six years with respect to co-op program quality assurance? It is basically left to internal assessment in the university. There is no doubt that the universities take their reputation and educational quality seriously, and in the three case study universities the co-op students are required to complete surveys regarding their workplace experience. While such a practice is common in increasing (if

not all) universities that offer co-op program, it doesn't go without concern. One concern is that quality control is pretty much left to the students themselves, and in particular their self-report feedback. In this regard, the research informants with HEQCO voiced a need to develop the assessment tool that may ensure triangulation of the experiential learning:

> *"reliance on any one person's opinion, whether you just ask faculty members or you just asked students for their personal analysis of their skills or if you just ask employers….or use any one tool then you are only getting part of the story."*

A veteran informant in a case study university shared this concern by saying "it is all done by volunteers….and we do the reviews and then we assume….we don't do a site visit, we don't double check." Furthermore, the HEQCO informants envision a necessity of assessing the students' overall skill development via experiential learning, including critical thinking and communication skills, rather than merely job specific skills, for university education now increasingly concerns transferability of knowledge and skills. Another concern is expressed by a university-based informant that those rich data coming from co-op students survey are not always systemically analyzed because there are not sufficient researchers:

> *"I'm looking for more researchers that would like to partner with us to look at you know what are the impacts of what we are doing. I am talking about doing my Masters just because I have all of these data sitting in front of me (laughing)….I did do a callout to the associate deans which they are pushing out, especially because we have a very great Faculty of Education that has teaching and learning as a component of our Master's program."*

More importantly, a couple of research informants in this study were concerned with how to effectively use the outcomes of external and internal assessments for the purpose of continuous improvement of co-op program, i.e., putting in place a mechanism that constantly collects and timely feedbacks all the stakeholders' opinions and needs, and "integrating that

more in the classroom then students need to know certain things so making sure that they have that knowledge before we put them into that place technically" (stated specifically by one informant). This informant also emphasized that learning objectives should be the core concerning the practice of assessment, and "continuous improvement is looking at your learning objectives and then making sure that you are [always] hitting those objectives." Another informant in a different university resonated this point and extended it with the notion that "there is more work that can be done on a quality assurance framework to help not to police but to help programs really have a fulsome holistic program that is really solid." She then elaborated this point: "there should be integration with the curriculum, assessment and learning outcomes as well as reflection, [as] ongoing meaningful support. So these components need to be there." These comments and observations might shed light on the reason behind Canada's and Ontario's literature gap in co-op education pedagogy and improvement of teaching/learning (Thematic Area #3), as this is an area that seriously requires faculty researcher to step in, which however is not happening. As this same informant put it,

> *"that integration piece is missing…. I could probably count on one hand the number of faculty members who would say I have a whole class who has just come back on a work term. What did you learn? How does that relate? What did you do in your work terms that relates to what has helped you understand this? It's very rare, and that is an untapped resource in my opinion."*

She further stressed her point that

> *"we work hard on our side to help the students to see between the curriculum and the experience and that is what we do in our learning outcomes and our assessments and our reflections but it doesn't happen in the classroom…."*

New models of co-op education are emerging elsewhere to prepare students both as workers and citizens in the 21st century, as well as forge the principle of equality and equity

Co-op education is arguably "the heaviest hitting of all of the experiential" (quoting one informant in this study), yet in the meantime "co-op is relatively the most rigid framework in the experiential" (citing another informant) for its very specific requirements. In this context, how could co-op education be steered to better meet the progressive needs of an increasingly knowledge-based economy in the 21st century? Specifically, how can co-op education provide students with a structure within which they can reinforce employability skills, examine larger issues about work and society, and undertake the crucial activities of critical reflection? Arguably, co-op education now increasingly face the needs to address the task of preparing students for fulfilling the both roles as workers and citizens in the 21st century. Furthermore, how could co-op education push for the principles of equality and equity in participation in the context of an increasingly knowledge-based economy? Put another way, co-op program in the university should deliberately foster equality and equity regarding students' career preparation and development. The research informants provide meaningful and inspiring insights into the issues and prospects down the road. Notably, University of Victoria in British Columbia appears to be a leader regarding such notions and practices, which in turn ushers in implications for universities in Ontario, and further entails certain changes characterizing future model of co-op education.

Specifically, University of Victoria seems to have spearheaded the notions catering towards co-op students' lifelong skills and career development:

> *"We want our students to develop their leading edge. And how they are going to get to this point is by answering these four questions for themselves. What do I love? What am I great at or could be great at? What can I be paid for and at least be sustained in? And what does the world need? And learning how to put it all together so that they can make a difference and have their leading edge,"*

Asserted a research informant at UVic. In practice, UVic co-op program now deliberately employs the notion of competency as a pathway to integrating curriculum and experience. In operations, a few sets of generally essential competencies across all academic program areas and employer sectors are now brought in, namely ten core competencies and intercultural competencies—in addition to the program and profession specific competencies (e.g., those about Anthropology, Business, Education, Engineering, Fine Arts, Humanities, Law, Science, etc.)—which not only serve to connect academic study to the world of work but also benefit co-op students' long-term career development. In particular, the Ten Core Competencies, including personal management, communication, managing information, research and analysis, project and task management, teamwork, commitment to quality, professional behaviour, social responsibility, and continuous learning, serve as a framework to align experiential learning with the UVic Learning Outcomes, and more importantly transfer "the competencies you've developed in the classroom to the workplace and understand the gaps between what you know and what you can become" (citing the UVic *Description of the ten core competencies*). As such, this framework shall have a strong implication for co-op education pedagogy and outcome assessment in the years to come. Further, UVic has identified a set of Intercultural Competencies for the sake of working in culturally diverse environments, which unpacks such competencies around four particular dimensions, namely, intercultural motivation, intercultural knowledge, strategic thinking, and appropriate behaviour, and helps co-op students to become a solid global worker and citizen. Altogether, the UVic framework of essential competencies takes a significant step forward considering co-op students' skills and career development in a much wider horizon and in the context of globalization, which shall in turn usher in a considerable impact on university education as a whole.

In a concrete way of fostering equality and equity in co-op education, UVic attends to co-op needs of international and indigenous students. UVic has developed "an intercultural competencies development curriculum that is offered for students whether they going or coming," told an UVic informant. As a result, UVic has witnessed a good increase of international students enrolled in its co-op program, who now account for approximately 12%

at undergraduate level and 25% at graduate level. Arguably, University of Waterloo and especially Brock University have a good number of international students engaging in co-op education as well. As a matter of fact, Brock University has the highest percentage of international co-op students at graduate level across the country, at some 70%. However, none of the Ontarian universities seems to have deliberately worked out the framework like UVic's Intercultural Competencies available to international students, which has implications not only about inclusiveness but also concerning equality and equity in co-op participation. In this regard, UVic's endeavour of recruiting indigenous students in co-op program might have an even stronger bearing on equality and equity. Since 2008, UVic has put in special effort and resource to forge co-op participation among its some 1,200 indigenous students, through hiring an indigenous co-op coordinator and exploring opportunities of co-op work in community, which are in favour of indigenous students with respect to their culture and values that stress a balance between physical health, intellectual health, emotional health and spiritual health. More recently, UVic launched the first indigenous international co-op exchange program in the country, which sends indigenous Canadian students to Australia and New Zealand to work there in the indigenous community settings. Such moves of UVic showcase not only the possibility of linking co-op program to equality and equity in education but also the necessity of conducting research concerning co-op education influence based on institutional and student characteristics.

Conclusion and Recommendation

The outcomes of this mix-method study first detect the status and characteristics of PSE co-op education in Ontario on the national and global knowledge maps, which are constructed via bibliometric analyses of the research literature. Relative to size of the university sector, Canada and Ontario show a solid position in terms of research extent (i.e., research topics covered in the literature regarding their PSE co-op program), and those research topics relating to Canada and Ontario collimate with many cutting-edge topics depicted on the global knowledge map. However, there appears to be a weak research cohesion (i.e., a lack of collateral relations and

connections between those research topics) in both cases of Ontario and Canada, though Ontario appears to be slightly better than the rest of Canada. For Ontario and the rest of Canada, attention seems to be convergently focused on certain selected areas—compared with peers like Germany, New Zealand, Australia, the USA and the UK—such as co-op program administration, stakeholders' attitudes and co-op outcomes, and career development. While this pattern sheds light on unique aspects of PSE co-op education in Ontario as well as Canada as a whole, it also ushers in the necessity to address cross-examination of PSE co-op issues from multiple and correlational angles. Regardless, Ontario is cast a leader on the national knowledge map, for it dominates most thematic areas regarding PSE co-op education in Canada.

The further study via interviewing co-op program staff in the three case study universities reveals the reasons behind a lack of research cohesion: most papers about PSE co-op education in Canada and Ontario have been authored by co-op program staff who have interest in pursuing academic research about this particular type of experiential learning. Given the fact that an accreditation process in Canada periodically requires and updates details concerning the aspects of co-op program with respect to structural arrangement, institutional context, institutional commitment, program delivery, monitoring and evaluation etc., it is thus straightforward why co-op program staff favour writing about administrative issues of co-op program, co-op stakeholders' attitudes, and co-op outcomes. Furthermore, co-op program is traditionally considered as part of student affairs, thus career development is naturally a research focus for co-op staff. Apart from these research topics, there are clearly gaps for Canada and Ontario concerning other important themes and topics identified on the global knowledge map, e.g., teaching and instruction, impact on education, co-op influence based on institutional and student characteristics. A crucial factor behind the scene is a lack of interest on the part of conventional postsecondary education researchers in studying co-op education. As such, it is pivotal to lure mainstream researchers into PSE co-op education studies, for a couple of reasons. First, it is pressing to rigorously study Canadian and Ontarian experience where co-op education has grown steadily and practiced fruitfully for decades, and project the successful experience onto the global knowledge map. As an informant rightfully pointed out, "unless you

have stuff published it's like it is not happening. So we need to support researchers publishing and people publishing in this space." Second and relatedly, while publishing "is super important" (citing the same informant), it cannot fall on co-op staff entirely. Rather, the mainstream researchers should step in and fill out those important gaps in the literature concerning Canadian and Ontarian experience, e.g., co-op impact on education as a whole, which could in turn depict a better picture of Ontario in the national and global contexts, as well as Canada on a global knowledge map. More importantly, those researchers may help address how new work-integrated learning ideas and approaches shall improve co-op education, and how co-op education can be steered to better meet professional and social needs in the 21st century, like fostering critical thinking ability for a lifelong career, and boosting dynamics for equality and equity in the workplace.

With respect to PSE co-op practices, Ontario remains a leading place as well, partially due to a high level consensus (among all the stakeholders, especially the industry partners) regarding co-op program operations, and an extraordinary alumni support, as well as Ontario's massive economy size (which in turn ushers in a constant and often an increasing demand for professional employees). Notwithstanding such advantages and legacies, Ontario faces challenges from peers in Canada, which is exemplified by some of the innovative practices observed in the benchmarking case in this study, i.e., UVic's using the framework of essential competencies as an efficacious pathway to effectively integrating curriculum and experience, and critically empowering co-op students for their lifelong career in the context of an increasing knowledge-based economy as well as an intensifying process of globalization. Arguably, such moves would certainly have an impact on pedagogy and delivery of co-op education in the university. Further, they could forge new models of co-op education that provide student with a structure within which they can reinforce employability skills, examine larger issues about work and society, and undertake the crucial activities of critical reflection. In this regard, Ontario seems to have lagged behind and not paid sufficient attention. As such, it calls for a research agenda that helps discover and boost similar initiatives in Ontario universities and colleges, as well as co-op education influence based on institutional and student characteristics.

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