

A National Census of Sustainability in K-12 Education Policy: Implications for International Monitoring, Evaluation, and Research

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Abstract

This paper reports on the first nationwide census examining sustainability uptake in policy initiatives in Canadian K-12 education. Included in the study are each of Canada's 13 provincial and territorial ministries of education, and all 374 public school divisions across the country. Sustainability was defined as including, at minimum, consideration of environmental issues, with the study also encompassing use of other related terminologies. Data were collected on three types of policy initiatives: (a) the existence of sustainability-specific policy, (b) participation in sustainability certification programs, and (c) the existence of sustainability staff, which were examined in relation to a range of geographic and institutional variables. Sustainability-specific policy was examined across five domains of a whole institution approach to sustainability: governance, curriculum, facilities and operations, research, and community outreach. We found that 54% of ministries of education and 59% of school divisions in Canada had sustainability-specific policy, most commonly in the curriculum domain at the ministry level and in the operations domain at the school division level. In addition, 43% of school divisions had participated in a sustainability certification program, and 25% had sustainability staff. We discuss implications for policy making in Canada as well for intergovernmental UN policy programs, in particular regarding new policy development and monitoring and evaluation efforts.

Keywords: sustainability education, education for sustainable development, environmental education, climate change education, Sustainable Development Goals, education policy, whole institution approach, eco schools, monitoring, evaluation

Sustainability has been a growing focus in kindergarten to grade 12 (K-12) education in Canada and internationally. This is partly in response to global policy agendas such as those spearheaded by the United Nations Educational, Scientific, and Cultural Organization (UNESCO), e.g., the Decade of Education for Sustainable Development (DESD, 2005-2014). The UN has increasingly recognized the importance of assessment in achieving sustainability goals and improving program effectiveness, including in education (United Nations, 2014). However, monitoring and evaluation of sustainability engagement in education has largely occurred through syntheses of government self-reports (e.g., Wals, 2012). Self-reporting is an essential piece of an assessment process, but can leave gaps that external data collection, analysis, and reporting can fill. The UN has gone so far as to call for a "data revolution" to enable more rigorous and systematic evaluation of global sustainability goals, including in education (United Nations, 2014).

In Canada, some national assessments have been conducted based on self-reported data (e.g., CMEC, 2008, 2014; Government of Canada, 2005). However, there has been minimal external research, and that

which has been conducted has tended to be limited in jurisdiction and subject area, with an identified need for external, comparative policy research in this area (Creech, Roy, & Buckler, 2008; Nazir, Pedretti, Wallace, Montemurro, & Inwood, 2009).

The current study responds to these national and international calls for rigorous and systematic comparative evaluation and research on engagement with sustainability in education policy (Nazir et al., 2009; UNESCO, 2016). It is a census of national uptake of sustainability in policy across Canada, reporting on all 13 provincial and territorial ministries of education, and all 374 school divisions in Canada. “Sustainability” is understood in the study as including, at minimum, consideration of environmental issues, typically along with social and economic considerations; with the study also encompassing the use of other related terminologies. The census also examined evidence of school division participation in sustainability certification programs, employment of sustainability staff, and geographic and institutional characteristics. We investigated whether sustainability-specific policy at the ministry level was related to policy initiatives at the school division level. In doing so, the study (a) provides a national stock-taking of engagement with sustainability in education policy, (b) offers one possible model for a national census that may be of interest to other countries interested in similar evaluation efforts, and (c) makes recommendations to UN-led international monitoring and evaluation initiatives. In what follows we provide further background context, overview the study aims and methods, and share our findings, including key implications for future policy and policy research.

Background

With the launch of the United Nations’ Sustainable Development Goals (SDGs) in 2015, new targets have been set and agreed to by countries around the world to address sustainability, including through Goal 4 focused on education. Goal 4.7 in particular aims to “ensure that all learners acquire the knowledge and skills needed to promote sustainable development” by the year 2030 (United Nations, 2016, p. 7). Indicators to track and measure progress towards this goal include the extent to which education for sustainable development is mainstreamed at all levels in education policies, curriculum, teacher education, and student assessment (UNESCO, 2016). However, as the recently published Global Education Monitoring (GEM) Report (UNESCO, 2016) suggests, monitoring and evaluation towards such goals is difficult, in part because much available data is self-reported, further limited by low response rates in many countries due to available resources and other demands. As a result, the Report concludes that “more systematic and rigorous approaches to monitoring country progress towards target 4.7 are needed to supplement country reports” (UNESCO, 2016, p. 52).

Also in 2015, the Paris Agreement resulting from the twenty-first session of the Conference of the Parties (COP21) on the United Nations Framework Convention on Climate Change affirmed the importance of ratifying countries enhancing climate change education, training, and public awareness as part of their efforts towards climate change mitigation and adaptation in Article 12 (UNFCCC, 2015). This builds on commitments made under Article 6 of the original Convention (UNFCCC, 1992) in which the Parties agreed to “promote and facilitate at the national and, as appropriate, subregional and regional levels...the development and implementation of educational and public awareness programmes on climate change and its effects” (p. 17). The Action for Climate Empowerment (ACE) Guidelines (UNESCO & UNFCCC, 2016) are a collaboration of UNFCC and UNESCO aimed at supporting national activities and strategies related to Article 6 of the Convention. Phase four of the ACE guidelines focuses on monitoring, evaluation, and reporting activities. Like other proposed phases, these assessment activities are intended to be led and implemented at the national level.

Finally, the United Nations Educational, Scientific, and Cultural Organization’s (UNESCO) Global Action Programme (GAP) on Education for Sustainable Development (ESD) (UNESCO, 2014b) is another related global monitoring and evaluation initiative. Following on from the UNESCO Decade of Education for Sustainable Development (DESD), the overarching goal of this programme launched in 2015 is “to generate and scale up action in all levels and areas of education and learning to accelerate progress towards sustainable development” (UNESCO, 2014b, p. 14). One of five priority areas is to “mainstream ESD into both education and sustainable development policies” (UNESCO, 2014b, p. 15). Another priority area focuses on transforming learning and training environments through whole-institution approaches, which go beyond facilities’ operations and curriculum to broader governance mandates. Each priority area aimed to set “targets” and “indicators” to assist in monitoring and evaluation efforts. The research pre-

sented in this paper is set within the context of these international commitments to both furthering the engagement of sustainability in education, and evaluating progress towards this goal. Indeed, it specifically responds to calls for “more systematic and rigorous approaches to monitoring country progress” towards engagement with sustainability in education (UNESCO, 2016, p. 52).

The study is also situated in relation to Canadian efforts to date in engagement and evaluation of progress towards a focus on sustainability in education. Key national ESE initiatives over the past 15 years include *A Framework for Environmental Learning and Sustainability in Canada* (Government of Canada, 2002), a vision document resulting from rounds of public consultation across Canada; as well as *Education for Sustainable Development in Canada* (Government of Canada, 2005), which outlines federal objectives for the Decade of ESD. The Council of Ministers of Education Canada (CMEC) is a national body which convenes provincial and territorial ministers of education on matters of shared concern, including sustainability. *Learn Canada 2020* was issued by CMEC in 2008 and includes ESD as one of eight priority areas for K-12 education in Canada. The stated aim was to “raise students’ awareness and encourage them to become actively engaged in working for a sustainable society” (CMEC, 2008, p. 2). This builds on prior CMEC work including a focus on ESD, such as the *Common Framework of Science Learning Outcomes* (CMEC, 1997). Monitoring and evaluation in relation to these initiatives has occurred primarily through reporting to the United Nations Economic Commission for Europe (UNECE) and UNESCO in relation to the DESD and now GAP, and other self-reporting mechanisms (e.g., CMEC, 1999, 2010, 2014).

In a 2008 report on ESD policy in school divisions, Creech, Roy, and Buckler observed that while reporting on ESD programming was robust, reporting and analysis on the state of *policy* was negligible. They further identified a “need for a more comprehensive exploration on whether and how policies can catalyze and sustain education and management practices in schools; how such policies are developed, implemented and monitored at the school level” (Creech, Roy, & Buckler, 2008, p. 4). Subsequent national reports to UNECE and UNESCO have helped address this gap, by tracing historical developments of ESD policy in Canada, including in relation to the Decade of ESD (CMEC, 2010, 2014). As noted within these documents, such reporting is meant to convey “the scope and inclusiveness of ESD in Canada,” with a focus on case studies “chosen on the basis of geographic representation, client groups, types of initiatives, levels of education, and stakeholder involvement” (CMEC, 2010, p. 8).

In an overview of sustainable development and climate change education in Canada, Nazir et al. (2009) indicated that ESE policy research in Canada has tended to be self-reporting from government agencies or other organizations that focus on cataloguing success stories. They indicate the lack of non-self-reported evaluation and research “reflect[s] a deeper systemic weakness, that is, the lack of emphasis on research in influencing policy and practice,” and suggest this may be because “plans surrounding ESD are relatively new, and the scholarly community has yet to develop appropriate research initiatives” (Nazir et al., 2009, p. 27). Exceptions have tended to focus on individual provincial jurisdictions or particular subject areas, and are based on empirical data in only a few cases¹ (e.g., Courtenay-Hall & Lott, 1999; Puk & Behm, 2003; Swayze & Creech, 2009). The limited number and range of studies in Canada is typical of the international literature as well. Policy research in ESE to date has lacked a focus on comparative empirical studies that could inform national and international monitoring and evaluation efforts (Aikens, McKenzie, & Vaughter, 2016; Læssøe, Feinstein, & Blum, 2013).

The research presented in this paper, and the larger Sustainability and Education Policy Network (SEPN) study of which it is a part, is undertaken in response to this gap of comparative research on sustainability-specific policy in education in Canada and internationally². It seeks to inform policy making efforts through documenting trends in policy engagement across provinces and territories, including the existence of sustainability-specific policies and in which domain of institutional activity, engagement with sustainability certification programs, and the existence of sustainability staff. As such, the study aims to support future engagement strategies for policy bodies across the country in furthering sustainability through education policy and practice. It also provides one possible model for conducting a national census of education policy regarding sustainability, which may be of interest to other national settings. In addition, the methods and patterns identified in this national stock-taking exercise provide an empirical

¹As an exception, Hart (2002) provided a broader evaluation of national-level policy in his description of the integration of environmental concepts into the Pan-Canadian science curriculum development process.

²SEPN is a partnership between academic researchers and national and international organizations, with a research program addressing sustainability engagement in education policy and practice, including across the five whole institution domains of overall governance, curriculum, facilities operations, research, and community outreach.

basis that can help inform global ESE policy initiatives and their monitoring and evaluation aims (e.g., United Nations, 2016; UNESCO, 2014b, 2016; UNESCO & UNFCCC, 2016).

Aims and Methods

As a national census of sustainability engagement in K-12 education policy, this study aims to address: To what extent do ministries of education and school divisions across the country have sustainability-specific policies or other high-level policy initiatives regarding sustainability? And what is the relationship, if any, between engagement at the two levels of policy, and in relation to geographic and institutional factors?

In order to answer these questions, the census analyzed provincial and territorial, as well as school division, data. As Canada has a federated education system, there is no national policy that directs education across all provinces and territories. Provincial and territorial ministries of education instead have authority over student curriculum and assessment, as well as financial oversight over school divisions and schools (Lessard, 2006). Regional school divisions are responsible for ongoing operations, financial accountability, and student learning (Galway, Sheppard, Wiens, & Brown, 2013).

We collected data within all 13 provincial and territorial ministries of education and all 374 school divisions across Canada using publicly available information³. Data were collected in 2014, with sustainability certification data updated in 2016. In this study we define “policy” broadly as a “vehicle or medium for carrying or transmitting a policy message” (Ozga, 2000, p. 33), including actual policies, but also mission statements, curricula, and web-based commitments. Collected data included: (a) sustainability-specific documents (provincial and school division levels), (b) cross-curricular competency documents with a focus on sustainability (provincial level only), (c) mission/vision statements with a focus on sustainability (provincial level), (d) engagement with sustainability certification programs (school division level)⁴, and (e) evidence of sustainability-specific staff (school division level)⁵. Additional data collected at the school division level included geographic characteristics (i.e., location) and institutional characteristics (i.e., school division type⁶, school choice policy, number of schools, student population, primary language, and the presence of an Indigenous or multicultural policy or mandate).

We aimed for the search to be comprehensive and to return any potentially relevant documents so we used multiple search terms. The following terms—which have been previously associated with sustainability initiatives—were used to search for sustainability related material on ministry and school division websites: ecological, environment, green, sustainable development, sustainability, Aboriginal, and their variations⁷. French terms were used for French language websites. The search terms were also entered into the Google search engine along with the ministry’s or division’s name (e.g., Kootenay Lake School District and sustainability) to supplement institutional website searches. We also reviewed the policy sections of ministry and division websites for the existence of additional sustainability related initiatives⁸. This included reviewing the sites for any specific climate change-related policies at both ministry and division levels. It was not within the scope of the study to contact each ministry and school division for additional

³In this study we included all school divisions that: i) were publicly funded in full, ii) had board of trustees’ responsibilities, powers, and operating procedures defined in provincial education acts, and iii) were not established through special application or registration. This definition was adapted for two territories. In Nunavut, local district education authorities are grouped into three regional “school operations;” we collected data at the level of school operation. In the Yukon Territory, school divisions were grouped into four “school areas,” so we collected data at the level of these school areas. These are administrative units, not legal entities, unlike the school divisions examined in other jurisdictions.

⁴Seven known certification programs were included in the search: Green Schools (SEEDS Connection), Destination Conservation, UNESCO Schools, Manitoba EcoGlobe Schools, Ontario EcoSchools, Établissement vert Brundtland de la Centrale des syndicats du Québec and Green Schools Nova Scotia. Richmond School District in BC used a unique certification program that they developed. Where program websites were out of date, we contacted programs for updated school certification lists.

⁵A broad consideration of full or part-time sustainability staff was used, including for example, those in charge of green committees or outdoor education programs within a school division.

⁶We classified school divisions as public, separate, charter, or hospital-based. Separate schools are constitutionally protected in some Canadian provinces, and religion-based schools can be publicly funded. At the time of data collection, all separate school divisions in Canada were Catholic, with the exception of one Protestant school division; and charter schools were only found in Alberta (independent public schools with their own division). Hospital-based schools are educational facilities located in or near a hospital that cater to hospitalized children; all of the hospital-based schools in Canada at the time of data collection were in Ontario.

⁷The term Aboriginal and its variations were included in recognition that the inclusion of sustainability in Indigenous education priorities may be included via additional terminology.

⁸Nunavut school operations and the Yukon school areas did not have websites, so we were restricted to web searches.

materials not available online. Open access databases for the ministry and school division level data can be found on the database resources page at www.sepn.ca.

Data analysis included classification of all collected documents as to which of the five domains of a whole institution approach to sustainability they engaged, pairwise analysis of the quantitative data, and allocating “sustainability initiative scores” to each province. In what follows, these methods of analysis are detailed further.

Policy Classification

Five domains of whole institution engagement with sustainability were used to classify all policy documents: (a) governance - the overall vision, policies, leadership, and management of an institution or body in relation to sustainability; (b) curriculum - academic programs, curriculum, or policies that incorporate sustainability; (c) operations – sustainability in relation to physical buildings and facilities management, such as water or energy conservation; (d) research - research focus on sustainability, including types of community or industry research partnerships; and/or (e) community outreach - collaborations with individuals, municipalities, or organizations in relation to sustainability initiatives. We modified this classification from The Association for the Advancement of Sustainability in Higher Education (2014) and it was also used in Beveridge, McKenzie, Vaughter, and Wright (2015). Similar classifications for whole institution engagement in sustainability are increasingly being used in the academic and policy literatures (Henderson & Tilbury, 2004; UNESCO, 2014a, 2014b).

Due to a high number of school division operations policies, these were further categorized according to the four most common areas of focus: material use or waste management, energy use or conservation, greenhouse gas emissions or climate change, and pest management.

Pairwise Analysis

To quantify how strongly any two variables were related, we calculated pairwise measures of association resulting in the identification and classification of *negligible*, *weak*, *moderate*, and *strong* relationships between variables. We calculated the appropriate measure of association using the R statistical language for all pairs of variables in the dataset (R Core Team, 2015). Between dichotomous variables (*yes/no*), we calculated the mean square contingency coefficient (Φ); between nominal variables (e.g., province or language), Cramér’s V (ϕ_c); and for combinations of binary and continuous variables (e.g., policy and student population), point biserial correlation (r_{pb}). All coefficients were scaled between 0 and 1, where we interpreted values up to 0.09 to reflect a negligible relationship, 0.10-0.29 a weak relationship, 0.30 to 0.49 a moderate relationship, and 0.50 and higher a strong relationship. Negligible relationships are not reported in the results section, other than in cases where the lack of relationship is of interest to the analysis. To visualize the relationship between two variables, we produced spine plots using *vcd* (Meyer, Zeileis, & Hornik, 2015), where the widths of the bars correspond to the relative frequencies of the first variable, and the heights of the bars correspond to the relative frequencies of the second variable at every level of the first variable. Spine plots allow simultaneous visualization of the relative frequencies of both variables.

Random Forest Analysis

To assess the importance of variables in predicting the relationship between ministry and school division policies, we used a machine learning technique called random forests⁹ described in greater detail in Breiman (2001). This indicated how useful each variable was in predicting the presence of sustainability-specific policies at both the school division and ministry levels. We used this technique because more conventional methods such as correlation and factor analysis were less appropriate given the redundancy and complexity of the data.

⁹ In random forests, several hundred classification decision trees are grown on various sub-samples of the data, with each tree then voting for a final model. After each tree is grown, the withheld data can be run down the tree, and the ratio of correct votes averaged over the forest. This ratio can be used to calculate Gini impurity. The mean decrease in Gini impurity from a variable split to its descendent nodes is an estimate of a variable’s predictive importance.

Sustainability Initiative Score

To develop a high level understanding of patterns of engagement with sustainability initiatives across provinces, we developed sustainability initiative (SI) scores. SI scores were based on the three policy initiatives examined at the school division level: existence of sustainability-specific policy documents, engagement with a sustainability certification program, and existence of sustainability staff. Each of these initiatives can be related to sustainability engagement across the whole institution domains of governance, curriculum, operations, research, and community outreach – with policies, certification programs, and staff activity often extending to multiple or all domains. For each province, we added the percentages of school divisions with a policy, with certified schools, and with staff for a combined SI score. The SI score ranged from 0, which meant no school division in that province or territory had engaged with any sustainability-specific policy initiatives, to 3, which meant that all school divisions in the province had engaged with all three policy initiatives examined.

Results

Our aim in this national census research was to evaluate existing levels of engagement with sustainability in K-12 education policy. We also examined relationships between policy engagement in various domains, across scales (ministry and school division levels), and in relation to other high-level policy initiatives and additional characteristics of school divisions, to consider other factors that may support or align with the existence of sustainability-specific policy initiatives. The research results and discussion seek to provide a stock taking of current policy activity, and point to implications for both policy making and future evaluation and research in this area in Canada and globally.

We first share our research results about ministry of education policy documents through an analysis of both sustainability-specific documents and cross-curricular competency documents. We then present our findings at the school division level on the existence of sustainability-specific policy documents, engagement with sustainability certification programs, and existence of sustainability staff. Finally, we overview our analysis of patterns and relationships between the two scales of policy engagement with sustainability.

Ministry of Education Policies

The ministries of education in all provinces and territories addressed sustainability in some capacity, either through the creation of separate sustainability-specific policies or the designation of sustainability as a cross-curricular priority¹⁰ (Table 1).

Table 1

Inclusion of Sustainability in Sustainability-Specific Policies and Cross-Curricular Competency Frameworks at the Level of Provincial/territorial Ministries of Education.

Jurisdiction	Sustainability-specific policies in Whole Institution Domains					Sustainability in CCC
	Governance	Curriculum	Operations	Research	Community	
Alberta	No	No	No	No	No	Yes
British Columbia	Yes	Yes	Yes	No	No	No
Manitoba	Yes	Yes	Yes	Yes	Yes	Yes
New Brunswick	No	No	No	No	No	Yes
Nova Scotia	No	No	No	No	No	Yes
Prince Edward Island	No	No	No	No	No	Yes
Newfoundland	No	No	No	No	No	Yes

¹⁰ Note that separate SEPN publications analyze the qualitative content of these same documents in relation to sustainability-uptake (McKenzie & Aikens, forthcoming) and regarding climate change engagement specifically (Bieler, Haluza-DeLay, Dale, & McKenzie, 2018).

Northwest Territories	No	Yes	No	No	No	N/A
Nunavut	No	Yes	No	No	No	Yes
Ontario	Yes	Yes	Yes	Yes	No	N/A
Québec	Yes	No	No	No	No	Yes
Saskatchewan	No	No	No	No	No	Yes
Yukon	No	No	No	Yes	No	N/A
Total	4	5	3	3	1	9

Note. Three provinces had multiple policies within a domain (British Columbia, Manitoba, Ontario).

Sustainability-specific policies. Based on the documents collected, in total seven provincial ministries in Canada had developed sustainability-specific policies, ranging across five whole institution domains of governance, curriculum, operations, research, and community outreach (see Table 1). Only the province of Manitoba showed evidence of policy activity across all five domains, though Ontario and British Columbia also demonstrated commitments across multiple domains.

Four provincial ministries of education had produced or signed on to overarching *governance* policies. In all four (BC, MB, ON, QC), these governance policies were related to broader government-wide mandates to address environmental protection, sustainable development, or climate change. In British Columbia, for example, a *Climate Action Charter* signed as an agreement between the province and all individual school boards supported the provincial mandate for a carbon neutral public service (British Columbia Ministry of Education, n.d.).

Five provinces (BC, MB, ON, NT, NU) had one or more sustainability-specific policies focused on *curriculum*, including pedagogical guides and curricular maps linking sustainability content directly to grade-level outcomes. While not using the title sustainability or “environment,” the Northwest Territories and Nunavut had created curriculum guides based on traditional Inuit knowledge and encompassing strong themes of cultural and environmental sustainability.

In terms of the remaining domains, three ministries (BC, MB, ON) had policies outlining sustainable school *operations* and three ministries of education (MB, ON, YK) had *research* reports related to sustainability curriculum, governance, or operations, produced in collaboration with working groups, advisory committees, or institutes. Only the Manitoba ministry of education produced sustainability documents specifically focused on community outreach activities, as well as publishing an ESD outreach newsletter between 2008 and 2012.

Cross-curricular competency frameworks. Publicly available overarching cross-curricular competency frameworks existed for all provinces and territories except Ontario, the Yukon, and the Northwest Territories; with all but British Columbia’s including a focus on sustainability. Most of these frameworks incorporated sustainability using the language of sustainable development, with several exceptions. For example, in Alberta (Alberta Education, 2011, p. 2) “Social, Cultural, Global and Environmental Responsibility” was listed as one of seven core competencies. The northern territory Nunavut had a set of Inuit knowledge-based cross-curricular competencies, developed according to “Inuit Piqujangit” or communal laws/principles (2007). This includes the competency of “Avatimik Kamattiarniq,” or environmental stewardship, which recognizes sustainability as fostered through mutually interdependent relationships.

Mission/vision statements. Of the 13 provinces and territories, only Manitoba referenced sustainability in ministry of education mission or vision declarations. In its mission statement, Manitoba Education and Training (n.d., para 5) referred to a “socially just and sustainable society.” Notably, British Columbia and Nova Scotia used the language of sustainability in economic terms in their mission/vision statements, referencing a “prosperous” and “sustainable economy.”

In sum, while all provincial ministries of education demonstrated some level of policy commitment toward sustainability, in 6 of the 13 jurisdictions this was accomplished mainly through the designation of a cross-curricular learning outcome. Without additional policy mechanisms supporting the integration of sustainability across governance, curricular, or other domains, achieving these cross-curricular outcomes may prove challenging.

School Division Policy Initiatives

At the school division level, we examined sustainability-specific policy documents, including in relation to involvement with sustainability certification programs, and the existence of sustainability-specific staff (Table 2). We also calculated “sustainability initiative scores” based on these three high-level policy initiatives, in order to assess trends at the school division level for each province and territory.

Sustainability-specific policy documents. Of Canada’s 374 K-12 school divisions at the time of data collection, 219 (59% of school divisions) were found to have policy documents with a focus on sustainability. Dates of school division adoption followed a distinct temporal trend, with few policies dating before 2006, followed by a rapid increase peaking in 2010. Seventy percent (187) of policies were dated between 2006 and 2014. The proportion of school divisions with policies varied across provinces, with Ontario having the highest and the Yukon and Nunavut the lowest. We further characterize these policies below in terms of domain of focus and institutional characteristics.

In terms of focus by whole institution domain, 177 sustainability-specific school division policies focused on *operations* (58% of policies). The majority of school division policies in most provinces were operations policies, ranging from 100% of policies in the Atlantic Provinces to 17% in Saskatchewan (Table 3). In general, more policies dealt with operations than all other domains of sustainability. Governance was addressed by 100 policies and curriculum by 94 policies (33% and 31% of policies). Only 18 policies dealt with *community outreach* (6% of policies). No sustainability-specific school division policies in Atlantic Canada focused on curriculum, governance, or community outreach. Regional variation in policy types is shown in Figure 1.

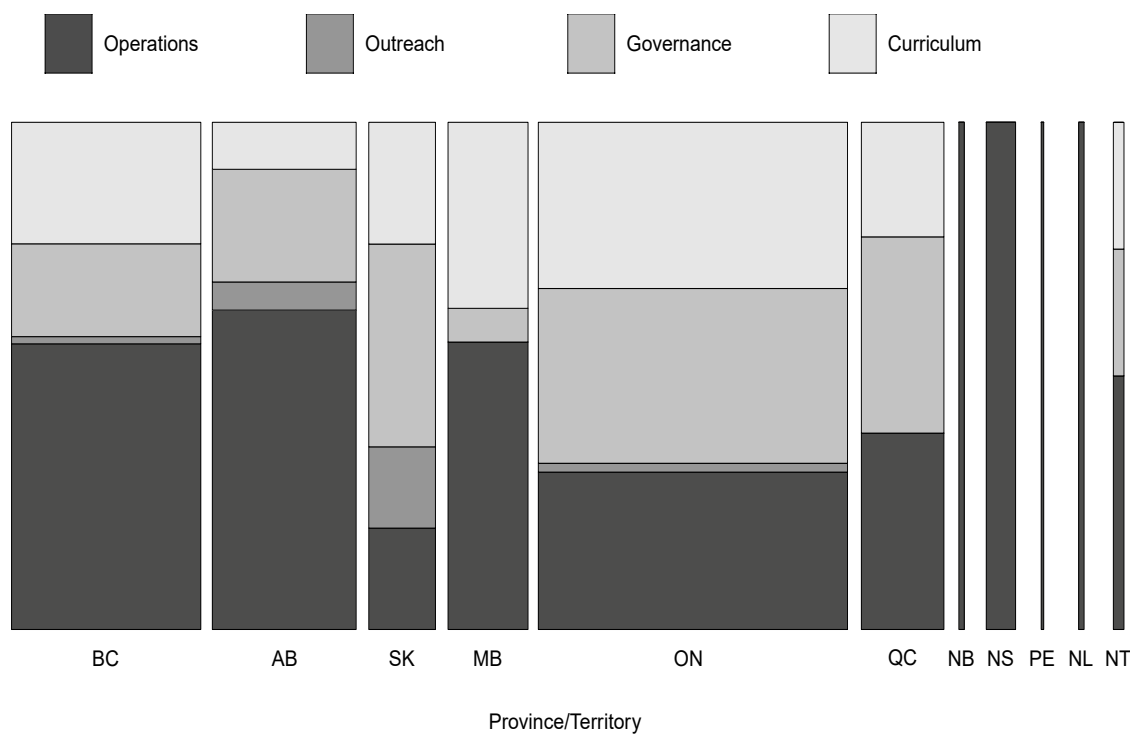


Figure 1. Sustainability domains of school division policies by province

Given the high number of sustainability-specific policies with a focus on operations, we examined the specific focus of those operations policies. Most had a focus on waste ($n=81$ policies; 27% of policies) and energy ($n=77$ policies; 25% of policies). Twenty-two policies focused on climate change (7% of policies); notably, climate change policies composed half of all policies in Atlantic Canada ($n=8$). No policies in Québec, the Yukon, Northwest Territories, or Nunavut had a climate change focus. These results are shown graphically in Figure 2.

Table 2
Sustainability Initiative Characteristics Tabulated by School Divisions in Canadian Provinces and Territories (Percentages in Parantheses).

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	CA
Mean SI score	1.0	0.9	0.8	1.1	1.5	1.2	0.4	1.7	0.5	1.0	0.0	0.4	0.0	1.1
Number of school divisions	60	61	28	37	78	73	7	9	2	2	5	8	4	374
Number of policies	65	43	24	23	107	23	2	11	1	2	0	3	0	304
School divisions with policies	40 (67)	38 (62)	18 (64)	18 (49)	71 (91)	22 (30)	1 (14)	6 (67)	1 (50)	1 (50)	0 (0)	3 (38)	0 (0)	219 (59)
Certification programs	11 (18)	13 (21)	3 (11)	21 (57)	34 (44)	66 (90)	2 (29)	9 (100)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	160 (43)
Staff	7 (12)	2 (3)	1 (4)	1 (3)	12 (15)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	25 (7)

Table 3
Detailed Breakdown of Sustainability Initiative Characteristics Tabulated by School Divisions in Canadian Provinces and Territories (Percentages in Parantheses).

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	CA
Policy domain focus														
Curriculum	14 (23)	9 (15)	5 (18)	13 (35)	38 (49)	8 (11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (13)	0 (0)	88 (24)
Outreach	3 (5)	2 (3)	4 (14)	1 (3)	7 (9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (5)
Governance	13 (22)	14 (23)	10 (36)	3 (8)	43 (55)	13 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (13)	0 (0)	97 (26)
Operations	31 (52)	31 (51)	4 (14)	13 (35)	32 (41)	13 (18)	1 (14)	6 (67)	1 (50)	1 (50)	0 (0)	2 (25)	0 (0)	135 (36)
Operations policy types														
Pest mgt	11 (18)	1 (2)	0 (0)	0 (0)	3 (4)	0 (0)	1 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	16 (4)
Energy	18 (30)	15 (25)	3 (11)	8 (22)	18 (23)	6 (8)	0 (0)	1 (11)	0 (0)	1 (50)	0 (0)	1 (13)	0 (0)	71 (19)
Waste	14 (23)	14 (23)	1 (4)	9 (24)	18 (23)	9 (12)	0 (0)	4 (44)	0 (0)	0 (0)	0 (0)	2 (25)	0 (0)	71 (19)
Climate change	6 (10)	1 (2)	2 (7)	3 (8)	2 (3)	0 (0)	1 (14)	5 (56)	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)	22 (6)
Certification prgms														
SEEDS	4 (7)	6 (10)	1 (4)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	13 (3)
Destination Cons	7 (12)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (2)
UNESCO	0 (0)	10 (16)	2 (7)	11 (30)	1 (1)	7 (10)	2 (29)	1 (11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	34 (9)
MB EcoGlobe	0 (0)	0 (0)	0 (0)	19 (51)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	19 (5)
ON EcoSchools	0 (0)	0 (0)	0 (0)	0 (0)	34 (44)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	34 (9)
Brundtland	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	66 (90)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	66 (18)
NS Green	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (2)

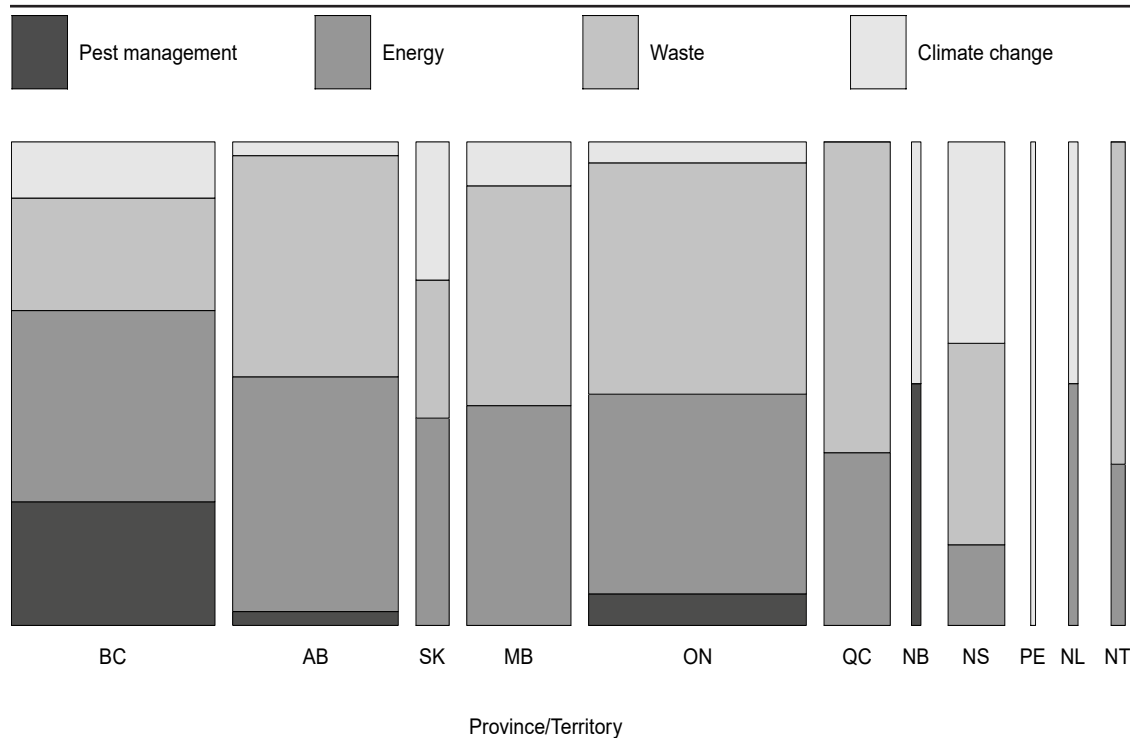


Figure 2. School division operations policies by type and by province

Having sustainability-specific policies was weakly or negligibly related to other school division characteristics with a few exceptions (Table 4). We found that school divisions having sustainability-specific policies was moderately related to the language of school divisions ($\Phi=0.38$), with English speaking divisions more likely to have policy. Having a sustainability-specific policy was also moderately related to having an Indigenous or multicultural policy or mandate ($\Phi=0.34$).

Sustainability certification programs. We found indications that schools in 160 divisions, or 43%, had been involved with one of seven formal sustainability certification programs (Table 2). Four of these programs were limited to a single province. For example, as shown in Table 3, one of the most popular was the Établissement Vert Brundtland School certification program, with data suggesting use by schools in 90% of school divisions in Québec. Similarly, in Nova Scotia, all nine school divisions indicated some level of school participation in the provincial Green Schools program. The provinces of Manitoba and Ontario also had unique certification programs, albeit with indications of lower levels of adoption.

Interestingly, we found little evidence of a connection between policy adoption and participation in sustainability certification programs: there was a negligible relationship between school divisions with sustainability certification participation and the existence of sustainability-specific policies ($\Phi=0.06$). In fact, school divisions with sustainability certified schools were slightly less likely to have adopted a policy than those without (55% versus 61%).

We found no substantive relationships between school division characteristics (e.g., number of schools, student population, language) and engagement with certification. One exception was the Ontario EcoSchools program, which was moderately related to the number of schools in the division ($r_{pb}=0.38$) and to student population ($r_{pb}=0.40$); unlike other certification programs, Ontario EcoSchools was used disproportionately in larger school divisions.

Sustainability staff. Twenty-five (7%) of Canada's 374 school divisions were found to have sustainability staff, or in other words, a dedicated staff member or members supporting sustainability engagement. Having sustainability staff was weakly related to having a sustainability-specific policy ($\Phi=0.20$). The presence of sustainability staff was moderately related to the number of schools in the division ($r_{pb}=0.35$) and to student population ($r_{pb}=0.35$); indicating that larger school divisions were more likely to employ full-time or part-time sustainability staff members.

Sustainability initiative score. Sustainability initiative (SI) scores evaluated the relative degree to

which the three analyzed sustainability initiatives (i.e., policy, certification program, staff) had been taken up across school divisions in each province. SI scores ranged from 1.7 and 1.5 in Nova Scotia and Ontario, respectively, to 0.0 in the Yukon and Nunavut (Table 2, Figure 3).

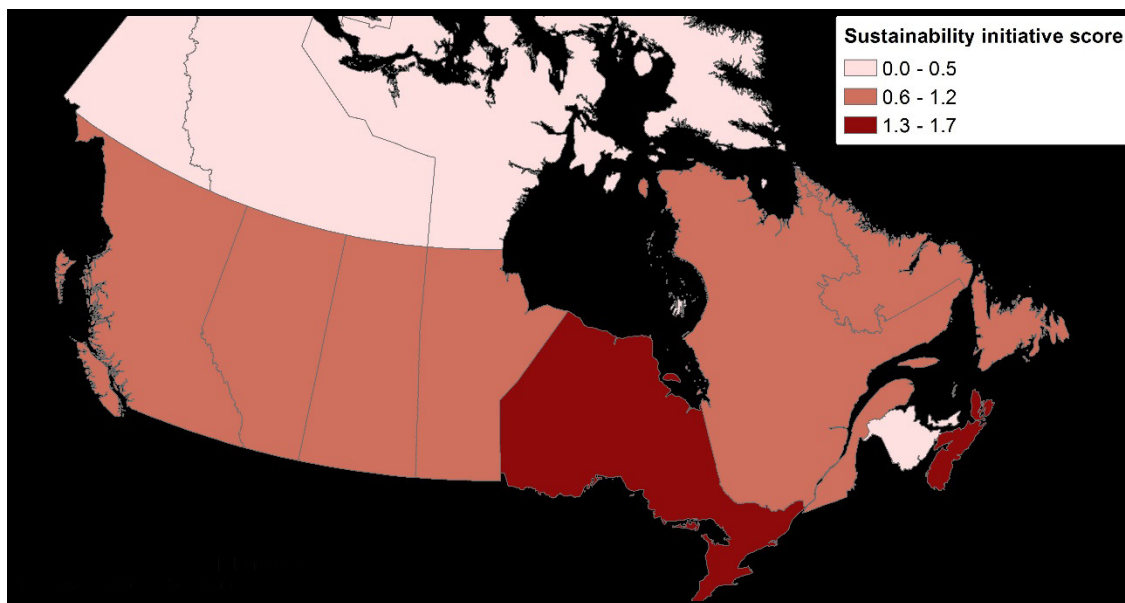


Figure 3. Provincial sustainability initiative (SI) scores

Relationships Between Ministry and School Division Indicators

We found little evidence of relationships between ministry of education and school division level indicators of engagement with sustainability in education policy. Random forest analysis indicated that the presence and type of ministry policies were poor predictors of the presence of school division sustainability-specific policies. These findings are supported by analysis of pairwise relationships: the presence of ministry sustainability-specific policies was only weakly associated with the provincial average SI score ($r_{pb} = 0.14$). One implication of this finding is that the adoption of ministry level sustainability-specific policies does not appear to spur development of school division policies. On the flip side, absence of ministry policy does not appear to hinder division level adoption. For example, in Alberta, Saskatchewan, and Nova Scotia, three provinces without ministry level policy on sustainability, division policy uptake was high: nearly two thirds of school divisions had created sustainability-specific policies.

While ministry-level policies were not predictive of school-division level policies, provincial context was influential, according to random forest classification. This suggests that other provincial factors may be important in initiating school division policy development. For example, within the province of Nova Scotia, commitments to waste diversion and climate change (Nova Scotia Environment, 2009) may have spurred school division policies in these areas (Table 2). Further research into the drivers of school division sustainability-specific policy is needed in order to elucidate the factors which influence local policy development.

Discussion

This research responds to the lack of comparative evaluation of the engagement with sustainability in K-12 education policy in Canada. It aims to inform policy making efforts through identifying trends in policy uptake across provinces and territories, including the existence of sustainability-specific policies and in which domain of institutional activity, engagement with sustainability certification programs, and the existence of sustainability staff. By providing data on the extent of sustainability uptake and relationships between ministry and school division uptake, we seek to provide evidence-based understandings that can inform and advance policy making in this area.

The study, and the larger project of which it is a part, respond to calls for “a research agenda to make

Table 4
 Moderate to High Association Coefficients Between School Division Characteristics; Association Coefficients Between School Division Characteristics

	Policy														Certifications									
	Province	Language	School Count	Student population	Policy	Policy Year	Curriculum	Outreach	Governance	Operations	Pest management	Energy	Waste	Climate change	Policy Count	SEEDS Green Schools	NS Green Schools	UNESCO Schools	Destination Conservation	ON EcoSchools	Brundtland Schools	MB EcoGlobe Schools	Staff	
Province	1																							
Language	0.35	1																						
School Cnt	0.13	0.04	1																					
Student Popn	0.11	0.07	0.93	1																				
Policy	0.47	0.38	0.21	0.22	1																			
Policy Year	0.19	0.26	0.23	0.28	0.65	1																		
Curriculum	0.36	0.13	0.15	0.17	0.47	0.38	1																	
Outreach	0.20	0.13	0.08	0.07	0.18	0.09	0.27	1																
Governance	0.39	0.18	0.24	0.27	0.50	0.29	0.16	0.11	1															
Operations	0.33	0.28	0.16	0.15	0.63	0.48	0.24	0.08	0.14	1														
Pest Mgmt	0.32	0.12	0.13	0.15	0.18	0.37	0.01	0.02	0.03	0.28	1													
Energy	0.23	0.18	0.07	0.07	0.41	0.31	0.20	0.06	0.04	0.63	0.10	1												
Waste	0.22	0.11	0.14	0.14	0.41	0.29	0.18	0.06	0.09	0.62	0.03	0.29	1											
Climate	0.42	0.15	0.06	0.03	0.21	0.10	0.02	0.16	0.07	0.33	0.06	0.20	0.20	1										
Policy Cnt	0.07	0.32	0.33	0.34	0.80	0.65	0.47	0.24	0.41	0.63	0.34	0.47	0.45	0.29	1									
SEEDS Green	0.28	0.08	0.17	0.12	0.07	0.03	0.07	0.04	0.05	0.07	0.03	0.13	0.06	0.08	0.07	1								
NS Green	0.01	0.05	0.04	0.03	0.04	0.01	0.08	0.03	0.09	0.10	0.03	0.04	0.09	0.31	0.06	0.03	1							
UNESCO	0.10	0.10	0.14	0.13	0.05	0.01	0.01	0.06	0.02	0.04	0.01	0.05	0.09	0.06	0.02	0.14	0.00	1						
DestCons	0.16	0.08	0.18	0.20	0.04	0.13	0.08	0.03	0.03	0.08	0.10	0.07	0.01	0.04	0.08	0.15	0.02	0.08	1					
ON Eco	0.19	0.10	0.38	0.40	0.25	0.19	0.26	0.15	0.28	0.09	0.07	0.01	0.06	0.04	0.24	0.06	0.05	0.05	0.05	1				
Brundtland	0.36	0.45	0.18	0.11	0.19	0.13	0.04	0.07	0.02	0.11	0.07	0.11	0.01	0.08	0.20	0.05	0.05	0.13	0.05	0.10	1			
MB Eco	0.13	0.02	0.05	0.03	0.02	0.04	0.08	0.05	0.03	0.02	0.03	0.08	0.09	0.05	0.01	0.03	0.02	0.23	0.02	0.05	0.05	0.05	1	
Staff	0.22	0.16	0.35	0.35	0.20	0.21	0.18	0.10	0.13	0.16	0.16	0.14	0.06	0.02	0.28	0.01	0.04	0.03	0.02	0.25	0.08	0.04	0.04	1

a stronger case for supporting ESD/EE” in Canada and internationally (CMEC, 2014, p 54). The 2016 Global Education Monitoring (GEM) Report also calls for “more systemic and rigorous approaches to monitoring country progress towards [SDG] target 4.7” (UNESCO, 2016, p. 52). It goes on to indicate that the “limited availability of curricular data poses a challenge for monitoring” (UNESCO, 2016, p. 56), along with access to other data which would help better understand how sustainability is being engaged in policy at national and regional levels. Such aspirations for the monitoring and evaluation (M&E) of policy are daunting. Yet given the importance of education in addressing climate change (UNESCO & UNFCCC, 2016) as well as broader sustainability issues (United Nations, 2016; UNESCO, 2014b), M&E is potentially valuable in enabling benchmarking of policy efforts, learning from other policy sites, target setting in the development and enactment of policy, and evaluation of progress towards those targets. Assessing successes and relationships in policy engagement can support efforts to “scale up” or “mainstream” sustainability in education nationally as well as internationally (United Nations, 2016; UNESCO, 2014b).

What do our data tell us about the state of sustainability engagement in Canadian education policy, and how might they be able inform policy making in Canada and internationally? Key findings from the study include the following:

- At the provincial level, all 13 ministries of education in Canada have addressed sustainability in some capacity, most often through cross-curricular priority or competency. Seven out of 13 (or 54%) had developed sustainability-specific policy.
- Five provinces and territories (almost 40%) also had a policy specifically focused on sustainability in the domain of curriculum, including two northern territories based on traditional Inuit knowledge.
- Three provinces (MB, ON, BC) had policy activity across multiple other domains of activity in addition to curriculum (e.g., overall governance and operations).
- Fifty nine percent of school divisions in Canada had policies with a focus on sustainability, with 58% of these in the domain of operations (waste, energy, climate change).
- School divisions that also had an Indigenous or multicultural policy were more likely to have a sustainability-specific policy.
- Forty three percent of school divisions in Canada had participated in one of 7 formal sustainability certification programs, and contrary to what might be expected, certified schools were less likely to have developed policy focused on sustainability.
- Twenty five percent of school divisions in Canada were found to have one or more dedicated staff members supporting sustainability engagement.
- The lack of relationship between ministry of education and school division level policy engagement suggests that ministry policy does not appear to advance policy development at the school division level; however, nor does it appear to hinder division development in low ministry policy contexts (e.g., AB, SK, and NS had no ministry level sustainability-specific policy, but nearly two thirds of divisions in those provinces had developed sustainability-specific policies).
- While ministry level policies were not predictive of division level policies, provincial context was (e.g., as indicated by SI scores), suggesting factors such as regional cultural contexts and requirements of provincial non-education policy directly affect school division engagement.

Despite long-standing acknowledgement of the influence of local leadership on policy (e.g., McLaughlin, 1987), research attending to the role of divisions in policy uptake has been “intermittent” (Rorer, Skrla, & Scheurich, 2008). In a systematic review of the environmental and sustainability education policy research literature, we noted a dearth of policy studies focusing on the local level (Aikens, McKenzie, & Vaughtner, 2016). Indeed, while recent international surveys of ESD and climate change education emphasized the heterogeneity of uptake within national contexts (Feinstein, Læssøe, Blum, & Chambers, 2013), comparative research programs have largely examined variation at the state or provincial level (e.g., Blum, Nazir, Breiting, Goh, & Pedretti, 2013; Kirk, Wilke, & Ruskey, 1997). To our knowledge, the findings presented here represent the first comprehensive analysis of the relationships between ministerial and division-level engagement with sustainability in education policy within a given national context.

Conclusions and Implications

The study's key findings suggest that levels of engagement with sustainability in K-12 education policy in Canada have room for further development. While particular topics are often included in particular grade and subject area curriculum, the minimal inclusion at the ministry level in cross curricular priorities in a number of provinces without further support is not ideal. While ministries of education tend to focus on the curriculum domain in engaging sustainability, at the school division level the focus is largely in the area of operations, as might be expected given their respective jurisdictions. However, at both levels there is a need for greater engagement across all domains of possible engagement in adoption a more "whole institution" approach to sustainability (Henderson & Tilbury, 2004). M&E across a range of domains of institutional activity helps identify gaps, and can support broader engagement with sustainability, not only in what happens in classrooms, but also in relation to overall planning, the infrastructure and footprint of education settings, how community is engaged or not in sustainability initiatives, and in whether research and evaluation of progress towards addressing sustainability is undertaken.

A second key implication of the study is that the different scales of policy matter in how sustainability is engaged, though their levels of engagement may influence each other less than one might expect. If it was left to the provincial level, little progress would have been made on the ground in terms of the footprint of divisions and schools. However, that over half of school divisions in the country have policies focused on sustainability, and over half of these are in the area of facilities' operations, means that this focus is being addressed, despite the relative dearth of ministry policy in this area¹¹. Further examination of the interscalar relationships between policy at the international (e.g., UNESCO), national (e.g., CMEC), provincial, and regional levels would help inform understandings of how various levels of policy making might work together to support and amplify policy activity regarding sustainability.

A final key finding we want to highlight is the lack of relationship found between school division participation in a sustainability certification program and the likelihood of divisions having sustainability-specific policy. While in some cases certification programs liaise directly with particular schools, in many cases there is broader division participation, and thus we would expect to see greater engagement at the policy level by participating divisions. An area for future research would be examining how certification programs in Canada and elsewhere require and support the development of policy as part of the milestones towards achieving certification status.

Finally, Canada, as a federated education system, is also a useful case in that it provides an exception to seeming assumptions in international guidelines that it is always possible to put in place national education policy or national strategies for sustainability engagement in education (UNESCO, 2014b; UNESCO & UNFCCC, 2016). UN guidelines and processes regarding sustainability are typically framed at the national level, given many countries do have national curriculum and other education policy. This often includes requirements of national-level monitoring and evaluation, and the appointment of national focal points who will oversee progress and evaluation. While interprovincial bodies such as CMEC can offer synthesis and communication, de-centralized policy making contexts such as in Canada could be better taken into account in UN language and processes in order to enable more successful engagement¹² (Feinstein et al., 2013). In addition, as the diversity of this census data suggests, there is not coherent approach to the engagement of sustainability across the country, which provides a challenge in how national-level evaluation efforts account for diverse, yet related, approaches (CMEC, 2014).

In closing, this study points to some of the achievements as well as gaps in how sustainability is being engaged across Canadian provinces and territories, at both ministry of education and school division levels. We hope as a benchmarking exercise that it provides some incentive for leadership at ministry and school division levels in developing further policies to support sustainability engagement and across various domains of activity. For sustainability certification program leadership, and those who participate in them, the study also suggests that there could be greater involvement and support of policy development through participation in these programs. Finally, for those involved in monitoring, evaluation, and research in K-12 education, we hope the methods and findings of the study contribute to understandings

¹¹The provinces of British Columbia, Manitoba, and Ontario are exceptions, addressing on-the-ground operations through ministerial policy.

¹²In addition to de-centralized provincial and territorial jurisdiction over public schooling, Indigenous and Northern Affairs Canada (INAC) also allows local jurisdiction over Indigenous community schools, each of which has the authority to develop their own curriculum (Bentham, Wilson, McKenzie, & Bradford, in press).

of the value on non self-reported, comparative data in assessing and supporting sustainability engagement in policy.

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