Literature Review & Jurisdictional Benchmarking to Support the Curriculum Review in

Social Studies, Grades 1 to 6
Geography, Grades 7 and 8
and
Canadian & World Studies, Grades 9 to 12

Prepared by

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Executive Summary

> Geography is concerned with place. Understanding the nature and causes of a real differentiation on the global surface has been the geographer's task since people first noticed differences between places.
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> Geography's focus is thus on the evolving character and organization of the Earth's surface, the way in which the interaction of physical and human elements creates distinctive places, and the way those places interact with or influence others in space and over time.
> (Canadian Council for Geographic Education [CCGE], 2001, p. iii)

When the lay person thinks of Geography, he or she may think of creating and reading maps and knowing the capitals of Canadian province and countries around the world. But Geography is much more all-encompassing than maps and capitals. It provides a lens for thinking critically about how we treat each other in the world and how we treat the world itself. It gives us innovative technological tools to help understand our roles as global citizens and the means to assess and evaluate our success in the pursuit of these roles.

The importance of these various aspects of Geography demands that we bring evidence-based insights into the development of our Ontario Geography curriculum. This evidence can come from investigating current research literature and from benchmarking curriculum documents in other jurisdictions nationally and internationally. That is precisely what we have done in the current report.

We have divided the report into six sections, each representing a critical aspect of Geography: Equity and Inclusion, Assessment and Evaluation, Global Citizenship, Critical Thinking, Geospatial Technology, and Environmental Education. We derived these themes from our complex understanding of the nature of Geography and our in-depth examination of research literature and curriculum documents (additional supplementary evidence around these themes is located in the appendices). Within each section, we first provide an overview of relevant literature. We then delineate how each of seven jurisdictions, including Ontario, is addressing the given aspect of

Geography. We end each section with a list of recommendations and a rationale for these recommendations.

Overall, we conclude that the current Geography curriculum demonstrates a strong understanding of the crucial aspects that need to be addressed in the subject. It is less helpful in showing how these aspects could and should be addressed, often relying on teachers going to other Ministry documents to locate appropriate information about pedagogical practices. Finally, we recognize that the best curriculum documents need to be accompanied by a commitment for teacher education to ensure that all students attain the goals at the forefront of the Geography curriculum.

Equity and Inclusion Report

Ontario is the most culturally and linguistically diverse province in Canada, with 28.3 % of Ontarians being immigrants, 22.8% visible minorities, and 26.1% having a mother tongue other than the official languages of English and French (Statistics Canada, 2009). In addition to cultural and language differences, people in Ontario vary by ability, with 13.5% of Ontarians identified as having a disability and nearly half of all Canadian children with disabilities aged 4 to 15 (approximately 155, 000 in total) residing in Ontario (Participation and Activity Limitation Survey [PALS], 2001).

Despite government efforts to support educational equity and inclusion, certain groups remain at risk for academic failure and dropping out of high school. For example, recent results from the Ontario Secondary School literacy test indicate that the percentage of ELL and Special Needs students who met or exceeded Ministry expectations, 66% and 55% respectively, is much lower than the general student population average of 85% (Education Quality and Accountability Office [EQAO], 2009). Moreover, longitudinal studies of Canadian high school English Language Learners (ELL) learners reported a 74% drop-out rate (Watt & Roessingh, 1994a, 1994b, 1996a, 1996b, 2001). Similarly, the Canadian Council on Social Development (2000) depicts Aboriginal youth as being at risk for not graduating from high school; 3 in 10 Aboriginals between the ages of 15 to 19 did not complete high school and were not going to school in the past year and over 50% of Aboriginals aged 20-24 did not graduate high school.

The National Anti-Racism Council of Canada (NARCC, 2007) asserts significant changes must occur in education to meet the needs of this increasingly diverse student population. Two NARCC recommendations are especially important in the context of curriculum revision. First, Euro-centric curriculum needs to be re-written to represent the lives of *all* students. Second, teachers need to be more knowledgeable of how to meet the needs of ELL learners.

A promising approach for informing a more representative and relevant curriculum is culturally responsive pedagogy (Gay, 2002; Richards, Brown & Ford, 2007; Villegas & Lucas, 2002). Gay (2002) defines culturally responsive teaching as "using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively" (p. 106). It involves studying a vast range of ethnic individuals and groups; identifying issues of

race, class ethnicity, and gender; and involving multiple kinds of knowledge and perspectives. Keeping in mind that a vast amount of instructional time is spent giving examples and illustrations, Gay asserts these examples/illustrations can act as "pedagogical bridges," connecting prior knowledge to new knowledge by incorporating students' cultures into examples and illustrations (i.e., ethnic architecture, fabric designs, recipes, etc.; p. 112). This effective instruction for culturally and linguistically diverse students involves early intervention, active participation in learning, explicit skills instruction, and communal learning styles (cooperative learning, buddy systems, peer tutoring; Cartledge & Kourea, 2008; Gay, 2002).

In addition to being culturally responsive, teachers must be aware of the unique needs of English Language Learners to effectively teach Social Studies and Geography. The use of decontextualized textbooks (Brown, 2007) and abstract vocabulary (Weisman & Hansen, 2007) presents special challenges for ELL learners. These challenges and appropriate methods of accommodation are outlined in the following table.

Table 1: Challenges and Methods of Accommodation for ELL Learners

Challenges	Accommodations
Decontextualized Textbook Challenges: • ELL students often lack background knowledge • ELL learners do not have grade-level vocabulary and language used in texts is often highly technical and abstract • There are few graphic clues • Texts do not provide clarification or feedback that conversations do (Brown, 2007, p. 185)	Textbook Accommodations: • Content maps- show how parts of text are related; graphic organizers illustrate the hierarchical relationship of facts; train students to look for the main idea of a complex sentence • Outline of the text- highlights vocabulary and content • Guiding Questions- help ELL students know what to look for, focuses their attention • Read a simpler version- content in textbooks is similar, a simpler version would help increase comprehension (Brown, 2007, p. 187)
Abstract Vocabulary Challenges: • ELL students are not able to learn content if they do not understand abstract vocabulary • ELL students miss out on important opportunities to share their experiences of culture, language, and knowledge (Weisman & Hansen, 2007, p. 180)	Abstract Vocabulary Accommodations: • Using real objects (realia), charts, pictures, and graphs helps portray meaning • Role playing abstract concepts • Graphic organizers- help students understand relationships between words and complex ideas • Opportunities to practice academic skills orally and in writing; group work facilitates the use of language • Model paraphrasing • Explicit instruction of vocabulary with visual aids • Frequent repetition of vocabulary throughout the unit (Weisman & Hansen, 2007, pp. 182-184)

Teacher understanding of subject-specific (outlined above) and general needs of ELL students (see the work of Jim Cummins on bilingual education) cannot be assumed. People for Education (2005) report only 5% of pre-service teachers from the University of Toronto's Ontario Institute for Studies in Education (OISE) take the ELL elective in any given year (p. 12). Teachers require training and understanding to help ELL students learn academic content and become proficient bilinguals.

One of the most practical and effective means of meeting the needs of a diverse group of learners, typical of most classrooms in Ontario, is differentiated instruction (Tomlinson, 2000; Van Garderen & Whittaker, 2006; VanSciver, 2005). While the goal of differentiated instruction is for all students to master content (essential understanding and skills), the means for obtaining mastery varies (VanSciver, 2005). Specifically, "teacher support, task complexity, pacing and avenues to learning" vary based on "student readiness, interest, and learning profile" (Tomlinson, 2000, p. 25). Van Garderen and Whittaker (2006) succinctly describe five classroom environments in which differentiated instruction can occur. The following table identifies these environments and corresponding differentiated instruction.

Table 2: Classroom Environments and Differential Instruction

Classroom Environment	Differentiated Instruction
Content: What is taught and how access to the information and ideas that matter is given.	- Texts at varied reading levels - Provision of organizers to guide note-taking - Use of examples and illustrations based on student interest - Present in visual, auditory, and kinesthetic modes - Provide materials in the primary language of second - language learners
Process: How students come to understand and "own" the knowledge, skills, and understanding.	- Vary the pacing of student work - Use cooperative grouping strategies (e.g., Think-Pair-Share, Jigsaw) - Develop activities that seek multiple perspectives on topics and issues - Highlight critical passages in a text - Tiered assignments
Product: Student demonstration of what he or she has come to know, understand, and be able to do.	- Provide bookmarked Internet sites at different levels of complexity for research sources - Develop rubrics for success based on both grade-level expectations and individual student learning needs - Teach students how to use a wide range of product formats (e.g., presentation software)
Affect: Student linking of thought and feeling in the classroom.	- Modelling respect - Help students examine multiple perspectives on important issues - Ensure consistently equitable participation of every student
Learning Environment: Classroom function and feeling.	- Rearrange furniture to allow for individual, small-group and whole-group work - Availability of supplies and materials (e.g., paint, paper, pencil) - Procedures for working at various places in the room and for various tasks

Differentiated instruction promotes equity and inclusion in the classroom setting by identifying and incorporating student strengths and interests in teaching and learning. It is therefore important for increasing student motivation and achievement.

Equity/Inclusion Canadian Comparisons

Ontario

The Social Studies Grades 1 to 8 and The Canadian and World Studies Grades 9 to 12 curriculum documents do not provide a detailed approach to equity and inclusion in the classroom, such as general principles or strategies and resources for educators. However, The Social Studies curriculum refers to the use of anti-racist pedagogy and The Canadian and World Studies curriculum states that students are expected to demonstrate, "respect, tolerance and understanding towards individuals, groups, and cultures in the global community and respect and responsibility towards the environment. They are also expected to understand that protecting human rights and taking a stand against racism and other expressions of hatred and discrimination are basic requirements of responsible citizenship" (p. 14).Ultimately, children need a safe and welcoming learning environment in order to realize their potential; they need to feel valued by teachers and peers to succeed in the school system. Teacher beliefs and school climate must be nurturing and validating. Students' cultural backgrounds and abilities need to be reflected in school resources (books, online resources, magazines, etc.) and within the school building itself (bulletin boards, posters, banners, etc.). Schools and teachers can foster respect for individuals by helping students understand each other's lives. For example, one teacher in a Toronto school partnered immigrant and non-immigrant students in a literature class, assigning each pair readings about immigrant experiences. By the end of the project, non-immigrant students acquired respect and admiration for their immigrant partners. Similarly, schools and classes have chosen to partner internationally through e-pals (email pen pals) and school/class projects to develop mutual respect and collaboration. Ontario teachers and schools need clear guidance on how to put inclusion and equity policies into practice for the benefit of all students.

Manitoba

The Manitoba curriculum is highly devoted to issues of equity and inclusion in the teaching and learning experience at all grade levels. Moreover, professional development and pedagogical techniques are integrated within curriculum documents. For example, the curriculum documents outlining the program of study for Social Studies Grades 7 to 10 include a chapter devoted to issues of equity and inclusion in teaching and learning, entitled *Social Studies as a Curriculum of and for Diversity and Equity*. This chapter outlines the characteristics of an inclusive social studies classroom focused on the principles of social justice. More specifically, the chapter outlines that a social studies curriculum that advocates social justice is built upon the integration and exploration of issues related to inclusion, diversity, and anti-racism. The development of an

anti-racist pedagogy involves creating a safe space where students can become more aware of their social and ethnic identity, encouraging students to question prevailing notions of power that contribute to the formation of one's identity, developing positive attitudes among students toward issues of diversity, and incorporating multicultural resources into the classroom.

British Columbia

The social studies curriculum in British Columbia outlines the role of educators in creating equitable and inclusive learning environments. Teachers should ensure that classroom instruction, assessment, and resources reflect sensitivity to diversity and incorporate positive role portrayals, relevant issues, and themes such as inclusion, respect, and acceptance. One approach that is strongly advocated is the inclusion of Aboriginal communities and perspectives in the social studies curriculum.

An emphasis is placed on creating connections between teachers and local Aboriginal communities. The education system in BC is dedicated to ensuring that the cultures and contributions of local Aboriginal peoples are reflected in the provincial curriculum. In order to address Aboriginal perspectives "in a way that is accurate and that respectfully reflects Aboriginal concepts of teaching and learning, teachers are strongly encouraged to seek the advice and support of local Aboriginal communities. Aboriginal communities are diverse in terms of language, culture, and available resources" (*British Columbia Ministry of Education Social Studies 10: Integrated Resource Package*, 2006, p. 10).

Nova Scotia

Nova Scotia's equity and inclusion policies are found in the *Racial Equity Policy* of 2002. The policy itself is quite broad, encompassing general statements rather than specific statements or prescriptions as to how these policies should be realized. The policy speaks to administrative and departmental concerns; however, these are included in the present review. The report outlines policy statements related to equitable curriculum, equitable assessment, equitable instruction practices, and affirmation of the learners' first language. An equitable curriculum is one that is sensitive to and respectful of the culture of all learners. Equitable assessment strategies must affirm racial equality for all learners. Equitable instructional practices accommodate the cultural backgrounds, experiences, perspectives, learning styles, and needs of diverse learners. The Ministry of Education respects and values a learner's first language.

The development of FSL/ELL programs should recognize and affirm a learner's first language by enabling the learner to build on past linguistic experiences.

New Brunswick

The New Brunswick curriculum includes a brief statement outlining the principles of equity and diversity in the social studies curriculum. The statement outlines commitment to the principles of diversity, and maintains that the curriculum should provide for the inclusion of diverse interests, values, and experiences of each student. The notion of respect is of utmost importance. All students are entitled to be treated with respect, and, in turn, are expected to respect all other people including peers and teachers. According to the Ministry, students "are entitled to an educational system that affirms their gender, racial, ethnic, and cultural identity, and promotes the development of a positive self- image." Although the statement outlines that the curriculum should foster understanding and acceptance of the diversity that is characteristic of Canada, educators are not provided with specific resources or tools to positively engage with cultural, ethnic, or linguistic diversity while simultaneously rejecting prejudiced attitudes and discriminatory practices.

UK Equity and Inclusion

The Primary Curriculum – Including All Learners Statement

As part of the new primary curriculum introduced in January 2010, a statutory inclusion statement establishes entitlement to a range of high quality teaching and learning experiences irrespective of social background, culture, belief, race, gender, or differences of ability. The statutory inclusion statement includes the following three principles:

1. *Setting suitable learning challenges*

    Teachers have the objective of setting appropriate learning challenges for all of their pupils. Teachers should aim to give every pupil the opportunity to experience success in learning and to achieve as high a standard as possible, whether or not this involves choosing knowledge and skills from earlier or later stages so that individual pupils can make progress and show what they can achieve.

2. *Responding to pupils' diverse learning needs*

    When planning, teachers should provide opportunities for all pupils to achieve; including boys and girls, pupils with special educational needs, pupils from all social and cultural backgrounds, pupils from different ethnic groups including refugees and asylum seekers, and those from diverse linguistic backgrounds. Teachers are responsible to take action

by: creating effective learning environments, securing pupil motivation and concentration, providing equality of opportunity through teaching approaches, using appropriate assessment approaches, and setting targets for learning.

3. *Overcoming potential barriers to learning and assessment for individuals and groups of pupils*

A minority of pupils will have particular learning and assessment requirements and, if not addressed, these requirements could create barriers to learning. Teachers must take account of these requirements and make provision, where necessary, to support individuals or groups of pupils to enable them to participate effectively in the curriculum and assessment activities. During end of key stage assessments, teachers should bear in mind that special arrangements are available to support individual pupils.

The Secondary Curriculum – Including All Learners Statement

The secondary curriculum also includes a statutory inclusion statement that establishes entitlement to a range of high quality teaching and learning experiences irrespective of social background, culture, belief, race, gender, or differences of ability. The statutory inclusion statement includes the following three principles:

1. Setting suitable learning challenges

The statute on differentiation responds to the need to set suitable learning challenges for all students. Differentiation in terms of setting goals and planning is the strategy advocated for creating a more inclusive teaching and learning environment. In such a classroom, all learners know the areas they need to work on, whether these relate to a subject, an area of social or thinking skills, or their personal targets. In terms of differentiated planning, it is more effective to design lessons around a central objective, allowing as much room as possible for individual engagement, a degree of choice, and respect for the range of abilities and interests in the class.

2. Responding to pupils' diverse learning needs

The statute on motivation responds to the diverse learning needs of pupils. All learners are motivated by progress. Careful discussion on where pupils have reached and what they should aim to learn next is crucial. Motivation requires an awareness on the part of the teacher of the pupils' strengths, interests, and learning styles. The role of the teacher must also include different ways of praising and reinforcing success, setting high expectations for pupils, and creating opportunities for creativity across the curriculum.

3. Overcoming potential barriers to learning and assessment for individuals and groups of pupils

The statute on removing barriers responds to the overcoming of potential barriers to learning and assessment for pupils in the inclusion statement. Teachers can offer a wide variety of support, such as: aiding pupils' memory, helping pupils in understanding the sequencing of events, improving pupils' coordination, incorporating auditory and visual methods of learning, and accessing alternative arrangements for assessment and evaluation.

New South Wales Equity and Inclusion

Equity and Inclusion is referenced to in the most general of terms in the New South Wales curriculum. Teachers and students are to be aware of issues around equity and inclusion of all students, especially Aboriginal students and students who have special needs. However, there are no specifics given about how this is to be accomplished.

Recommendations

Recommendation 1: *Culturally responsive pedagogy, including resources and instructional methods such as cooperative small group learning, should be clearly supported in the curriculum documents, with specific information for teachers, not restricted to general principles.*
Rationale: Ontario's culturally diverse population includes students at-risk for academic failure and drop out (ELL, special needs learners, Aboriginal youth). Reports from the Canadian Council on Social Development, the National Anti-Racism Council of Canada, EQAO, and Watt and Roessingh (2001) point to the need for change in pedagogical practices to support the learning of all students. Specific culturally responsive practices can meet the needs of all learners. The inclusion of Aboriginal perspectives into the curriculum can benefit Aboriginal students as well as those who are non-Aboriginal (Manitoba, 2003).

Recommendation 2: *Differentiated instruction based on the principles of Universal Design for Learning (UDL) should be the model for classroom practice.*
Rationale: Differentiated instruction allows teachers to deal with specific student difficulties and skills, and facilitates high levels of student engagement and achievement of curriculum expectations (Education for All, 2005). Teachers working from a differentiated instruction approach use a variety of methods, activities, and resources to meet the differing needs of all students in their classes. Differentiated instruction can include variations in content, processes, products, and assessment. Student needs are accommodated appropriately.

Recommendation 3: *Provide explicit support for teacher professional learning and improvement of teaching practice by means of specific strategies, resources, and modeling of best practices such as cooperative small group learning through online links easily accessed directly from curriculum expectations. Do not make teachers search external documents, websites, or supports such as eworkshops – put the links right with the curriculum expectations.*

Rationale: Research-supported best practices improve student learning (Education for All, 2005). Information about and models of best practices for equity and inclusion should be easy for teachers to find and use in the most culturally and linguistically diverse province with high drop out rates for certain groups. Teachers reported that only 57% of elementary teachers in an Ontario survey felt adequately prepared to teach the curriculum, and only 25% agreed that there were adequate resources available to them (Leithwood, McAdie, Bascia & Rodrigue, 2004). Support should be easy to access for teachers wanting to differentiate their classroom instruction, by using, for example, cooperative learning groups or problem-based learning.

Assessment and Evaluation Report

Recent discussions about the purpose of assessment and evaluation in education focus on the need for strategies that support and enhance student learning (Black, McCormick, James, & Pedder, 2006; Earl, 2003; Education for All, 2005; Shepard, 2000; Stiggins, 2002; Tomlinson, 2007). Such discussions have resulted in the distinction between assessment *of* learning versus assessment *for* learning. Assessment of learning refers to summative evaluations or final judgments often associated with end-of-unit tests. It is also connected with once a year standardized (or high stakes) tests meant to increase educational accountability (i.e., students are learning what they are supposed to be learning and teachers are teaching what they are supposed to be teaching). On the other hand, assessment for learning is based on formative evaluations meant to improve teacher instruction and student performance. Assessment for learning advocates argue that leaving assessment until the end of a unit (or year) is highly unproductive as it leaves no room for improvement.

While there is a place for summative assessment in social studies, an overreliance on tests is detrimental (Lambert, 2002). For example, a research review by the Assessment Reform Group (2002) in the UK found tests have a significant negative impact on student motivation and learning. Mathison and Fragnoli (2006) believe this effect is because the word "test" has been stripped of its connotation of tentativeness in school contexts. Rather than a means of trying something out, tests signify an unalterable end result. You either pass the test or you fail it.

This consequence is equally true in standardized testing. The deep-held notion that increasing academic standards and accountability result in increased student performance is flawed; students who perceive increased expectations as unattainable give up in hopelessness (Stiggins, 2002). Moreover, Popham (2001) asserts that standardized testing may actually worsen student performance because it narrows the curriculum, dedicating instructional time to what is on the test instead of what is important, and decreasing motivation with tedious drill and skill activities. Black, McCormick, James, and Pedder (2006) also view teaching to the test as negative. They contend that teachers who teach to the test ask students to memorize decontextualized information and abstract concepts and thus undermine the goal of developing effective learners. Black, Harrison, Lee, Marshall, and William (2004) expand on the problems associated with current tests and grade-focused assessment practices: they do not promote

good learning, they tend to emphasize competition rather than individual improvement, and they have a particularly negative impact on low-achieving students.

The assessment for learning movement is a response to the problems linked with assessment of learning, with the aim of incorporating assessment activities that generate feedback intended to positively modify the teaching and learning environment. Black et al. (2002) identify and explain four assessment practices that promote student learning:

1. Questioning	- Teachers need to incorporate wait time to allow more students to demonstrate their understanding, which can be done by using a "Think, Pair, Share" strategy prior to class discussions; - Teachers need to ask open-ended, deep questions that are worth answering to get at students' real understanding of concepts; - Teachers need to frame their questions well and use rich follow-up activities to extend student learning
2. Feedback	- Written tasks and responses to oral questions should encourage students to develop and show key features of what they have learned; - Feedback should be targeted at improvement, with an emphasis on comments rather than grades; - Comments should identify what has been done well, what still needs improvement, and guidance on how to improve - Opportunities for students to respond to comments should be a planned part of the learning process, which can be done through conferencing
3. Peer Assessment and Self-Assessment	- Criteria for evaluating any learning achievements must be made transparent so students have a clear overview both of the aims of their work and of what it means to complete it successfully. Such criteria may well be abstract, but concrete examples should be used in modelling exercises to develop understanding - Students need to keep in mind the objectives of pieces of work to effectively assess the work of peers and their own progress - peer assessment can help develop the objectivity required for effective self-assessment - peer assessment and self-assessment make distinct contributions to the development of students' learning - self-assessment can help students guide their work and become independent learners
4. Formative Use of Summative Tests	- Students are encouraged to re-draft work based upon feedback from the teacher-, peer-, and/or self-assessment - Students can participate in setting and marking questions so they know what is required of them on final tests - Overall, summative tests should become a positive part of the learning process. Through active involvement in the testing process, students can see that they can be the beneficiaries rather than the victims of testing, because tests can help them improve their learning

A case study of a school in Scotland involved in the national Assessment for Learning initiative, which incorporated Black et al.'s (2002) model, revealed positive findings (Priestly & Sim, 2005). Overall, there was improved classroom dialogue, and teachers were more explicit about assessment objectives and criteria. Specifically, wait time led to more cooperative learning activities, teachers used conferencing more as a form of feedback, and the introduction of techniques such as traffic lighting (red= no understanding, amber= partial understanding, and green= complete understanding) aided self-assessment. Moreover, teachers indicated having less marking and more flexibility and spontaneity in the classroom. Teachers felt that assessment for learning practices increased student motivation to learn and helped students become more independent learners.

Assessment for learning tasks should be based on backwards design (Shepard, 2000). For example, if teachers desire students to learn to reason critically, solve complex problems, and apply knowledge in meaningful contexts, students must be given open-ended performance tasks though which to demonstrate these skills. Authentic assessment tasks that support higher-order thinking include: observation, interviews, reflective journals, projects, demonstrations, collections of student work, and students' self-evaluations. In general, "good assessment tasks are interchangeable with good instructional tasks" (p. 8). Ongoing formative assessment of teachers' own practices aids the assessment for learning process by improving instructional and assessment strategies (Shepard, 2000; Tomlinson, 2007). An emphasis on assessment for learning guides students and teachers towards improvement. This improvement is not always the case with assessment of learning.

Assessment and Evaluation Canadian Comparisons

Ontario

The Social Studies Grades 1 to 6 and the Canadian and World Studies curriculum makes a distinction between and need for both assessment and evaluation. Assessment strategies involve the systemic gathering of information on the achievement of curricular expectations. Evaluation is the process of interpreting, analyzing, and reflecting upon the data collected to make decisions and judgments of student achievement. According to the Canadian and World Studies curriculum, "As part of assessment, teachers provide students with descriptive feedback that guides their efforts towards improvement. Evaluation refers to the process of judging the quality of student work on the basis of established criteria, and assigning a value to represent that quality" (*The Ontario Curriculum Grade 9 and 10, Canadian & World Studies*, 2005, p.14).

Manitoba

Manitoba does a good job addressing the issue of assessment and evaluation within their curriculum documents. For example, the curriculum documents for Grades 7 to 10 include a chapter outlining principles for classroom-based assessment. The distinction is made between summative assessment, which is often referred to as assessment of learning and formative assessment, also described as assessment for/as learning. More importantly, assessment is linked to three stages in the learning process: activating, acquiring, and applying. Assessment during the activating stage identifies gaps and strengths in students' prior knowledge, and informing future instruction. Assessment during the acquiring stage provides feedback as learning takes place, and allows teachers and students to make adjustments to strategies and activities. Assessment during the applying stage focuses on students using new understandings in meaningful and authentic ways. Authentic assessment tasks are those that have a practical purpose and replicate real-world situations, allowing students to apply knowledge, values, and skills beyond the classroom.

British Columbia

The British Columbia curriculum documents outlining the program of study for social studies 7 to 12 distinguishes between three types of assessment, all of which can be used in conjunction with one another to support student achievement. Broadly speaking, assessment for learning is assessment for purposes of greater achievement. Assessment as learning is assessment as a process of developing and supporting students' active participation in their own learning. Assessment of learning is assessment for purposes of providing evidence of achievement for reporting. The Ministry also makes a clear distinction between formative and summative assessment. Both assessment for learning and assessment as learning are labeled as formative assessment. The teacher should adjust practices to respond to the identified needs of students as a result of such assessment. Students are also provided with feedback, and given the opportunity to consider how they can improve their own learning. Assessment of learning is labeled as summative assessment, occurring at the end of the year, or key stages. Summative assessment is used by teachers to make judgments of student performance in relation to provincial curriculum standards.

Nova Scotia

The Ministry of Education in Nova Scotia makes a clear distinction between assessment and evaluation. Assessment strategies involve the systemic gathering of information on the achievement of curricular expectations. Evaluation is the process of interpreting, analyzing, and reflecting upon the data collected to make decisions and judgments of student achievement. Based on this distinction, formative assessment and summative evaluation are used in conjunction with one another to improve student learning and achievement. Formative assessment is designed to identify a student's strengths and weaknesses so that adaptations can be made. Formative assessment is a continual process. With respect to summative assessment, the intention is to gauge the extent to which the students are meeting curricular expectations. Summative assessment generally takes place at the end of the course or at key stages throughout the course, such as the end of units or themes.

New Brunswick

New Brunswick provides a definitional distinction between assessment and evaluation. Assessment strategies involve the systemic gathering of information on the achievement of curricular expectations. Evaluation is the process of interpreting, analyzing, and reflecting upon the data collected to make decisions and judgments of student achievement. Evaluation in the social studies program in New Brunswick distinguishes between two broad types of evaluation. Evaluation for learning is designed as a diagnostic tool, with the goal of using this information to improve future learning environments to meet the needs of the learner. It is a formative evaluation designed to identify a student's strengths and weaknesses so that adaptations can be made. Evaluation of learning is intended to gauge the extent to which students are achieving the learning outcomes and curricular expectations. Evaluation of learning is a form of summative evaluation.

UK Assessment and Evaluation

Assessment Principles in the New Primary Curriculum

The new primary curriculum includes a more child-centered approach to assessment that is based on four key principles designed to allow schools to reconsider their practices of assessment with a particular focus on how children experience the process of assessment. Two principles are particularly salient in this discussion. First, the child is at the heart of assessment. According to this principle, assessment should be based on students' needs with the goal of leading to improved progress and higher attainment. Moreover, students should play an active

role in the assessment process, such as self-evaluation and self-reflection. Second, assessment should provide a view of the whole child. Assessment creates a rounded picture of the student that values the broad range of attitudes and skills found in the national curriculum. For assessment to be effective teachers need to draw on evidence beyond the school environment, including parents, caregivers, peers, and members of the wider community.

Assessment Principles in the Secondary Curriculum

The secondary curriculum has adopted the Assessing Pupils' Progress (APP) framework. The APP is a new national approach to assessment that puts the learner at the heart of the assessment process. APP not only provides a link to national standards, but also builds a more comprehensive individual profile of the learners' achievements that highlights their strengths and outlines areas for improvement. The APP framework allows teachers to effectively track pupils' progress and use this diagnostic information of student strengths and weaknesses to adjust teaching practices, leading to increased student achievement. There are many benefits to the APP framework:

- Reduces the need to use tests and specific assessment tasks to make judgments by taking into account a wider range of evidence, giving a more accurate picture of student achievement
- Provides a valuable opportunity for professional development by giving teachers effective tools to develop their assessment and teaching techniques
- Provides a common framework for teachers to share and discuss the evidence they have of pupils' progress
- Directly informs discussions with pupils, as well as future planning, teaching and learning

New South Wales Assessment and Evaluation

New South Wales uses a standards-referenced framework consisting of two interrelated elements, outcomes and content. This framework includes descriptions of levels of achievement of learning. Course performance descriptors are used in the form of a rubric. Assessment for learning is emphasized in curriculum documents and its importance is highlighted with the following descriptors:

- is an essential and integrated part of teaching and learning
- reflects a belief that all students can improve
- involves setting learning goals with students

- helps students know and recognise the standards for which they are aiming
- involves students in self-assessment and peer assessment
- provides feedback that helps students understand the next steps in learning and plan how to achieve these stepd
- involves teachers, students, and parents in reflecting on assessment data.

At the end of Year 10, teachers of Geography Years 7–10 make an on-balance judgment, based on the available assessment evidence, to match each student's achievement to a level description. This level is reported on the student's School Certificate Record of Achievement.

At Stage 4 there are four levels of achievement. Level 4 describes a very high level of achievement; levels 2 and 3 describe satisfactory and high achievement that should provide a solid foundation for the next stage of learning. The level 1 description helps identify students who are progressing towards the outcomes for the stage

At Stage 5 there are six levels of achievement (use of Letter grades) Level 6 describes a very high level of achievement in relation to course objectives and outcomes. Level 2 describes satisfactory achievement, while the level 1 description identifies students who are progressing towards the outcomes for the stage.

Areas for assessment in m*andatory* courses include*:* communication, geographical tools and skills, and geographical knowledge. Areas for Assessment in *elective* courses include: research and communication, geographical tools and skills, and geographical knowledge.

Recommendations

Recommendation 1: *Assessment for learning should be emphasized in the Ontario curriculum for the benefit of students and teachers.*

Rationale: Although marks and grade level expectations are important, assessment for learning should be emphasized in order to help students feel successful and improve their skills. The strength of assessment for learning is it provides students with positive feedback outlining student strengths (through conferencing and/or written comments) and gives clear direction about measures for improvement. Similarly, teachers benefit from the assessment of their own practices. They should be encouraged to utilize and assess research-based practices in the

classroom. For example, teachers incorporating differentiated instruction can attempt different techniques, taking note of which work particularly well with the students in their class.

Recommendation 2: *Assessment for Learning strategies should be explained and described in the curriculum document.*

Rationale: Teachers, especially new teachers, are not experts in assessment and evaluation. The concept of Assessment for Learning should be explained and described in the curriculum documents in detail with specific examples.

Recommendation 3: *Assessment strategies should be authentic and match goals of instruction.*

Rationale: The principle of backward design must be met with respect to assessment strategies; teachers should select assessment methods based upon skills being assessed. This results in assessment that is more valid and meaningful. It also prevents an overreliance on tests. However, the current achievement chart does not identify specific geographic skills or details about assessment. The generalist approach to the achievement chart fails to provide teachers with clear guidelines for geography instruction and assessment. Five sets of geographic skills were developed by an international team of experts during the 1994 National Geography Standards Project in the USA. They first appeared in an outstanding reference, *Geography For Life*, and were later incorporated in the Canadian Council For Geographic Education's (CCGE) resource, *Canadian National Standards for Geography: A Standards-Based Guide to K-12 Geography.* These geographic skill sets are grouped as follows: Asking Geographic Questions; Acquiring Geographic Information; Organizing Geographic Information; Analyzing Geographic Information; and Answering Geographic Information. They are described in greater detail in the chart on the next page (CCGE, 2001, p. 69). Benchmarking details about each skill set provides authentic expectations and assessment practices related to the application of skills. For example, in the skill set "Organizing Geographic Information" students should be able to "select and design appropriate forms of maps to organize geographic information" by the end of Grade 12. Similarly, in the skill set "Asking Geographic Questions" students should be able to "identify geographic issues, define geographic problems, and pose geographic questions" by the end of Grade 8. Expectations and assessment of the geographic skills sets are clearly related to the application of knowledge and not merely knowledge transmission. Another resource with excellent geographic skill sets is the *Ontario Intermediate Senior Geography Curriculum Guidelines Part B: Planning at the Local Level* (Ontario Ministry of Education, 1998). Geography curriculum needs to clearly articulate geographic skills and corresponding assessment practices.

THE FIVE SETS OF GEOGRAPHIC SKILLS BY GRADE LEVEL

The geographic skills that all students need to develop are organized by benchmark year (by the end of the fifth, eighth and twelfth grades).

	K-5 (by the end of grade 5)	6-8 (by the end of grade 8)	9-12 (by the end of grade 12)
1 Asking geographic questions	1. Ask geographic questions – Where is it located? • What is significant about its location? • How is its location related to the locations of other people, places and environments? 2. Distinguish between geographic and non-geographic questions.	1. Identify geographic issues, define geographic problems and pose geographic questions. 2. Plan how to answer geographic questions.	1. Plan and organize a geographic research project (e.g. specify a problem, pose a research question or hypothesis and identify data sources)
2 Acquiring geographic information	1. Locate, gather and process information from a variety of primary and secondary sources including maps. 2. Make and record observations about the physical and human characteristics of places.	1. Use a variety of research skills to locate and collect geographic data. 2. Use maps to collect and/or compile geographic information. 3. Systematically observe the physical and human characteristics of places on the basis of fieldwork.	1. Systematically locate and gather geographic information from a variety of primary and secondary sources. 2. Systematically assess the value and use of geographic information.
3 Organizing geographic information	1. Prepare maps to display geographic information. 2. Construct graphs, tables and diagrams to display geographic information.	1. Prepare various forms of maps as a means of organizing geographic information. 2. Prepare various forms of graphs to organize and display geographic information. 3. Prepare various forms of diagrams, tables and charts to organize and display geographic information. 4. Integrate various types of materials to organize geographic information.	1. Select and design appropriate forms of maps to organize geographic information. 2. Select and design appropriate forms of graphs, diagrams, tables and charts to organize geographic information. 3. Use a variety of media to develop and organize integrated summaries of geographic information.
4 Analyzing geographic information	1. Use maps to observe and interpret geographic relationships. 2. Use tables and graphs to observe and interpret geographic trends and relationships. 3. Use texts, photographs and documents to observe and interpret geographic trends and relationships. 4. Use simple mathematics to analyze geographic data.	1. Interpret information obtained from maps, aerial photographs, satellite-produced images and geographic information systems. 2. Use statistics and other quantitative techniques to evaluate geographic information. 3. Interpret and synthesize information obtained from a variety of sources – graphs, charts, tables, diagrams, texts, photographs, documents and interviews.	1. Use quantitative methods of analysis to interpret geographic information. 2. Make inferences and draw conclusions from maps and other geographic representations. 3. Use the processes of analysis, synthesis, evaluation and explanation to interpret geographic information from a variety of sources.
5 Answering geographic questions	1. Present geographic information in the form of both oral and written reports accompanied by maps and graphics. 2. Use methods of geographic inquiry to acquire geographic information, draw conclusions and make generalizations. 3. Apply generalizations to solve geographic problems and make reasoned decisions.	1. Develop and present combinations of geographic information to answer geographic questions. 2. Make generalizations and assess their validity.	1. Formulate valid generalizations from the results of various kinds of geographic inquiry. 2. Evaluate the answers to geographic questions. 3. Apply geographic models, generalizations and theories to the analysis, interpretation and presentation of geographic information.

Global Citizenship Education Report

Globalization has changed the way the world operates on a number of fundamental levels. Dramatic shifts from national to international economic markets, nations with increasingly multicultural populations, the advancement of universal human rights, and world-wide use of technology have connected people across countries like never before (Fujikane, 2003; Kirkwood, 2001; Torres, 2002). This newly realized interconnectedness provides opportunities for collective well-being, where people work together across nations (and within nations) to improve economic and political conditions (Parekh, 2003) and overcome global challenges like health, environmental, and labour issues (Gaudelli & Heilman, 2009).

Promoting collective well-being is at the heart of global citizenship education (GCE); GCE advocates believe human rights education (Gaudelli & Fernekes, 2004; Gaudelli & Heilman, 2009; Heilman, 2008; Myers, 2006; Parekh, 2003) is foundational for students to become first-rate global citizens. For example, Kasai and Merryfield (2004) contend the primary purpose of global education is "to prepare students to be effective and responsible citizens in a global society" (p. 355). They outline four research-identified strategies used by Social Studies teachers to develop global citizenship: participating in multiple perspective-taking activities, acquiring knowledge about global interconnectedness (including local and global connections), learning about global issues with an action-oriented emphasis, and facilitating cross-cultural experiences.

Similarly, Ibrhaim (2005) states the objective of global education is "to teach students about their rights and responsibilities and equip them with skills for democratic participation, at all levels, from local to global" (p. 179). Ibrhaim highlights the importance of teaching students to be politically literate, instructing them on how to influence political powers to make globally responsible decisions.

Effective GCE goes beyond a superficial "international studies" approach that focuses on independent nation states in competition for scarce resources to a "world systems" perspective of the world as interconnected and interdependent (Myers, 2006). A world systems perspective should include curricular topics of "1) international human rights as the foundation of global citizenship, 2) the reconciliation of the universal and the local, and 3) political action beyond the

nation state" (p. 376). Dunn (2002) agrees that global citizenship education must move past shallow comparisons of countries/cultures to asking how the world came to be the way it is. This process enables students to critique social injustices and points to the need for social action (Banks, 2003). Hicks (2003) conceptualized the core elements of global education as four separate dimensions: issues, spatial, temporal, and process. These dimensions are described in the following table.

Table 1: Core Elements of Global Education

Issues Dimension	Embraces five major *problem* areas (and *solutions* to them): inequality/ equality; injustice/justice; conflict/peace; environmental damage/care; alienation/participation
Spatial Dimension	Emphasizes exploration of the *local–global connections* that exist in relation to these issues, including the nature of both interdependency and dependency
Temporal Dimension	Emphasizes exploration of the interconnections that exist between *past, present and future* in relation to such issues and in particular scenarios of preferred futures
Process Dimension	Stresses a participatory and experiential pedagogy that explores differing *value perspectives* and leads to politically aware local–global *citizenship*

Oxfam (2006), a UK based non-government organization committed to the development of global citizens, incorporates global education elements in its free curriculum booklet, *Education for Global Citizenship: A Guide for Schools.* This comprehensive approach to GCE includes knowledge and understanding, skills, and values and attitudes. Key points for each element are listed in the following table.

Table 2: Key Elements of Global Citizenship Education

Knowledge and Understanding	Skills	Values and Attitudes
- Social justice and equity - Diversity - Globalisation and interdependence - Sustainable development - Peace and conflict	- Critical thinking - Ability to argue effectively - Ability to challenge injustice and inequalities - Respect for people and things - Co-operation and conflict resolution	- Sense of identity and self-esteem - Empathy - Commitment to social justice and equity - Value and respect for diversity - Concern for the environment and commitment to sustainable development - Belief that people can make a difference

These elements have been instantiated in practical projects within Social Studies. For instance, Erikson, Black, and Seegmiller (2005) describe a teacher-initiated class project in which Grade 6 students in the USA helped fellow students in Antigua after a hurricane ravaged their island by soliciting community members and businesses for donations. A highlight of this project was "students [in the USA] wanted to learn more [about life in Antigua] so they could do more" (p. 28). These American students exemplified capabilities of competent global citizens including a compassionate awareness of others' difficulties, a desire to fulfill democratic principles and universal human rights, and the ability to work collaboratively with others in their community for the common good (Heilman, 2008). They learned how to be global citizens by the best means possible- through experience (Barber, 2002).

Although the Ontario Ministry of Education has included global citizenship issues in the Grade 10 Civics course, Schweisfurth's (2006) qualitative research on Social Studies teachers' perceptions of global citizenship education in Ontario indicates teachers believe the official curriculum is lacking and superficial with respect to global issues. Other provincial and international jurisdictions are beginning to more fully recognize the positive values, understandings, and skills global citizenship education espouses, incorporating them more comprehensively into their curriculum.

Global Citizenship Education Canadian Comparisons

Ontario

Global citizenship education is beginning to be realized in Ontario as an important component of our youth's formal schooling. The Ontario Ministry of Education understands that schools have a vital role to play in preparing our young people to take their place as informed, engaged, and empowered citizens who will be pivotal in shaping the future of our communities, our province, our country, and the global environment.

Manitoba

Citizenship education is one of the key concepts outlined in curriculum documents in Manitoba social studies Grades 7 to 10. Citizenship is the core concept that provides the learning focus for social studies at all grades. The Manitoba curriculum acknowledges that citizenship is a fluid concept, changing with time. Therefore, the social studies curriculum allows students to explore the complexities of citizenship at local, provincial, national, and global levels. Citizenship in the global context refers to the fact that Canada is part of a global community that is becoming

increasingly interconnected and interdependent. Many of the most serious problems facing our world must be dealt with on a global basis such as environmental degradation, poverty, AIDS, etc. An important education objective in Manitoba is teaching Canadian citizens to think and act globally as well as locally and nationally.

British Columbia

Global citizenship is not represented in the BC Social Studies curriculum. The notion of global citizenship is not identified as a particular skill associated with social studies, nor is it identified in the specific learning outcomes in any of the senior level courses offered.

Nova Scotia

The Essential Graduation Learnings, a description of knowledge, skills, and values expected of all students graduating in Atlantic Canada outlines citizenship as a category of achievement. Social studies plays an important part in developing students as informed and active citizens from the local to the global level. Although a great deal of emphasis is placed on the ability of students to understand and be active in the Canadian context, students are expected to "identify qualities and attributes that individuals need to be effective global citizens" (*Nova Scotia Education and Culture, Atlantic Canada in the Global Community*, 1998, p. 5). In terms of specific curricular outcomes and learning expectations in particular courses, elements of global citizenship have largely been excluded. However, the opportunity to introduce the concepts of global citizenship in the social studies Grades 7 to 12 curriculum is present. This opportunity is available in the Grade 9 social studies course entitled *Atlantic Canada in the Global Community*, which identifies the theme of interdependence as a major organizer for the course. This theme focuses on the ways in which local, national, and global relationships continue to evolve and play important roles in society today

New Brunswick

The Essential Graduation Learnings, a description of knowledge, skills, and values expected of all students graduating in Atlantic Canada outlines citizenship as a category of achievement. The middle school (Grades 7 to 9) curriculum documents for New Brunswick highlight informed and active citizenship as one of the primary aims of the social studies curriculum. Although not explicitly stated as a global citizenship initiative, the social studies program aims to "enable and encourage students to examine issues, respond critically and creatively, and make informed decisions as individuals and as citizens of Canada and of an increasingly interdependent world"

(*New Brunswick Education, Social Studies 7 Empowerment*, 2005, p. 1). Global citizenship is not referred to in the curricular expectations of the social studies program 7 to 12.

UK Global Citizenship Education

Primary and Secondary Curriculum – Aim of the National Curriculum

The national curriculum has three broad aims; for the purpose of global citizenship education (GCE), the national curriculum aims to cultivate responsible citizens who make a positive contribution to society. Although not explicitly stated as global citizenship, many of the elements identified as responsible citizenship are closely tied to concepts of global citizenship. According to the national curriculum, responsible citizens:

- are well prepared for life and work
- are enterprising
- are able to work cooperatively with others
- respect others and act with integrity
- understand their own and others' cultures and traditions, within the context of British heritage, and have a strong sense of their own place in the world
- appreciate the benefits of diversity
- challenge injustice, are committed to human rights, and strive to live peaceably with others
- sustain and improve the environment, locally and globally
- take account of the needs of present and future generations in the choices they make
- can change things for the better

Primary Curriculum – Historical, geographical, and social understanding

With respect to the primary curriculum, global citizenship education informs the curriculum, although it is not explicitly stated in such terms. In this area of learning, pupils are encouraged to investigate the world around them, from the local to the global. They learn about the impact of their actions on the planet and understand the importance of developing a future that is sustainable. When exploring local, national, and global contexts, pupils should explore issues of justice, rights, and responsibilities in their own contexts and the wider world. In terms of essential knowledge, the national primary level social studies curriculum states that pupils should understand how people, communities, and places are connected and can be interdependent at a range of scales. In terms of key skills, the national primary level social

studies curriculum states that pupils should consider, respond to, and debate alternative viewpoints to take informed and responsible action from the local to the global level.

Secondary Curriculum – Key Stage 3 Geography

With respect to the secondary curriculum, elements of global citizenship education are incorporated into the subject of geography in key stage 3. However, global citizenship is not explicitly identified as a key concept or process with respect to key stage 3 geography. In terms of essential knowledge outcomes, students in key stage 3 geography learn to make sense of a complex and dynamically changing world. This process occurs at a variety of levels including local, national, and global. Pupils are expected to investigate places at all scales, from the personal to the global.

New South Wales Global Citizenship Education

New South Wales references Global Citizenship in outcomes throughout grades 7 to 12. Citizenship in general is encapsulated within stage 4 Geography and referenced in both stages 5 and 6. Stages 5 and 6 include the following GCE-related expectations:

- Examine/understand how physical, social, cultural, economic and political factors shape communities, including the global community
- Participate in Civics for informed and active citizenship

Recommendations

Recommendation 1: *Incorporate Global Citizenship Education more comprehensively and integrally in the Ontario Curriculum.*

Rationale: Global Citizenship Education provides an excellent opportunity for students to learn about the importance of collaboration and diversity in our increasingly diverse society. Students should be encouraged to learn about the interdependence of nations and the responsibility they have to contribute positively to our global community. Global Citizenship can be introduced in Kindergarten by exploring family backgrounds of children in the classroom. Canadian families, with the exception of Aboriginals, are connected to international countries of origin. This is a great starting point for learning about other nations and how we are connected to them. Teachers could also include investigations on countries students have visited and are familiar with. Learning about global communities students have familiarity with helps them understand firsthand their connection with the rest of the world. By Grade 2 global issues can be examined.

Topics for discussion include clean water, child rights, conflict and conflict resolution, poverty and wealth, and food production. Children do not require a concentrated grounding in local issues before learning about the global context; local issues and global issues can be explored simultaneously.

Recommendation 2: *Make Global Citizenship Education meaningful by teaching students to act locally, nationally, and globally.*

Rationale: Students learn best through participation. GCE must have a social action approach if students are to learn how to become active global citizens. For example, student initiated projects in relation to fair trade and child labour have increased awareness about human rights issues and resulted in greater social justice.

Recommendation 3: *Utilize Multiple-Perspective-Taking espoused in Global Citizenship Education to promote Anti-Racist Pedagogy and Critical Thinking.*

Rationale: Global Citizenship Education provides students with opportunities to examine problems/solutions from multiple perspectives. Teaching students to value opinions different from their own supports Anti-Racist pedagogy. Also, challenging students to consider problems/solutions from multiple vantage points supports critical thinking processes. GCE uses multiple-perspective taking to examine social issues and address the role of power relations in social inequities. Pursuing social justice requires students to ask questions like "Who is represented?", "Who is missing/not represented?", "Who benefits from existing conditions?", and "Who suffers from existing conditions?" Global Citizenship Education provides an optimal context for examining social inequities and possible solutions through its focus on local, national, and international issues.

Critical Thinking Report

The fundamental purpose of schooling is to teach students to become critical thinkers (Case & LeRoi, 2008; Case & Sharpe, 2008; Facione, 2000). Critical thinking is the ability to produce reasonable arguments based upon the analysis and evaluation of information (Yeh, 2001). It is a complex task people do not naturally possess because they tend to prefer taking information at face value than interrogating its credibility and coherence (van Geder, 2004). Thus critical thinking requires explicit instruction and active engagement to master (Case & LeRoi, 2008; Case & Sharpe, 2008; van Geder, 2004). Facione (2000) understands critical thinking as encapsulating both attitudes and skills, explaining that the development of critical thinkers requires teachers to "nurture truth-seeking, openmindedness, analyticity, systematicity, intellectual curiosity, confidence in the proper use of reasons and evidence, and maturity of judgment" (p. 80).

While many educators conceive of a false dichotomy between process and skills, Case and LeRoi (2008) assert that effective critical thinking instruction involves teaching students to think for themselves while simultaneously teaching subject-specific content. In this way, process skills and content knowledge are meaningfully intertwined to promote deep understanding. Case and LeRoi (2008) identify five tools for critical thinking instruction: background knowledge, criteria for judgment, critical thinking vocabulary, thinking strategies, and habits of mind. These tools, as described in the following table, equip students to reflect thoughtfully about problems and respond effectively based upon careful analysis of plausible solutions.

Table 1: Five Tools for Critical Thinking Instruction

Critical Thinking Tool	Description
1. Background Knowledge	Critical thinkers possess relevant information about a topic necessary for thoughtful reflection
2. Criteria for Judgment	Critical thinkers understand/select appropriate criteria or grounds for responding to challenges
3. Critical Thinking Vocabulary	Critical thinkers possess concepts and distinctions required for thoughtful analysis/evaluation- for example, the difference between "conclusion" and "premise," or "cause" and "effect"
4. Thinking Strategies	Critical thinkers have a repertoire of procedures, heuristics, organizing devices, and models for working through challenges
5. Habits of Mind	Critical thinkers possess values and attitudes of a careful and conscientious thinker

The most effective way to equip students with critical thinking tools is to actively engage them in the process. For example, Burbach, Matkin, and Fritz (2004) examined the relationship between critical thinking and active learning. Their study involved students enrolled in a leadership course involving journal writing, service learning, small groups, scenarios, case study, and questioning. Students were given the Watson-Glover Critical Thinking Appraisal as a pretest and posttest, with analysis revealing that active learning resulted in increased critical thinking. Similarly, Tsui's (2002) study on teaching practices associated with critical thinking highlighted that active learning promotes critical thinking. In particular, analytical writing assignments and class discussions helped students become critical thinkers. Writing assignments in which students received written feedback and were required to re-write the assignment were very beneficial. Another effective active learning technique fostering critical thinking is argument mapping because it helps students understand arguments better and allows teachers and students to easily discern errors in logic (Twardy, 2004). Browne and Freeman (2000) envision the ideal critical thinking classroom as consisting of four distinct features reflective of active learning: problem-based learning sparked by controversy, frequent evaluative questions posed by teachers and students alike, participation in analysis and evaluations, and an appreciation for multiple perspectives and solutions.

Yeh (2001) points to the need for alternative testing/assessment procedures based on a critical thinking mindset. First, she explains that important information (quotes, formulas, evidence) should be on the test for students to analyze because the focus in critical thinking is on how students use facts, not on whether they can recall them. Second, students must be given questions to which there are alternative responses available and through which they can explain their understanding. Lastly, questions should prioritize meaningful content knowledge.

Misunderstandings about critical thinking can act as barriers for teachers and students. For example, Moore (2004) describes a positivistic movement in critical thinking towards the "truth" and "right" answers. While there are moral dimensions to certain problems posed by critical thinking challenges, narrowing responses does not teach students to think for themselves, a primary objective of critical thinking. Other issues in the classroom include the following: (i) students may think they cannot question the teacher's questions, (ii) if a problem is posed by the geography teacher the student may feel obliged to only use arguments learned in geography, and (iii) students may feel limited to use school-knowledge as opposed to outside

real-world thinking (McKendree, Small, & Stenning, 2002). The nature of critical thinking must be made evident for teachers and students for it to be developed appropriately.

Advocates of critical thinking and geography have coined the phrase "geographical thinking" to refer to the infusion of critical thinking skills into geography instruction (Case & Sharpe, 2008). Geographical thinking involves making geography problematic so as to teach it with an inquiry-based approach. The Critical Thinking Consortium and the Royal Canadian Geographic Society have identified six concepts to help transform "factual content of geography into the subject of analysis" (p. 3). These six guiding principles are as follows:

- Geographical Importance- *What aspects or features of particular geographic phenomena and locations make them worthy of attention or recognition?*
- Evidence and Interpretation- *How adequately does the geographic evidence justify the interpretations offered, and what interpretations might plausibly be made from evidence provided?*
- Patterns and Trends- *What can we conclude about the variation and distribution of geographic phenomena over time and space?*
- Interactions and Associations- *How do human and environmental factors and events influence each other?*
- Sense of Place- *What are the human and physical features and identities that characterize a place?*
- Geographical Value Judgments- *How desirable are the practices and outcomes associated with particular geographic actions and events?*
  (Case & Sharpe, 2008, pp. 4-5)

Canadian Jurisdictional Comparisons

Ontario

The current Ontario curriculum document (2004) for Social Studies Grades 1-6 and History and Geography in Grades 7-8 includes a clear achievement chart (pp. 12-13), which explains the core category of thinking (the use of critical and creative thinking skills and/or processes) and how this category might look at each of levels 1-4. In addition, for each of the core geography units for Grades 7 and 8, there are specific expectations related to skills of Inquiry/Research and Communication skills and Map, Globe and Graphic Skills (pp. 72-73). However, while the language of "critical thinking" is used in the introductory achievement chart, this parallel

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language is NOT included at the operational level, i.e., the detailed course/unit explanations to which teachers will turn.

The current (2005) C&WS document for Grades 9 -10 Geography, History and Civics provides a similar achievement chart (pp. 18-19) with the same category of thinking at the four levels, similar to the Grades 1-8 document. The two required geography of Canada courses outlined for Grade 9 students are organized around a series of five strands. Under each strand, there are a series of overall and specific expectations. Here again there is a category of specific expectations which focus on "developing and practicing skills." These skills tend to be the traditional inquiry and focused geography (map/globe/graphic) skills. The language of *"critical thinking*" does not show up at the operational course description level. The comments indicated above for the Grade 9 geography document also apply to the current (2005) C&WS geography course descriptions and achievement chart (pp. 18-19) for the 10 Grades 11-12 geography courses outlined.

British Columbia
Inquiry and traditional "Geography" skills are clearly identified in curriculum document (see grade charts #6, #8 A-1) for all grades/courses from Grades 7-12.

Manitoba
Inquiry and traditional "Geography" are clearly identified in curriculum documents (see grade charts #11-3) for most grades/courses from Grades 7-12.

Nova Scotia
There is little or no direct reference to *"Thinking Skills*" in the current Grades 7-12 curriculum documents; however, all documents do mention "skills" using other language, e.g., problem solving.

New Brunswick
There are no specific references to "*Thinking Skills"* by name. However, there is mention of "skills" expectations for each course from Grades 7-12.

New South Wales Critical Thinking

Throughout the NSW curriculum outlines of Grades 7-12, there are many references to "skills" and "geography skills"; however, these seem to be the traditional skills that geographers have brought to their courses at all levels – essentially built around the enquiry process, including data collection and interpretation. There is no specific reference to *"critical thinking skills"* by name, but one can extrapolate that there are many opportunities for critical thinking based on the content elements of the curriculum outlines and the application questions posed.

UK Critical Thinking

The England National Curriculum is outlined in a number of stages (stage 1 = year 1-2, stage 2 = year 3-6, stage 3 = year 7-9, stage 4 = year 10-11). At each stage of geography-related curriculum, there is a clear focus on developing geographical inquiry and skills. A core part of the program is "promoting key skills through geography." Detailed expectations under "Geographical Enquiry and Skills" are included at each stage, which are extended/expanded as one moves through the stages. The specific language of *"thinking critically"* does not appear until stage 3; however, this document is the most recent one and, as a result, likely reflects more current use of this term. New primary revisions will likely do the same.

Recommendations

Recommendation 1**:** *There should be a clearly outlined growth scheme for the development of critical thinking skills as well as traditional geography skills in the Ontario curriculum. The growth scheme should be focused a) from Grades 1-6, b) from Grades 7-9, and c) for senior courses.* Rationale: Given that the literature recognizes the significant importance of critical thinking skills, it is important for teachers to have a clear guide as to how to develop these skills throughout the grades. This growth scheme would allow teachers to see what skills have been developed with students in previous grades such that teachers can more effectively a) conduct an assessment of prior learning as a base for current instruction, b) have a guide in terms of how to build and extend upon skills previously developed, and c) see where specific skills fit in an ongoing continuum. "The Five Sets of Geographic Skills By Grade" table in the Assessment and Evaluation section of this report does a good job of articulating and benchmarking geographic skills. A similar chart for Critical Thinking describing expectations and authentic forms of assessment would be helpful for teachers.

Recommendation 2: *The same language, in terms of critical thinking, should be used consistently in any future curriculum documents, e.g., in summary achievement charts as well as operational sections of the document.*

Rationale: A consistency of language reduces confusion on the part of teachers and users of such documents. If there is a clear understanding of what is being referred to in terms of critical thinking, then it will be easier and more probable that teachers make a greater effort to implement those concepts.

Recommendation 3: *Clear explanations and models of how to incorporate critical thinking into the social studies and geography program, at different grade levels, should be included (or directly linked) within the actual guideline document.*

Rationale: Currently, critical thinking is referred to rather ambiguously in curriculum documents. The development of critical thinking is stated as a key underpinning of social studies/geography curriculum documents at all grade levels, yet very little refers to how to actually develop this skill. Teachers need clear guidance in terms of how to go about developing critical thinking skills within the social studies/geography context. The Critical Thinking Consortium and The Royal Canadian Geographic Society's resource, *Teaching About Geographical Thinking*, outlines how to teach Geography with a critical thinking emphasis. Its six guiding principles (Geographical Importance, Evidence and Interpretations, Patterns and Trends, Interactions and Associations, Sense of Place, and Geographical Value Judgments) mentioned earlier are useful for making Geography inquiry-based, teaching students to think critically about geographic issues. The following "From Factual Coverage to Critical Inquiry" chart provides suggestions on how to move from teaching about geographic facts to a critical inquiry approach to Geography (Case & Sharpe, 2008, pp. 11-12).

From factual coverage to critical inquiry

CGS essential elements	Broad learning outcomes	Sample activities (Royal Canadian Geographical Society 2001)	Critical inquiries (suggestions for problematizing the sample activities)
The world in spatial terms— Location	Apply concepts and models of spatial organization to make decisions. (Specified outcome for grades 9-12)	Explain the recent shift in retail shopping from original CBDs [Central Business Districts] or suburban shopping centres to retail parks such as Bayer's Lake Park as part of the multiple nuclei model of development.	Based on the lessons learned from recent shifts in retail shopping, recommend the best location for a new fast-food outlet in your city. (*Geographical value judgment*) Rank order the three most significant changes brought on by retail suburbanization for the Central Business District. (*Patterns and trends*)
Places and regions	Evaluate how humans interact with physical environments to form places. (Specified outcome for grades 9-12)	Explain why places have specific physical and human characteristics in different parts of the world (e.g., the effects of climate, tectonic processes, settlement and migration patterns, site and situation components).	What aspects of Canada's northern location and physical geography figure most in shaping the Canadian identity? (*Geographical importance*) Which of the UNESCO heritage designations in Canada represents the most notable example of the interaction of humans on the environment? (*Geographical importance/ Interactions and associations*)
Physical systems	Describe how physical processes affect different regions of Canada and the world. (Specified outcome for grades 9-12)	Explain how extreme physical events affect human settlements in different regions (e.g., the destructive effects of hurricanes in the Caribbean Basin and the eastern United States, the ice storms in Eastern Canada, and earthquakes in Turkey, Japan, and Nicaragua).	Based on the data provided about the destructive effects of an extreme physical event in several places (e.g., hurricanes in the Caribbean Basin and the eastern United States, or earthquakes in Turkey, Japan, and Nicaragua) develop an in-depth profile of each place after the destructive event has occurred. (*Sense of place*) Debate the claim that, relative to other countries, Canada stands to benefit from the effects of global climate change. (*Patterns and trends*)

From factual coverage to critical inquiry (continued)

CGS essential elements	Broad learning outcomes	Sample activities (Royal Canadian Geographical Society 2001)	Critical inquiries (suggestions for problematizing the sample activities)
Human systems	Describe the structure of different populations through the use of key demographic concepts. (Specified outcome for grades 6-8)	Compare Canada and an economically less developed country using natural increase, crude birth rate, crude death rate, and infant mortality.	Based on a comparison of natural increase, crude birth rate, crude death rate, and infant mortality rate in Canada and a selected less developed country, identify the biggest differences for the provision of education, health care, housing, and water in the two countries. (*Evidence and interpretation*)
Environment and society	Describe how humans prepare for natural hazards. (Specified outcome for grades 6-8)	Explain the ways humans prepare for natural hazards (e.g., earthquakes, floods, tornadoes, snowstorms).	What are the biggest differences between Canada's preparedness for three common natural hazards with those of selected countries around the world prone to similar hazards? (*Patterns and trends*)
Uses of geography	Analyze the ways in which physical and human features have influenced the evolution of significant historic events and movements. (Specified outcome for grades 9-12)	Examine the historical and geographical forces responsible for the industrial revolution in England in the late 18th and early 19th centuries (e.g., the availability of resources, capital, labour, markets, technology).	Humans or Nature? Create an annotated pie chart rating the relative influence of geographical and historical forces on the advent of the industrial revolution in England in the late 18th and early 19th centuries. (*Interactions and associations*)

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Geotechnology Report

The widespread use of Information and Communication Technology (ICT) affords new opportunities for teaching and learning, especially in the classroom. For example, ICT provides students with direct access to primary and secondary data sources, enabling them to engage actively in learning. Hassel (2005) advocates for ICT integration by social studies and geography teachers because of the increasingly important role ICT plays in the decision-making process. Students need to know how to locate and to consult a variety of reliable resources to make informed decisions. In addition to equipping students with problem-solving skills, ICT use in the classroom increases student motivation (Wright & Wilson, 2009; Zhao, 2007) and, in combination with inquiry-based learning or collaborative learning, results in greater student achievement (Hurley, Proctor, & Ford, 1999; Mitchell & Reed, 2001; Sui & Bednarz, 1999).

An area of ICT of particular interest to social studies and geography teachers is Geospatial Technology (GT). GT refers to a system used to acquire, store, analyze, and output data in two or three dimensions. These data are referenced to the earth by some type of coordinate system, such as a map projection. Geospatial systems include thematic mapping, the Global Positioning System (GPS), remote sensing (RS), telemetry, and Geographic Information Systems (GIS) (Federal Geographic Data Committee, 1994). The table below provides information about each of these geospatial systems (Open Geospatial Consortium, 2007).

Geospatial System	Definition and Application
Thematic Map	A map showing, by color or pattern, the distribution of a single phenomenon. For example, it can be used to highlight topography, climate, minerals, or land-use.
GPS	Global Positioning System: (1) a network of satellites that interact with special receivers to position the receiver relative to the Earth. (2) describing the generic approach to using a network of satellites to deliver a positioning service Although GPS can be used to determine location very precisely (within centimeters given the correct controls and proper use) it does not solve all the problems of location determination in GIS databases. GPS is used to provide exact location and track movement in areas of aviation, railways, space exploration, environment, disaster relief and monitoring, agriculture, and recreation (golf).
RS	Remote Sensing: Acquisition of raster images of the Earth, often involving spectral frequencies other than the visible band, by devices typically carried on airborne or satellite platforms. Sometimes refers also to image analysis of these images. It is used to examine below-

	ground resources without having to excavate. RS is often used in archeological research.
Telemetry	The remote collection of data. Uses of telemetry include weather-data collection, monitoring space flights (manned and unmanned) and power generation plants
GIS	Geographic Information System: A computer system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data related to positions on the Earth`s surface. Both vector and raster GISs are available. GIS applications allow people to investigate geographical phenomena of interest to them, analyze information, work with data and maps, and record their findings.

With GIS students create their *own* maps to analyze the Earth. These maps are dynamic--the student can change the scale, the symbology, the content, the projection, the classification, and other characteristics of each. GIS is an analysis tool to ask questions about and investigate the Earth. In global GIS lessons, students create many different kinds of maps at many different scales to investigate hydrology, land use, natural hazards, population, and other phenomena. GIS use in high school Geography classrooms increases student success (Demicri. 2008) and understanding of how to use maps as analytical tools, especially for students with low-to-average skills in geography (Warner & Kerski, 1999). The Committee on the Support for Thinking Spatially (2006) asserts the major benefits of using GIS in school settings are its ability to meet the needs of diverse learners and its provision of experience working with information technology (IT), which enhances workplace opportunities.

The National Council for Geographic Education's Standards Project (1994) recognized Geographic Information Systems (GIS) as powerful tools for developing students skills and perspectives. Similarly, Goodchild (2006) asserts GIS "is something that every educated person should know about, a set of tools that allow us to see and interact with the world in new and stimulating ways, a contemporary way of satisfying a deeply felt love of maps and geography, and a way of expressing concern for the future of the planet" (p. 61). Hamon and Bodzin (2009) view geotechnologies as an approach that allows teachers and students to move beyond the focus of map reading skills to engage in data interpretation, analysis, and even map making. Essentially, geospatial technologies foster spatial thinking in innovative and significant ways

For more than a decade, geographic educators have recognised the promise of geographic information systems (GIS) as a tool to support learning, with pioneering teachers and students incorporating various applications into curriculum (Alibrandi, 2003; Baker, 2002; Kerski, 2000;

NRC, 2006). The use of geospatial technology in the U.S. education system is slowly expanding (Fitzpatrick, 2001). Two factors are responsible for this growth. First, there are a growing number of teachers incorporating GT practices (Fitzpatrick, 2001). Second, the National Centre for Geographic Information and Analysis (NCGIA) was created to aid research and expand the use of GIS at all educational levels (from K-12 through to college and universities; Chalmers, 2002, 2009). Despite modest growth, GT integration has fallen short of expectations (Doering, Veletsianos, & Scharber, 2008; Whitworth & Berson, 2003). For example, inventories on the use of GIS in American (Kerski, 2003) and British (Morell, 2006) secondary schools indicate that only a small percentage of teachers use geotechnologies.

Barriers to successful GT implementation must be addressed and overcome. For example, most teachers and students have no experience or training with geotechnologies (Edelson, Smith, & Brown, 2008). Moreover, teachers are reluctant to incorporate GT into classroom practice because of their lack of time, the variable skill levels among students, and software complexity (Baker, Palmer, & Kerski, 2009). Another problem with incorporating geospatial technology is a lack of understanding about effective teaching practices for its use (Bednarz & Baker, 2003). Fitzpatrick (2001) advocates that students be given minimal direction to solve posed 'real life' problems. Similarly, Favier and van der Schee (2009) contend, "projects in which students investigate real world problems combining fieldwork with GIS can have a great impact of students' learning" (p. 272). Examples of student research projects that combine data acquisition with data visualisation involve noxious weeds (Zanelli English & Feaster, 2003a), dead trees (Loudon, 2000), water quality of creeks (Coulter, 2000; Zanelli English & Feaster, 2003b), and safety issues (Paul & Hamilton, 2000). Although a problem solving approach to GT is highly engaging and motivating, it must be balanced with explicit instruction. For example, a common concern for teachers who allow students to produce their own maps is that they lack skills necessary for analysis. Thus students require explicit instruction in spatial analysis for them to make meaning of the data mapped (Koch & Denike, 2007; Wiegand, 2003).

Geospatial thinking is currently undervalued in education. It incorporates concepts of space (such as distance, proximity, and distribution), tools of representation (such as maps and graphs), and processes of reasoning (such as decision-making) that aid in the development of spatial literacy (Committee on the Support for Thinking Spatially, 2006). In our increasingly complex society, spatial literacy is a tool necessary for effective problem solving (Goodchild,

2006). The implementation of geospatial technology in education is necessary for the development of spatial literacy.

Geotechnologies within the Ontario Curriculum

Geotechnologies are embedded within the secondary curriculum. They are referenced within the 7 & 8 geography curriculum but the fact remains in all but a few schools and boards they are the purview of Grade 9-12 Geography. Expectations that reference the use of geotechnology are found within the methods of geographic inquiry strands in all Grades 9, 11, and 12 geography courses. Two specific courses rely exclusively on the use geospatial technologies: Geographics (11workplace destination) and Geomatics (12 university/college destination). Although these courses are offered in the province, numbers of sections that are taught are relatively small. There is also an expectation within the Ontario Grade 9 curriculum (both applied and academic) that 20 to 25 % of the course be taught using technology specifically geospatial (both visual and analytical) to equitably meet the needs of geotechnology province-wide. Ontario has met these demands with province-wide licensing of up-to-date industrial strength software (ESRI's ArcGIS 9.2) and comparable data sets of regional, national, and international information.

Geotechnologies in Comparative Canadian Jurisdictions

Manitoba

Manitoba Education, Citizenship and Youth ministry recently acquired a new provincial site licence for ESRI Canada Geographic Information Systems (GIS) software version *ArcView* 9.2 for use by students and educators. The province has specific learning outcomes in Grades 7 and 10 that address geotechnologies.

Nova Scotia

All secondary schools have access to ESRI ArcView software and data. Specific outcomes within secondary geography reference geotechnologies and remote sensing.

British Columbia

British Columbia has specific outcomes that describe the geographic applications of current information and imaging technologies by identifying various technologies used by geographers and giving examples of how geographers use particular technologies, such as GIS, GPS, and

remote sensing. Software licences have been purchased by a consortium of Boards and are thus not consistent across the province.

Geotechnologies in New South Wales

As an outcome, GIS and geotechnologies are only identified once and that is in the section under interpreting photographs using Geographic Information Systems (GIS) to examine spatial and ecological issues. In an effort to nationally coordinate the meaningful introduction of spatial technologies into schools, the Australian Geography Teachers Association (AGTA) has developed a GIS Working Party to oversee initiatives across Australia. New South Wales senior geography curriculum is presently going through a rewrite, and there has been an identification of the need to incorporate the use of spatial technologies into the curriculum.

Geotechnologies in the United Kingdom

Already used in a number of schools around the UK, GIS became part of the national curriculum for Geography in England and Wales at KS-3, KS-4 and A-level in 2008. Geotechnologies became part of the national A-level curriculum in September 2008

Geotechnologies in Finland

(Note: While we do not usually benchmark Finland, we include it here because of its advanced use of Geotechnologies.)

GIS was added to the National Curriculum of Upper secondary schools in 2005 and the basic principles and applications of GIS are taught in every upper secondary school (Grades 10-12). Since 2006, there have been questions about GIS in the geography section of the national Matriculation Examination, and Finland has special courses on GIS spatial area studies and cartography along with state-run virtual courses. Finland has created an online Virtual project on developing GIS education that includes training active teachers in a train-the-trainer model. Finnish educational authorities also created a GIS portal of lessons and state-wide data along with developing new methods of teaching Geography with GIS. The National Board of Education is currently reforming upper secondary school curriculum and produced an outline in 2002. GIS is incorporated into Geography course number four. The following websites provide greater details about GIS education in Finland:

http://proceeding.esri.com/library/userconf/educ08/educ/papers/pap_1902.pdf
http://www.scangis.org/scangis2003/papers/20.pdf

Recommendations

Recommendation 1: *Incorporate Geotechnology skills and methods into all Geography courses.*

Rationale: GIS represents a major path for the future with implications beyond Geography to other subject matters. While having a specific Grade 12 course is helpful for focused study in the area, most especially for those students bound for post-secondary education where understanding of such technologies are expected, elements of GT must be built into all courses beginning at the Grade 7 level. Specific expectations in the "Inquiry Strand" need to be less content driven and more related to methods, skills, and tools of spatial and critical thinking. Overall expectations should include the following:

- Utilize geotechnologies and geographic inquiry (critical thinking in geography) methods and skills to locate, gather, evaluate, and organize information about (course specific)
- Analyze and interpret data gathered in inquiries using a variety of geotechnologies and spatial thinking methods
- Communicate results of geographic and spatial thinking inquiries using appropriate terms, concepts, and geotechnologies

Recommendation 2: *Increase the amount of Geography course time spent on Geospatial technology, explicitly stating the percentage of course time that should be dedicated to GT in curriculum documents.*

Rationale: Presently there is an accepted recommendation that 20% of time in a Grade 9 applied or academic class be dedicated to using Geotechnologies. However, to support the increasing need for professional development of teachers and administrators, this expectation should be stated within the front matter of all geography courses. Furthermore, Geotechnology, especially GPS, should be given more prominence within Grade 7 and 8 geography units. This increased prominence would enhance authentic learning, encourage more outdoor activities, and support a better transitions model to Grade 9 as students would be more conversant in the skill and methods inherent in the application of these technologies.

Recommendation 3: *Provide quality Geotechnology training for pre-service and in-service teachers.*

Rationale: The major obstacle to successful implementation of Geotechnology into the Ontario curriculum is teacher skill sets. Until teachers are comfortable with using and teaching

geotechnologies, full implementation will never succeed. Ontario has gone a long way in implementing recommendations from the "Learning to Think Spatially" National Academy document. However, Ontario continues to falls short on "establishing guidelines and practices for pre-and in- service teacher training programs for teaching spatial thinking using GIS." For Geospatial Technology training to be effective it must include the following parameters:

- The Trainers must have expert knowledge
- Attendees must be given time away from the workplace
- The training syllabus must be informative
- The materials must be accessible and
- Incentives must be provided for attendees
  (Baker, Palmer, & Kerski, 2009)

Ontario (at present)	Comparative Jurisdictions	Literature Review	Considerations/ recommendations
Grades 7 & 8 Direct quotes from curriculum doc: It is essential to emphasize the **relationship** of social studies, history, and **geography to the world outside the school** so that students recognize that these areas of study are not just school subjects but f**ields of knowledge** that affect **their lives, their communities, and the world**. *Page 14 SS Hist & Geog 2004* **Computer programs can help students** to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. The technology also makes it possible to use simulations – **in geography, for instance** *Page 18* *Common Overall Expectation for 7 & 8 Geography* ▪ use a variety of **geographic representatio ns, resources,**	*Mb*-**Manitoba Education, Citizenship and Youth** is pleased to announce that it has recently acquired a **new provincial site licence** for ESRI **Canada Geographic Information Systems (GIS)** software version *ArcView* 9.2 **for use by students and educators.** Specific Learning outcomes **Mb Grade 7 10** Create maps using a variety of information sources, tools, and technologies. *Examples: observation, traditional knowledge, geographic information systems (GIS), Global Positioning Systems (GPS).* **Mb Grade 10** Construct maps using a variety of information sources and technologies. *Examples: observation, traditional knowledge, compass, Geographic Information Systems (GIS) and Global Positioning Systems (GPS)...* *N.S.* **All secondary schools have access to ESRI ArcView software and Data** *B.C.* **Outcomes- describe the geographic applications of current information and imaging technologies** by identify various technologies used by geographers q give examples of **how geographers use**	National Council for Geographic Education 's Standards Project (Geography for life project: national geography Standards pg 256) **Recognized Geographic Information Systems (GIS) as powerful tools for developing students skills and perspectives.** **Overriding Philosophical and pedagogical Article** <u>**The Fourth R? Rethinking GIS Education**</u> Michael F. Goodchild, ArcNews Fall 2006 , ESRI Press **"GIS** is seen as something that **every educated person should know about,** a **set of tools** that allow us to see and interact with the world in new and stimulating ways, a contemporary way of satisfying a deeply felt love of maps and geography, and a way of expressing concern for the future of the planet. <u>**Relevant Reviews**</u> **Teaching *with* Rather than *about* Geographic Information Systems T**homas C. Hammon and Alec M. Bodzin Social Education 73(3) pp 119-123 2009 National council for the Social Studies **Reasons to Teach with GIS** 1. "In geography the use of GIS can prompt teachers and students to move beyond the focus of map reading skills to engage in data interpretation, analysis, and even map making 2. Pedagogical opportunities- "Teachers can use GIS to support and challenge many types of learners" (**Differentiated and**	**Considerations Spatial thinking can be learned, *and* it can and should be taught at all levels in the education system.-** National Research Council 2006 **Spatial literacy & Critical Thinking Spatially literate students** who have developed appropriate **levels of spatial knowledge and skills i**n spatial ways of **thinking and acting**, together with sets of **spatial capabilities**, have the following characteristics: 1. They have the habit of mind of thinking spatially— they know where, when, how, and why to think spatially. 2. They **practice spatial thinking** in an informed way— they have a broad and deep knowledge of spatial concepts and spatial representations, a command over spatial reasoning using a variety of spatial ways of thinking and acting, and well-developed spatial capabilities

Ontario (at present)	Comparative Jurisdictions	Literature Review	Considerations/ recommendations
tools, and technologies to **gather, process, and communicate geographic** information about *plug in content;*	**particular technologies**, including – **GIS** – **GPS** – remote sensing (e.g., radar, infrared, satellite imaging *NSW Australia* **GIS and geotechnologies is only identified once and that is in this section under interpreting photographs** using Geographic Information Systems (GIS) to examine spatial and ecological issues. *U.K.*-Already used in a number of schools around the UK, **GIS became part of the national curriculum** for Geography in England and Wales at KS-3, KS-4 and A-level in **2008**. GIS became part of the **national A-level curriculum** in September 2008 *Finland (this comparison was made because of similarities in geographical and geospatial components of their Educational systems and does not reflect a complete curriculum correlation)* From GIS Education in Finnish Secondary Upper Schools –Simo Tolvanen ESRI professional Papers 2008 • **GIS** was added to the **National Curriculum of Upper secondary `schools in 2005** • The basic principals and applications of	**Integrated approaches)** 3. Research demonstrates- "students experiences with GIS in the classroom has identified increases in affective variables, such as interest and motivation and also improved academic outcome**s" pg 119** **Where and Why There? Spatial Thinking with Geographic Information Systems** Andrew J Milson and Mary d. Curtis Social Education 73(3) pp 113-118 2009 National council for the Social Studies Spatial thinking is a combination of three elements: concept of space(such as distance, proximity, and distribution) tools of representation (such as maps and graphs) and the processes of reasoning (such as decision making) – **geospatial technologies(geotechnologies) can foster spatial thinking in innovative and significant ways**-pp113 "Given an authentic Task and a powerful geospatial technology tool students engaged in spatial thinking with GIS" pp118 **Geography: The Essential Skill for the 21st Century-** Paul Nagel Social Education 72(7) pp 354-358 2008 National council for the Social Studies 2009 Premise "**Geography provides students an inexhaustible context for creativity in an interdependent world"** PP 354 Thinking Geographically (geographic Inquiry model)accompanied by the geographic tools of GPS and GIS will help students ,parents, educators and business leaders for the next 92 years and beyond" pp 358	for **using supporting tools and technologies.** 3. They adopt a **critical stance to spatial thinking**— they can evaluate the quality of **Considerations** spatial data based on its source and its likely accuracy and reliability; can use spatial data to construct, articulate, and defend a line of reasoning or point of view in solving problems and answering questions; and can evaluate the validity of arguments based on spatial information. **Spatial literacy** throughout 7-12 as integrated into Inquiry strand basic concepts of spatial thinking and reasoning to Include; ▪ Location and Place, ▪ distance and direction ▪ topological relationships ▪ wayfinding and map reading ▪ concepts of Neighbourhhod ▪ spatial interaction ▪ competition for space, territory and migration with spatial context

Ontario (at present)	Comparative Jurisdictions	Literature Review	Considerations/ recommendations

	GIS are taught in **every upper secondary** school(grades 10-12)
	• **Since 2006** there have been questions about GIS in the geography section of **the national Matriculation Examination**
	• There are special courses on GIS spatial area studies and cartography along with state run virtual courses
	• Created Virtual project on Developing GIS education to include:
	   o Training active teachers in a train the trainer model
	   o Creating a GIS portal of lessons and Data state wide
	   o Developing new methods of teaching Geography with GIS
	
	.
		Other literature
		Learning to Think Spatially: GIS as a Support System in the K-12 Curriculum- authors *Committee on the Support for the Thinking Spatially*: The Incorporation of Geographic Information Science Across the K-12 Curriculum, Committee on Geography, **National Research Counci**l
		ISBN: 978-0-309-09208-1, 332 pages, 7 x 10, paperback (2006)
		
		A National survey to Examine Teacher Professional Development and the Implementation of Desktop GIS, Thomas R. Baker, Anita M. Palmer, and Joseph J. Kerski. Journal of Geography 108: 174-185, 2009 –National council for Geographic Education
		
		Recommendations for teacher training:
		▪ **The Trainers must have expert knowledge**
		▪ **Attendees must be given time away from the workplace**
		▪ **The training syllabus must be informative**
		▪ **The materials must be accessible and**
		▪ **There must be incentives for attendees**
			▪ Visualization
			▪ Cartography
			▪ Grounded in technology specifically GIS and its concepts
			After Goodchild 2006
			
			Recommendations
			▪ Move from suggested time to proscribed amount of time using geotechnologies- this would help support teachers and administrators
			▪ Inclusion in all geography programs
			▪ Rework of Geographics- does not work as a workplace destination – not logically as GIS is a tool to be used in industry and academia
			▪ Connections to other courses and disciplines – highlight how geospatial skills are transferable to other areas including economics, History, environmental science and business
			▪ Major data retrieval and analysis methods used in concert with

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Ontario (at present)	Comparative Jurisdictions	Literature Review	Considerations/ recommendations
			environmental and sustainable focus
			▪ Weak link in Geospatial implementation province wide is teacher training see
			Learning to Think Spatially: GIS as a Support System in the K-12 Curriculum- authors *Committee on the Support for the Thinking Spatially*: The Incorporation of Geographic Information Science Across the K-12 Curriculum, Committee on Geography,
			National Research Council *Reference their recommendations*

Notes: for sake of brevity jurisdictions are coded

England – ENG

New South Wales Australia- NSW

Alberta- Ab

British Columbia- BC

Manitoba- Mb

Nova Scotia- NS

Environmental Education Report

Geography is an integrative discipline that brings together the physical and human dimensions of the world in the study of people, places, and environments (National Council For Geographic Education, 1994). It is by definition a key stakeholder in environmental education. As the world facing students in coming years will be more crowded, the physical environment more threatened, and the global economy more competitive and connected, understanding the new world order will require high levels of competence in geography.

Environmental education uses seven major themes to develop student understanding and perspectives about the increasingly complex world in which students live: citizenship (responsibilities and action), stewardship (preservation and conservation), sustainability, natural/human systems, change (causal and impacts), resource management, and environmental awareness (OAGEE, 2007). As more and more people realize that there is but one Earth and that it must be cared for to sustain us and all life, Environmental Education (EE) themes are growing in importance. However, EE teachers must be careful not to repeat mistakes associated with earlier initiatives that led to a generation that is pessimistic and apathetic to environmental issues (Nagel, 2005). The key to meaningful environmental education is the development of an environmentally conscious and responsive citizenry. This development requires educators to emphasize a sense of place in relation to how it sustains life (Ardoin, 2005) and the notion that EE is a lifelong process (Haigh, 2006; Moore, 2005).

Much of the literature on environmental education focuses on effective ways to incorporate it into curricula (see Heimilch et al., 2004). Experts highlight the importance of developing a coordinated educational plan (Abeliotis & Goussia-Rizou, 2004; Hungerford, 2005) and motivating teachers to implement EE initiatives because successful school implementation of EE depends significantly upon teacher beliefs and understandings (Cotton, 2006). Environmental education advocates assert curriculum must focus on the importance of interdependence if it is to lead to positive lasting changes in attitudes and behaviours (Buchan, 2004; Finch, 2008; Hsu, 2004). For example, curriculum must acknowledge that it is only through collaborative efforts to care for our world that real solutions to major environmental issues will come to fruition. Moreover, collaboration has a central role to play in overcoming boundaries like race, class, location, political affiliation, and economic ideology (Rivera, 2008).

While Gralton, Sinclair, and Purnell's (2004) work showed little evidence of long-term impacts following EE, the approach he examined did not incorporate social transformation. Similarly, Gruenewald's (2004) contention that institutionalizing EE works against its own socially and ecologically transformative goals fails to address the need to transform human thinking and actions locally, nationally, and internationally to sustain life. Current trends in environmental education incorporate a social transformation agenda.

What are the best ways to teach EE for real and lasting change? Sauvé (2005) outlines fifteen currents of EE, pointing out several that are being used advantageously. She identifies holistic, bioregional, praxic, socially critical, feminist, ethnographic, eco-education, and sustainability as currents replacing traditional approaches. Other effective EE practices incorporate multidisciplinary approaches, modelling, and constructivism (DiEnno & Hilton, 2005; Higgs & McMillan, 2006). Cole (2007) argues for the use of multidisciplinary lenses and for the incorporation of more diverse, locally appropriate, and inclusive pedagogies in environmental education.

Research shows a substantial divergence between teacher beliefs and the espoused aims of much EE literature and the Geography syllabus they were following. Thus new curriculum materials may not be implemented in the intended manner. This failure brings many things into question like how personal worldviews (Manoli, Johnson, & Dunlap, 2007; Sauvé, Berryman, & Brunelle, 2007) impact teaching and how to build capacity for implementing EE curriculum initiatives (Tilbury, 2004) in our schools and society.

Environmental education themes have varying degrees of attention through the Social Studies/Geography program in Ontario with the greatest attention occurring in Grades 7, 9, and Grade 12. The expectations that are related to each Grade and course in the K-12 curriculum are shown in Appendix 6.1. Over half of all the expectations in the Social Studies/Geography program in Ontario are related to the environment and Environmental Education (EE).

From an examination of the literature and practices in Ontario and other jurisdictions it can be seen that EE is:
- growing in significance as a focus for all school curriculum and operations as in Australia and Ontario. EE has become more apparent as a theme in geography programs as in

courses like 'Geography for the 21st Century' in Manitoba, 'Global geography' in Nova Scotia, and 'Environment and Resource Management' in Ontario.

- often connected to 'sustainability' education as well as with initiatives like the 'Sustainable Schools' in the U.K., 'Sustainability Education Makes Sense' in Nova Scotia, or Manitoba's 'Grants for Education in Sustainable Development'. The literature reminds us that sustainability is only one, albeit important, aspect of EE.

- supported as part of citizenship education

- best when making use of experiential projects and studies using critical inquiry towards responsive action.

- in need of inservice EE training and better courses/programs for preservice teachers that include or offer EE.

These key elements of environmental education are summarized in Table 1.

Table 1: Some Key Elements of EE

Knowledge and Understanding	Skills	Vales and Attitudes
- global human and natural systems - humans are part of nature - impacts of humans and their activities on the environment - local to global scales - making connections through learning	- critical thinking - research - field skills (methods/experiential/real world learning - geoliteracy (graphicacy/photo/map)and geotechnical skills (GIS/GPS) - communication skills - cooperative group/team skills	- promoting stewardship - respect for all living/non-living things - concern for the environment and sustainable living (an environmental ethic) - a disposition for action and belief people can make a difference

Environmental Education in Ontario

Ontario is a world leader in Environmental Education. Following upon the recommendations of the Working Group on Environmental Education in 'Shaping Our Schools, Shaping Our Future' (2007), the province initiated 'Acting Today, Shaping Tomorrow' (2009), which involves all curriculum areas K-12 in Environmental Education and school environmental planning. To support and guide the policy, a scope and sequence was developed for EE (*Environmental Education: Scope and Sequence of Expectations for Grades 1-8 and Grades 9-12, 2008*). Through this policy, all curriculum areas have expectations to address regarding EE.

Environmental Education in Comparative Canadian Jurisdictions

Nova Scotia

N.S has no EE curriculum policy; however, some units of study in Grades 8, 10, and 12 are directly related to EE such as 'The Fragile Planet' and 'The New Planet: Under New Management' in Grade 12 Global Geography. Nova Scotia is placing a greater focus on EE as noticed in Ministry of Education publications like 'Branching Out' (Oct. 2008) and 'Sustainability Education Makes Sense,' connecting teachers to the Nova Scotia Environmental Network for professional growth opportunities like SENSE projects (e.g. footprint, sustainability, First nations).

New Brunswick

N.B. has no EE curriculum policy. Grades 1-6 Social Studies have few EE topics/ outcomes. However, NB has many topics and outcomes that address EE in three geography courses: one in Grade 8, and two secondary courses: Canadian Geography 120 and World Issues 120. All show a need for updating and refocus especially regarding the environment and sustainability.

Manitoba

While Manitoba has no EE curriculum policy, it has a current focus on 'Citizenship Education,' which includes aspects of the global citizen and environment ethic. There is a new program of 'Grants for Education in Sustainable Development' awarded to teachers/projects which spur attention to EE in all grades. Little EE is done in Social Studies in any grade before Grade 7. There is some focus on EE through Geography-focused courses like Grade 7 "People and Places in the World", Grade 10, "Geographic Issues of the 21st Century" and optional senior courses in World Human Geography or World Issues.

British Columbia

This province has no EE curriculum policy. It does have a guide for 'greening' schools and environmental learning called 'Environmental Learning and Experience: An Interdisciplinary Guide for Teachers (2007) for K- post-secondary that promotes integrating Environmental Learning principles like direct experience, critical reflection, negotiation, and experiential learning cycle model.

Environmental Education in the United Kingdom

The U.K. has no EE curriculum policy**.** They do have a 'National Framework for Sustainable Schools'. It encourages schools to become more sustainable and improve student and staff knowledge and skills to achieve attitude and behaviour change. It is supported by the Sustainable Development Commission. The program identifies eight 'doorways' to building sustainable schools for 2020.The curriculum has more mandatory Geography components that help increase geographic literacy and environmental education.

Environmental Education in New South Wales

This province has a similar approach to Ontario**.** They have policies and guidelines for implementing EE in their schools and throughout the curriculum. Schools have 'School Environment Management Plans' and are following guidelines and suggestions on how to link environmental education objectives with course syllabi. For the 'Common Entrance Examination at 13+ and the Common Academic Scholarship Examination at 13+, the Geography Syllabus identifies the course as leading candidates to 'people, places, and environments' and 'contributing to environmental awareness and education for sustainable development'. Geography Grades 7-10 include many environmental outcomes.

Table 2 summarizes these initiatives across jurisdictions. Further information about the linkages from environmental education to other aspects of Geography education is found in the Appendix.

Table 2: EE Policies for Curriculum, Schools, and EE in Geography Courses

Jurisdiction	Curricular Policy for EE	School Environmental Planning	Geography Courses With EE
Nova Scotia	No	Sustainability projects	Gr 8, 10, and 12
New Brunswick	No	No	Gr. 8, Can. Geog. 120 and World Issues 120
Manitoba	No	Sustainable projects	Gr 7, 10, and two senior optional courses
British Columbia	No - .but has an environmental learning guide with Environmental Learning Principles	Yes - the province has a plan for greening schools	Gr 12
United Kingdom	No	Yes - National Framework for Sustainable Schools has eight 'doorways' to sustainability	Gr. 1-12 particularly 'A' level have EE outcomes
New South Wales, Australia	Yes	Yes	Gr. 1-12. Grades 7-10 have many EE outcomes and senior courses as well

Recommendations

Recommendation 1: *Expand efforts at improving teacher/staff motivation for cross-curricular and school EE implementation efforts.*

Rationale: While Ontario is advanced in its understanding of environmental education and is in the forefront compared to other jurisdictions in its elaboration and understanding of environmental principles, research (e.g., Cotton, 2006) suggests that, without teacher buy-in, such exemplary efforts are likely to fail. Therefore, it is necessary to explore education of teachers in a similar way to education for students to excite teachers about the possibilities inherent in environmental education approaches. Such education would best be coordinated with the different Faculties of Education across the province.

Recommendation 2: *Use geography's 'centrality' and geography teachers in Environmental Education to help all curricular and school efforts.*

The need for environmental education spans all curriculum areas. However, EE is a central component in all aspects of Geography. Such centrality needs to be stressed more in the curriculum documents and indicated in other subject curriculum documents so that Geography teachers become the school expects on EE, providing informal support to other teachers in their implementation of EE policy and principles.

Recommendation 3: *Connect EE efforts to the emerging currents in EE including: holistic, bioregional, praxic, socially critical, feminist, ethnographic, eco-education, sustainability.* Rationale: Gralton, Sinclair, and Purnell (2004) and Gruenewald (2004) all suggest that traditional approaches to EE have little and perhaps even negative long-term impact on efforts to promote environmental awareness. Therefore, it is time to incorporate more innovative pedagogical approaches (e.g., Sauvé, 2005) to increase the effectiveness of EE not only in Geography but across subject matter.

Concluding Remarks

An examination of curriculum documents across diverse jurisdictions and recent research literature in Geography reveals a definite strength in the Ontario Geography curriculum. In particular, Ontario has done an exemplary job in articulating the key aspects needed to be among the global leaders in Geography curriculum development. What is not always as clear is how we might bring these key aspects into being.

For four areas, namely Equity and Inclusion, Assessment and Evaluation, Critical Thinking, and Global Citizenship, Ontario indicates how Geography should incorporate these elements. However, the processes for incorporation are not embedded in the curriculum documents themselves but are found in other Ministry of Education documents. We strongly recommend that these processes be included within the curriculum documents. Among comparable jurisdictions, the Geography curriculum for Manitoba does the best job of doing so for Equity and Inclusion and Assessment and Evaluation. We were particularly impressed in this regard by the articulation of anti-racist pedagogical practices and the focus on assessment for learning in Manitoba. For Critical Thinking and Global Citizenship, the United Kingdom seems to be on the cutting edge for Geography-specific pedagogy to enhance these understandings.

Ontario was the strongest of the seven jurisdictions studied with respect to Geospatial Technology and Environmental Education. The curriculum documents not only delineate the central role Geography plays in addressing these critical cross-curricular topics but gives concrete suggestions on how teachers might do so. What may be lacking is the motivation to use these strategies by teachers and to be engaged in these domains by students. Here the problem appears to lie outside the purview of curriculum per se and to rest with professional development of teachers at the pre-service and in-service levels.

Overall, then, this report shines a light on the exciting possibilities for Geography in Ontario. The developers of the current Geography curriculum documents were far-sighted in recognizing the key elements of Geography as still evident in the research literature. The challenge now is to provide teachers with examples of exemplary pedagogical practices to attain these elements and the motivation and education to deliver these elements to Ontario students from Grades 1-12.

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