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ACCOMMODATING ABORIGINAL STUDENTS WITH MILD INTELLECTUAL  
DISABILITY IN ONLINE COURSES

BY

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**“Accommodating Aboriginal students with Mild Intellectual Disability in  
online courses”**

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Abstract

This research study examined the design elements required to create an online course for Aboriginal students with mild intellectual disability (MID). Action research was undertaken to design an intervention to address the problem of students with MID at Keewaytinook Internet High School (KiHS) not having their needs met in online courses, which included not receiving all of the accommodations in online courses as prescribed on their individual education plans (IEPs). The intervention was based on revising a grade nine math course currently offered at KiHS to incorporate design elements, including accommodations related to course design, in order to meet the academic needs of these students. The design elements were selected based on a review of literature and the responses to a questionnaire given to teachers asking what course design elements they felt would help meet the needs of students with MID. Once the revised course was delivered, it was evaluated using questionnaires and interviews asking teachers about the perceived success of the course. Overall, teachers felt that the intervention was a success in all five areas of course design: goals; content; context; methods; and assessment. The following specific design elements were seen as beneficial to students: use of interactive materials, continual review of content, simplified template, removal of external links, simplified language, and clearly stated goals (curriculum expectations) for each lesson. Although this research study focused on a specific group of students, the findings may be valuable for online instructors who work with students with similar needs to those with MID.

Definition of Terms and Acronyms

<p>Aboriginal Affairs and Northern Development Canada (AANDC)</p>	<p>Formally known as Indian and Northern Affairs Canada (INAC), AANDC is one of the departments of the federal government responsible for meeting the obligations of the Government of Canada and commitments to First Nations, Inuit, and Métis people. In addition, AANDC is responsible for fulfilling the constitutional responsibilities of the Federal Government in the North (Aboriginal Affairs and Northern Development Canada, 2010a).</p>
<p>Aboriginal People</p>	<p>Individuals belonging to at least one of the following Aboriginal groups: Indians, Métis, or Inuit. They are the descendants of the original inhabitants of North America (Aboriginal Affairs and Northern Development Canada, 2010e).</p>
<p>Accommodations</p>	<p>“The special teaching and assessment strategies, human supports, and/or individualized equipment required to enable a student to learn and to demonstrate learning” (Ontario Ministry of Education, 2004b, p. 25). Accommodations do not change the curriculum expectations for the grade or course. Instead, they help remove the barriers to meeting these expectations. <i>Accommodated only</i> (AC) is the term used on an Individual Education Plan (IEP) to show the subjects or courses in which students require accommodations in order to meet the curriculum expectations (Ontario Ministry of Education, 2004b).</p>
<p>Alternative expectations</p>	<p>Expectations that are not a part of the Ontario curriculum. They</p>

	<p>are not a part of a subject or a course, therefore they are referred to as <i>alternative programs</i> or <i>alternative courses</i> (Ontario Ministry of Education, 2004b).</p> <p>On an Individual Education Plan (IEP), the term <i>alternative</i> (ALT) is used. In secondary school, alternative courses are non-credit courses and do not contribute toward the requirements of an Ontario Secondary School Certificate (OSSC) or an Ontario Secondary School Diploma (OSSD).</p>
Assessment accommodations	<p>“Adjustments in assessment activities and methods required to enable the student to demonstrate learning” (Ontario Ministry of Education, 2004b, p. 28).</p>
Band-operated schools	<p>Also known as band-run schools, these schools are operated by First Nations communities (University of Manitoba, 2006).</p> <p>They are funded by the federal government, but the localized authority allows their administration to be in control of hiring, curriculum, and administration.</p>
Certificate of Accomplishment (COA)	<p>A certificate granted to students who leave school before meeting the requirements for the Ontario Secondary School Certificate or the Ontario Secondary School Diploma (Ontario Ministry of Education, 1999).</p>
Environmental accommodations	<p>“Changes or supports in the physical environment of the classroom and/or the school” (Ontario Ministry of Education, 2004b, p. 28).</p>
First Nation	<p>A term that replaces the word “Indian,” which some people find</p>

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	<p>offensive. No legal definition of the term exists. The term “First Nations peoples” refers to both Status and Non-Status Indians in Canada. Some communities use the term “First Nation” to replace the word “band” in the name of their community (Aboriginal Affairs and Northern Development Canada, 2010e).</p>
<p>Individual Education Plan (IEP)</p>	<p>A “written plan describing the special education program and/or services required by a particular student. It identifies learning expectations that are modified from, or alternative to, the expectations given in the curriculum policy document for the appropriate grade and subject or course, and/or any accommodations and special education services needed to assist the student in achieving his or her learning expectations” (Ontario Ministry of Education, 2000, p. 3).</p>
<p>Identification, Placement, and Review Committee (IPRC)</p>	<p>A committee made up of at least three people, one of whom must be the principal or superintendent of education (Simcoe Catholic District School Board, 2011). All schools must form a committee. The roles of the IPRC are to determine if a student is to be identified as exceptional, and to determine the placement for exceptional students, which is reviewed at least once each school year.</p>
<p>Instructional accommodations</p>	<p>“Adjustments in teaching strategies required to enable the student to learn and to progress through the curriculum” (Ontario Ministry of Education, 2004b, p. 28).</p>
<p>Keewaytinook Internet High</p>	<p>An online high school that primarily serves Aboriginal</p>

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School (KIHS)	communities in northern Ontario. KIHS offers a full program of courses, including a variety of compulsory and optional courses, for Grades 9 through 12 at all levels.
Modifications	<p>“Changes made in the age-appropriate, grade-level expectations for a subject or course in order to meet a student’s learning needs. These changes may involve developing expectations that reflect knowledge and skills required in the curriculum for a different grade level and/or increasing or decreasing the number and/or complexity of the regular grade level curriculum expectations” (Ontario Ministry of Education, 2004b, p. 25).</p> <p>The term <i>Modified</i> (MOD) is used on an IEP to show the subjects or courses where the student requires modified expectations.</p>
Ontario Secondary School Certificate (OSSC)	A certificate granted to students who leave secondary school before earning the Ontario Secondary School Diploma. To receive a certificate, students must earn a minimum of 14 credits, including seven compulsory credits and seven optional credits (Ontario Ministry of Education, 1999).
OSSD: Ontario Secondary School Diploma (OSSD)	A diploma awarded to secondary school graduates in Ontario. In order to meet the requirements for the diploma, students must earn a minimum of 30 credits, including 18 compulsory credits and 12 optional credits. In addition, students must pass the provincial secondary school literacy tests and complete 40 hours of community involvement activities (Ontario Ministry of



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	Education, 1999).
Voice recognition software	“Voice recognition software (also known as speech-to-text software) allows an individual to use their voice instead of typing on a keyboard. Voice recognition may be used to dictate text into the computer or to give commands to the computer” (Special Needs Opportunity Window, 2011a, “Description,” para. 1).
Word prediction software	Software that supports individuals with text entry. It “assists with reducing the number of required keystrokes, by predicting the word you are typing and the next word based on word frequency and context” (Special Needs Opportunity Window, 2011b, “Description,” para. 1).

## Chapter I: Introduction

Before the introduction of distance education methods in secondary school courses, many Aboriginal students in remote northern Ontario locations had to leave their communities to pursue a secondary school education. At the age of 13 or 14, these young individuals would leave their family to board with a host family in an urban centre with unfamiliar languages, cultures, and environments. Even today, students still leave their communities to attend secondary school, but they now have a choice about where and how to pursue their education. The advent of distance education offerings in the North, such as radio courses, correspondence courses, independent learning courses, and online courses, has given students this choice, and today many choose to remain in their home communities and study online.

This dissertation research examines one of these options, online education, which many Aboriginal students in Northern Ontario choose as the means to receive their secondary school education. While specifically focusing on course design for students with special needs, the areas of Aboriginal Education, Special Education, and Online Education also informed the research study and provided background for the research question.

Regardless of ethnicity, special needs, or how they choose to pursue their studies, all children and youth have a right to a publicly funded education (United Nations Educational, Scientific and Cultural Organization, 2011). In Canada, education, including special education, is a provincial government responsibility (Ontario Ministry of Education, 2012b). Under Ontario's *Education Amendment Act of 1980 (Bill 82)*, school boards are required to provide, or to purchase from another board, special

education programs and services for exceptional students (Government of Ontario, 2011). However, this responsibility does not extend to the education of Aboriginal students who attend schools on reserves. For those students, the responsibility for the provision of education and special education rests with Aboriginal Affairs and Northern Development Canada. The Council of Ministers of Education, Canada (2010) explains this difference as follows: “Across Canada, the interpretation of the ‘right to education’ varies between and within jurisdiction for First Nations, Métis, and Inuit peoples . . . from the perspectives of First Nations and off-reserve status and non-status Indians, education is a treaty right that extends from early childhood to adulthood” (p. 13).

A variety of legislation pertains to the education of Aboriginal people. The *Constitution Act (1982)* recognizes the right to a federally-operated education system for all Aboriginal peoples, including Inuit and Métis peoples (Cherubini & Hodson, 2008; Council of Ministers of Education, Canada, 2010; Federation of Saskatchewan Indian Nations, First Nations Education Council of Quebec, & Nishnawbe Aski Nation, 2011). Under the *Indian Act (1876)*, the federal government is responsible for elementary and secondary schools located on reserve lands (Council of Ministers of Education, 2010; Simeone, 2011). As First Nations schools are not regulated by a provincial government, they are not subject to the regulations outlined in the *Education Amendment Act*, and therefore, do not have to follow the same detailed regulations in regards to provision of educational services as do other schools within Ontario. Instead, First Nations schools follow the National Program Guidelines for the Elementary/Secondary Program developed by Aboriginal Affairs and Northern Development Canada (AANDC).

The current federal policy under this program is to provide educational services to First Nations at a level “comparable to those required in provincial schools,” but there is no legislation assigning the appropriate authorities and accountabilities required to achieve this objective (Aboriginal Affairs and Northern Development Canada, 2009). Grand Chief Beardy describes this lack of standards for First Nations schools saying, “The federal delivery of education on-reserve is not legislated-based, so you don’t have a minimum, you don’t have standards. It’s almost *ad hoc* in delivering that education because it is delivered without a policy” (cited in Garrick, 2012, p. 3). Similarly, the imprecise guidance that characterizes First Nation education also extends to special education on reserves. In fact, there is presently no federal education law mandating First Nation schools to provide any special education services (Phillips, 2010). Neither the *National Program Guidelines for Elementary and Secondary Education* nor the *Special Education Program* developed by the federal government provides specific policies or recommendations for band-operated schools regarding the delivery of special education services. These schools are managed by their respective First Nations community, which allows for local control of curriculum, hiring, and administration (University of Manitoba, 2006). To allow for this localized management of Aboriginal special education, the *Special Education Program* (Government of Canada, 2011b) states the following general objective: “To provide access to quality special education programs and services that are culturally sensitive and comparable to generally accepted provincial standards in that locality” (p. 1).

Provincial and federal governments provide funding for students to attend any ministry-approved school, including those providing distance education (Ontario

Ministry of Education, 2012a; The Standing Senate Committee on Aboriginal Peoples, 2011b). Students may choose to study in classroom-based schools, at a distance, or by a combination of these delivery methods to suit their educational needs and preferences. However, although all students have the right to a publicly funded education and the freedom to choose how to access this education, First Nations students with special needs may experience differences in quality and range of the special education services available to them within the province, depending on the remoteness of their location (Aboriginal Affairs and Northern Development Canada, 2011a). Furthermore, they may experience differences in the type of services, such as formal identification of special needs, provided to them within the province, based on whether or not they attend a provincially-funded school or a federally-funded school (Aboriginal Affairs and Northern Development Canada, 2010d; Government of Ontario, 2011; Miracle, 2004).

Offering special education services at a distance, particularly in the online environment, is a new and underexplored area in education. Provincial and federal governments have yet to provide specific legislation or curriculum resources for this area. Furthermore, the research into special education at a distance is limited and focuses more on providing accessible courses to students with physical or sensory disabilities, rather than intellectual disorders. In Chapters II and II of this dissertation, the literature in several related areas is reviewed in order to gain a more complete understanding regarding the education of Aboriginal students with intellectual disabilities in the online or blended distance educational environment. The remainder of this chapter will provide background information on the online school, Keewaytinook Internet High School (KiHS), and a description of the purpose, and related components, of this research study.

## **Background**

There are several online high schools in Canada, including Keewaytinook Internet High School (KiHS), a school serving Aboriginal communities across Northern Ontario; Sunchild E-Learning Community, a school serving Aboriginal communities across Alberta; and Virtual High School, a school available to all students residing in Ontario. One of the most recent online high schools is Canadian Online High School, which was launched in November 2012, and offers courses accredited by the Ontario Ministry of Education (Lenssen, 2012). All of these schools are considered private schools because they are not funded by the provincial government. For Aboriginal students who are funded by the federal government, such as the students in this study, a set amount of funding is provided to the school for each student name on the school role. In addition to this core funding, these schools receive federal funding to administer complementary programs, such as the special education program, which aim to improve the quality of education and outcomes for First Nations students (Assembly of First Nations, 2012). Any costs not covered by federal funding are the responsibility of the band. Of these online schools, only KiHS and Virtual High School have a special education program.

KiHS, a private, accredited online high school located in Ontario, Canada, offers a unique classroom environment that cannot be found elsewhere in Canada. It opened in the fall of 2000, with 36 students from three First Nation communities and a curriculum of Grade 9 courses. Since then, the school has grown substantially, and currently offers fully online courses in Grades 9 through 12 at all levels, such as applied, locally-developed, essential, workplace preparation, college preparation, university preparation,

and open courses. KiHS is the only online secondary school in Ontario created to serve First Nation communities, and is the only private online high school in Canada that offers a full range of courses, from locally-developed to university preparation. In addition, unlike most online secondary schools in Canada, KiHS has situated learning centres in order to provide on-site learning resources and support for students. These centres are located in 13 First Nation communities, most in remote locations, where the native languages are Cree, Oji-Cree, and Ojibway.

The majority of these learning centres are one-building rooms separate from the elementary school. Each learning centre has one teacher who assists students from grades 9 to 12 in all subject areas. In centres with larger enrollment, there may be a classroom assistant present to work alongside the teacher. Although lessons are delivered online at KiHS, Elders and community members will occasionally be involved in face-to-face teachings with the students. In addition, some communities will carry out traditional practices within the learning centres, such as smudging at the beginning of the school day.

In the 2012/2013 school year, KiHS had approximately 250 students and employed 16 instructors/mentors and three full-time classroom assistants. Eight of these employees were of Aboriginal descent. At KiHS, and for the purpose of this study, the term *teacher* refers to the collective group of instructors and mentors. An *instructor* is an individual who teaches a course online, and a *mentor* is the individual who is present in the situated learning centre. The majority of teachers at KiHS hold both of these roles; however there are some instructors who are not mentors. For example, the special education resource teacher instructs several courses throughout the year, but works at the

main office rather than in a situated learning centre. A *classroom assistant* is an individual who works alongside a mentor, but does not possess formal teaching qualifications or instruct any courses.

The delivery model at KiHS is individualized, and each student works independently. The courses are asynchronous and fully online. The learning centres are available during regular school hours and are equipped with high-speed Internet access and computers that students can use to work on their courses. A mentor is present in each learning centre to assist students with course content and assignments. Most students choose to attend the learning centres in their community rather than completing their coursework at home or in another location outside of the learning centre.

The online courses use Moodle First Nations (MoodleFN), a customized version of the Moodle learning management system (LMS), which is composed of Moodle plug-ins specifically designed to support and promote First Nations identity, culture, and pedagogies (Oliveira, 2008). MoodleFN was created by K-Net in 2003 to support KiHS and the Native Education (NED) Program, a supplementary program for grade 7 and 8 students in First Nation elementary schools and education programs across Ontario. MoodleFN later grew to include other schools and programs that delivered e-learning to First Nations learners. The LMS was developed by a group of teachers and administrators from organizations that used the MoodleFN plug-ins and contributed to the development costs (F. Oliveira, personal communication, November 27, 2013). In addition to promoting First Nations, the MoodleFN project was centred on the First Nations principles of ownership, control, access, and possession of data in First Nations communities also known as OCAP (First Nations Information Governance Centre, 2010),



as well as the Open Source movement in general (F. Oliveira, personal communication, November 27, 2013). KiHS is the only online high school in Canada that utilizes this customized LMS.

Design features incorporated into the MoodleFN interface for KiHS consist of a random photograph gallery showcasing students' Aboriginal artwork (found on the KiHS homepage), as well as a block describing one of the *Seven Sacred Teachings* that rotates weekly. Another customized feature of MoodleFN is the "Tabs Course Format" plug-in that displays sections (weeks) as numbered tabs (Oliveira, 2013). This plug-in includes an alternative activity tracking system, which tracks activities for students as complete (earned a passing grade), incomplete (did not earn passing grade), draft, not attempted, or waiting for grade. The "Tabs Course Format" plug-in also provides a quick overview of the activity completion status by showing a green bar in weeks where all activities are complete, and a red bar where more work is required; it allows students to mouse-over tabs to see a quick report of the activity statuses for any given week.

Students receive their courses through this LMS by logging into the KiHS website. Course materials, such as textbooks or art supplies, are available at the learning centres in each of the communities or by mail.

There are four terms each school year, and each term is eight weeks in duration. Students take two courses per term, but are permitted to take more with permission from the administration. Students also have the option to work on their online courses outside of the classroom, wherever and whenever they choose.

KiHS was initially created for the Keewatinook Okimakanak First Nation, but has since expanded to serve other First Nation reserves. Currently, it serves five

Keewatinook Okimakanak First Nations, and eight other reserves in Northwestern Ontario (see Figure 1 below).



Figure 1. KiHS partner communities with situated learning centres. From *Keewatinook Internet High School*, 2013. Reprinted with permission.

Students residing outside of these locations may apply to the school either independently or through a contractual arrangement between their secondary school and KiHS. By offering the option to work from the learning centre, at home, or elsewhere, and by allowing course access to students outside of the 13 participating communities, KiHS makes learning more accessible to students living in remote locations.

As a final point, KiHS gives students the opportunity to remain in their communities for secondary school. Prior to the establishment of KiHS, most of the

communities did not have a local high school and had to send their children to larger urban centres to pursue a secondary education.

### **Special Education at KiHS**

Until September 2008, when a special education program was implemented at KiHS, the school was not able to provide adequate educational experiences for students with special needs. Before then, these students needed to travel outside of their communities in order to gain access to educational provisions that met their needs. After September 2008, an Individual Education Plan (IEP), a written plan detailing the special education plan and services required by a student (Ministry of Education, 2004b), was provided for students with special needs, and “accommodated-only,” “modified,” and “alternative” courses became available at KiHS for these students.

When developing an IEP, it is important that the IEP team, along with course instructors, determine which option would best match the student’s programming needs in each relevant course and subject (Ministry of Education, 2004b). In the following section, as well as in the Glossary, the various options are described and the information to be recorded in the student’s IEP for each case is outlined.

“Accommodated-only” courses are those in which accommodations are provided to meet the curriculum expectations (Ontario Ministry of Education, 2004b).

Accommodations are “special teaching and assessment strategies, human supports, and/or individualized equipment required to enable a student to learn and to demonstrate learning” (Ontario Ministry of Education, 2004b, p. 25). They do not change the curriculum expectations for the grade or course. Accommodations, such as special strategies or supports, are prescribed to help remove barriers to meeting these

expectations. In an IEP, accommodations are categorized under instructional accommodations, environmental accommodations, and assessment accommodations. Instructional accommodations are “adjustments in teaching strategies required to enable the student to learn and to progress through the curriculum” (Ontario Ministry of Education, 2004b, p. 28), such as the use of a large-size font or repetition of instruction. Environmental accommodations are changes or supports in the physical learning environment and include accommodations such as a quiet setting or reduction of audio/visual stimuli (Ontario Ministry of Education, 2004b, p. 28). Lastly, assessment accommodations are “adjustments in assessment activities and methods required to enable the student to demonstrate learning” (p. 28), such as oral responses for tests and a reduction in the number of tasks used to assess a concept or skill.

“Modified” courses are those in which changes are made in the age-appropriate grade-level expectations (Ontario Ministry of Education, 2004b). These changes or modifications may include “developing expectations that reflect knowledge and skills required in the curriculum for a different grade level and/or increasing or decreasing the number and/or complexity of the regular grade level curriculum expectations” (Ontario Ministry of Education, 2004b, p. 25). Modified courses may also be accommodated, but are identified only as modified in the IEP.

“Alternative” courses have expectations that are not part of the Ontario curriculum; they are classified as non-credit courses at the secondary level (Ontario Ministry of Education, 2004b).

Since the special education program was implemented at KiHS, educational provisions, such as the course options described above, are available. Other provisions

include educational testing, and meetings of the Identification, Placement, and Review Committee (IPRC), which identify students with special needs and their placements. A position for a full-time special education resource teacher was created to assist students, mentors, and instructors, and classroom assistants were made available in communities that have students requiring resource assistance.

With the addition of the special education program, students can be awarded an Ontario Secondary School Diploma (OSSD), an Ontario Secondary School Certificate (OSSC), or a Certificate of Accomplishment (COA). Each is different in terms of the number of credits required. An OSSD requires that a student earn a minimum of 30 credits, including 18 compulsory credits and 12 optional credits (Ontario Ministry of Education, 1999). An OSSC is given before students complete an OSSD, and requires a minimum of 14 credits, including seven compulsory and seven optional credits. Unlike the OSSD, students pursuing an OSSC are not required to complete 40 hours of community involvement activities or to pass the provincial secondary school literacy requirement. Students who leave school before they have completed an OSSD or OSSC receive a COA to acknowledge their secondary school achievements. Students in an alternative program taking non-credit courses also receive a COA when they have completed their studies.

About half of the students with IEPs, approximately 10 students each year, have a mild intellectual disability (MID). This is the most common type of disability in the KiHS group of students with special needs and therefore warrants specific attention and programming. Addressing the educational needs of these students is the purpose of this research study and is described in further detail in the section below.

### **Statement of the Purpose**

The purpose of this research study was to identify the design elements of online courses that effectively met the needs of Aboriginal students with MID, or those not formally identified, but with similar need. The design elements were the goals, instructional methods, assessment, contextual considerations, and content that together created the design of a course (Ellis, Light, & Pryde, 1999). The design elements were used to create an online course specifically for students with MID attending KiHS. The overall goal behind the study was to explore how to increase the perceived success of courses in meeting the needs of individuals with MID or with similar needs. Success in this dissertation research study is defined as “the accomplishment of an aim or purpose” (Oxford University Press, 2014).

The following research question was addressed in this study:

- 1) What elements of an online course specifically designed to meet the needs of high school students with mild intellectual disability, effectively met the needs of these students, as perceived by the teachers of the students completing this course?

### **Statement of the Problem**

The year prior to the study, staff members at KiHS expressed concern over the courses at KiHS not meeting the needs of students with MID. It was felt that the design of these courses, not the curriculum, was the primary cause for the difficulties experienced by the students. Teachers also reported experiencing frustration with the design of courses for students with an intellectual disability, particularly when trying to provide the accommodations as outlined on students’ IEPs.

At the commencement of this study, not every student with special needs at KiHS was receiving all of the accommodations as directed on their IEPs. Students' instructional and assessment accommodations were only occurring in the learning centres rather than in online lessons. All students accessed the same lessons for a particular course, and it was up to the mentor or instructor to provide the needed accommodations. This situation created difficulties for students, mentors, and instructors and often accommodations were not able to be provided. For example, students were unable to receive accommodations, such as an uncluttered format or simplified instructions, because mentors were unable to change any elements of the master course that all students accessed. Instructors experienced problems when the expectations for one student's assignment were different from that of other students in the course. The accommodation of having a reduced number of tasks required to meet an expectation was not always implemented because instructors could not override the mark for an individual assignment; when this situation occurred, the assessment was not accurate for students with this accommodation because the mark entered into the LMS was not the correct grade.

In the experience of the researcher, as a mentor, instructor, and special education resource teacher, it seemed that students, mentors, and instructors would benefit from having instructional accommodations directly embedded in the design of the online course and provided from the onset of a course. In this study, all students with MID who required accommodations, or those with similar needs, received accommodations directly incorporated into the online course (See Table 1 for a list of these accommodations). Even if individual students had not been prescribed all of the selected accommodations,

the design elements used were those that had been shown in the literature review to be beneficial to all students with MID, such as using both auditory and visual presentation (More, 1999) and chunking instruction into smaller steps (Ontario Ministry of Education, 2002). Some accommodations specified on students' IEPs needed to be supplied at the learning centre level (e.g., quiet work environment), but most were more appropriate for application in the online course design. For instance, the accommodation of a "simple, uncluttered format" or "chunking of information" was previously difficult for mentors to implement because the online lesson was part of a master course created for all students, and may not have included these features in its design. In such situations, mentors would have had to download and adapt the lesson to incorporate these accommodations, but were then unable to upload the lesson back into the online course because subsequently it would become the master lesson for all students. Alternatively, by modifying the lesson outside of MoodleFN in a word processor, formatting, such as templates, embedded videos and learning objects, would be altered or lost.



Table 1

*Accommodations Included in the Course Design*

Instructional Accommodations	Assessment Accommodations
<ul style="list-style-type: none"> <li>• use a variety of instructional methods</li> <li>• highlight key words;</li> <li>• provide simple, uncluttered formats;</li> <li>• sequence the steps involved in learning a skill or concept;</li> <li>• teach the same concept or skill in many situations;</li> <li>• provide extended and numerous opportunities to practice skills and learn material;</li> <li>• use drill and practice;</li> <li>• chunk the instruction into smaller steps (Ontario Ministry of Education, 2002);</li> <li>• provide graphical representation of concepts; (College Committee on Disability Issues, 2006);</li> <li>• use manipulatives</li> <li>• offer alternatives to written expression (More, 1999);</li> <li>• introduce key concepts and vocabulary at the beginning of a new lesson (College Committee on Disability Issues, 2006);</li> <li>• use concrete examples (British Columbia Ministry of Education, n.d.);</li> <li>• review previously learned material (Weber &amp; Bennett, 2004).</li> </ul>	<ul style="list-style-type: none"> <li>• give clear, specific written directions (College Committee on Disability Issues, 2006);</li> <li>• provide practice questions;</li> <li>• highlight key words in questions;</li> <li>• divide the tests into parts;</li> <li>• use alternative forms of assessment; and</li> <li>• use frequent short assessments rather than one long assessment (Ontario Ministry of Education, 2002).</li> </ul>

Another benefit of providing accommodations directly within the online course design was that students with IEPs would not require mentors to provide these accommodations. Since the accommodations would be provided within the lessons by the instructor, mentors would no longer have to provide individual accommodations in the face-to-face environment of the learning centres. By making changes to the online environment to meet students' needs, students would not be singled out as obviously and frequently in the face-to-face environment. In addition, if curriculum modifications were

similar for all students enrolled in a course, they also could be provided directly within the online course by instructors, rather than by mentors. However, because modifications are focused only on curriculum expectations, and not on how students accessed learning through the design of the course, they fell outside of the scope of this study.

Previously, teachers and mentors at KiHS were not able to provide all accommodations set out in individual students' IEPs because of limited time, resources, and/or knowledge. Teachers did not have the time to create alternative versions of their course to publish online, as they developed and/or instructed a minimum of three courses a year, while supporting students full-time in the learning centre (personal communication with teachers concerned, n.d.). Although KiHS teachers often had one semester when they did not instruct online, this schedule did not provide much time to attend to these responsibilities and to develop another course for students with special needs. Course loads would have to be reduced in order to incorporate the development and instruction of these new versions of online courses or another solution would have to be found.

Nonetheless, even if teachers did have the time, they did not necessarily have the knowledge to provide instructional accommodations for students with special needs or, specifically, how to create online lessons to meet these needs. Based on a yearly compilation of KiHS staff qualifications by the special education resource teacher, at the time of the study only 38% of the 16 teachers had any provincially recognized special educational qualifications and only one teacher had special education specialist qualifications. Furthermore, extensive professional development in special education

was not provided for KiHS staff. When professional development was provided, it occurred in short sessions during bi-annual staff training weeks, leaving any formal instruction in special education to be received in pre-service teaching education or through elective continuing education courses offered at post-secondary institutions.

Alternatively, if instructors were provided with a set of course design guidelines, such as those identified by this study, and instruction on how to implement them, the time to develop a course that met the needs of students with MID may be decreased as there would be concise guidelines for design and instructors would not have to acquire this knowledge independently. In addition, as the curriculum would not change with accommodations, instructors would not be required to gain additional subject knowledge, and instead would only be communicating the course curriculum in a different way. The special education resource teacher would be available to provide instruction on the purpose behind the design guidelines and also on how to incorporate the guidelines into course design.

The starting point for this research study was a list of course design guidelines that were considered to meet the needs of the students with MID, or students with similar needs, based on the perception and experience of their teachers as well as the literature review. This list included instructional and assessment accommodations that related to design, as well as other design elements that would benefit Aboriginal students with MID. These guidelines, in turn, were used to create a model course that was then implemented and evaluated. The feedback from the implementation of this course can serve as a guide for future development of courses by instructors at KiHS.

The result of utilizing the design guidelines to revise a course was a course that teachers believed could successfully meet the academic needs of students with MID. The new course may serve as an exemplar for subsequent courses that may need revision to meet the needs of these students. In the future, the list of course design guidelines used to revise this course could also lead to a comprehensive program of courses tailored for students, such as those with MID, who are pursuing their OSSC.

### **Assumptions of the Study**

There are five assumptions upon which this research study was based. These assumptions are outlined below.

1. Students with MID have a wide range of strengths and needs. Not all students will exhibit the same characteristics (British Columbia Ministry of Education, n.d.; Ontario Ministry of Education, 2002; Weber & Bennett, 2004).
2. Not all students with MID are capable of taking credit courses at the secondary school level. School boards in Ontario are responsible for determining their own criteria for identifying students with MID (Harrison & Holmes, 2009; Ministry of Education, 2001). There is no official set of scores for testing to classify intellectual disability across school boards in Ontario (Harrison & Holmes, 2009; Weber & Bennett, 2004), nor a universally accepted definition of the disability (Weber & Bennett, 2004). Therefore, those who are labeled with MID could have a wide range of academic abilities (Harrison & Holmes, 2009), including the ability to earn secondary school credits.
3. Not all students with MID can have all of their educational needs met in an online environment. For example, some students with MID require an Alternative

- program with expectations not covered in the Ontario high school curriculum, such as personal health care, grooming, physical education, social skills, or meal preparation (Ontario Ministry of Education, 2002), which may be difficult to provide or achieve online.
4. Most of these students will require modifications to the curriculum (Ministry of Education, 2001) beyond the accommodations being provided in the online course design.

### **Significance**

This study is important for its potential to identify the special education services that students with MID may require. By being able to provide accommodations not only face-to-face in the situated learning centres, but also directly within the online courses, KiHS is increasing the chances of student success. Furthermore, when students with special needs can take online courses that are tailored to their academic needs and that meet graduation requirements, fewer students at KiHS will be discouraged by being enrolled in courses that are too difficult or do not count towards an OSSC or OSSD. For example, at the commencement of the study, a common concern from teachers at KiHS was that some of the locally developed or applied courses were too difficult for students with MID, even though these students were considered to be capable of meeting the curriculum expectations, and students were becoming frustrated by not being able to complete activities. If students are considered capable of meeting curriculum expectations, then there should be a way to deliver course content in a way that meets their learning needs. This study was thus aimed to provide teachers and course developers with guidelines about how to design courses for these students.

### **Organization of the Study**

This dissertation is organized into eight chapters. An introduction to the study has been presented in Chapter I. In the next two chapters, a review of literature will cover the areas of Aboriginal education, special education for students with MID, and online education for students with special needs. The significance of the study for each of these areas will be discussed. Chapter IV will outline the methodology and procedures used in this study, including data collection, and analysis. A timeline of these procedures will be provided, along with a discussion of ethics, limitations, and delimitations of this study. The results found in the literature review and by the preliminary questionnaire will be provided in Chapter V. Chapter VI will discuss these results and demonstrate how the findings were used to revise the course at KiHS. Chapter VII will communicate the results of the course implementation, and will follow with a discussion of these results. Lastly, the limitations and significance of the results, as well as areas of future investigation will be provided in Chapter VIII.

## Chapter II: Review of the Literature

A review of the literature relating to special education in the online environment produced limited research on the study of meeting the needs of students with exceptionalities who are pursuing their education online. For meeting the needs of Aboriginal students with mild intellectual disability, who are studying online, the resources are even scarcer. The literature that is available focuses on general topics such as Aboriginal education, accessibility of online content, special education in face-to-face classrooms, and the classification of intellectual disabilities as a whole. Therefore, multiple broad topics have been explored for this study. The literature review was informed by various books, online refereed journals, websites, books, reports, and printed and online publications using the following data descriptors individually or in combination with one another: Aboriginal/First Nations education; online/distance education/learning; distance education; special education in distance/online education/learning; mild-intellectual disability; intellectual disability; course design; models of course design; universal design; universal design for learning; and accessibility in online/distance education/learning. Some of the databases used for locating scholarly articles included Athabasca Library, ProQuest Education, Education Resources Information Center (ERIC), and Education Research Complete by EBSCO Publishing. These topics, in order of discussion, are Aboriginal education, mild intellectual disability, and online learning for students with special needs.

To cover the wide range of topics, the review of literature is organized into two chapters. First, this chapter examines the literature on Aboriginal education, including the status of First Nations education, special education policies, academic achievement,

and academic needs. The term *Aboriginal* is used to describe three groups of peoples – First Nations, Métis, and Inuit (Aboriginal Affairs and Northern Development Canada, 2010e). In this study, the school serves First Nation peoples, and thus, whenever possible, research involving this specific Aboriginal group was used. Because the study examined the needs of Aboriginal students, and the online school in this study served Aboriginal communities, it was necessary to review the background information on the academic needs of this culture, as well as the policies that governed the secondary school.

The second part of the review of literature is found in Chapter III, which moves to specific discussion of the literature available on special education for students with MID, and online learning for students with special needs. As the study was focused on Aboriginal students with MID in an online environment, it was also necessary to review the literature on MID and online learning for students with an intellectual disability. Together, Chapters II and III provide the background necessary to inform the study presented in this dissertation.

The examination of Aboriginal education commences below with a survey of the literature describing the current state of Aboriginal education in Canada.

### **Policy and Academic Needs in Aboriginal Education**

Many of the issues arising in Aboriginal education and, more specifically, the provision of Special Education for Aboriginal children, derive from the fact that different jurisdictions manage different areas of education. Unlike the public school system, which is the responsibility of provincial governments, Aboriginal education is the financial responsibility of the federal Government of Canada. This responsibility includes First Nation students, living on reserves, who attend First Nation, provincial,



federal, or private schools (Aboriginal Affairs and Northern Development Canada, 2006; Council of Ministers of Education, 2010; Simeone, 2011).

For the most part, there are three models by which First Nation students receive primary and secondary education services (The Senate Committee on Aboriginal Peoples, 2011b): federal schools controlled by Department of Aboriginal Affairs and Northern Development (AANDC); local schools operated by individual First Nations (also known as band-operated schools); and provincial and/or territorial public school systems. It is estimated that of the approximately 120,000 on-reserve First Nation students in Canada, 60% attend First Nation schools and 40% attend provincial, federal, or private schools (Aboriginal Affairs and Northern Development Canada, 2011a). The majority of students attending provincial schools are at the secondary level (The Standing Senate Committee on Aboriginal Peoples, 2011b). The location of this dissertation research study, KiHS, is a private school funded by the federal government, but it follows the Ontario curriculum in order to have the authority to grant secondary school credits.

Besides the jurisdiction over the provision of education, Aboriginal education differs in what is supplied for educational services. First Nation schools lack access to many benefits that the provincial governments provide to its public schools (The Standing Senate Committee on Aboriginal Peoples, 2011b). For example, the education system for First Nation students does not have ministries of education, education acts, or legal requirements for parental involvement (The Standing Senate Committee on Aboriginal Peoples, 2011b). Many of the locally-run, band-operated schools do not offer a wide range of educational services, such as curriculum development, teacher training, professional development for principals, and testing and quality assurance (Mendelson,

2006). Many people feel that First Nation schools should require the establishment of First Nation school boards mandated to deliver such services, comparable to those offered by provincial school boards (The Standing Senate on Aboriginal Peoples, 2011b). Hearing these concerns, the *National Panel on First Nations Elementary and Secondary Education on Reserve*, a panel created by the Assembly of First Nations and AANDC in order to offer insight into how to improve the academic achievement of First Nation students living on-reserve (Haldane, Lafond, & Krause, 2011), recommended that the federal government create legislation that would clarify the roles and responsibilities of the government and First Nations, as well as set out educational funding sufficient to provide comparable quality of education (Rae, 2013). The panel was launched in June 2011 and concluded its activities in December 2011 (Narine, 2012), visiting numerous areas across Canada to hear from First Nation students, parents, Elders, teachers, Chiefs and Councils, First Nation organizations, provinces, the private sector, and other interested Canadians (Haldane, Lafond, & Krause, 2011). Following the publication of the recommendations of the National Panel on First Nations Elementary and Secondary Education, the federal government announced that it would, in fact, introduce a First Nations Education Act by September 2014 (Rae, 2013). When the proposal for the Act was released on October 23, 2013, it received criticism for not being consistent with the recommendations of the National Panel, specifically that the Act be created in partnership between First Nations and Canada, and that it solve the problem of inadequate and unequal funding levels (Atleo, 2013; Rae, 2013). Although the roles and responsibilities of First Nations and the federal government were clarified in the draft, the proposed First Nations Education Act put the majority of these obligations on First Nations, while taking

away the control of education from First Nations (Rae, 2013). In response to the draft proposal of the education act, Chief Shawn Atleo (2013) stated his informed opinion that the only way to achieve academic success was for First Nations to have control of their education, and that any relegation or oversight by the Minister “smacks of the disastrous policies of the past that continue to victimize our communities and families” (p. 2).

Nipissing First Nation Education Director Fran Couchie agreed with Chief Atleo, stating that the proposed top-down approach was “poisoned by history,” and to [look at] residential schools [as a prime example]” (Thomas, 2013, para. 5). By having control of their education, Atleo (2013) stated that it would allow individual First Nations to design their own standards that were uniquely designed to reflect their language, culture, and way of learning and knowing, while still meeting or exceeding provincial standards. As a result of criticism, including public protests, the First Nations Education Act deadline was dropped (Kilpatrick, S., 2013; Valcourt, 2013), and on April 10, 2014, the Minister of Aboriginal Affairs and Northern Development, Bernard Valcourt, introduced Bill C-33 – The First Nations Control of First Nations Education Act (Aboriginal Affairs and Northern Development Canada, 2014). The new Bill replaced the First Nations Education Act, and promised to “ensure First Nations control of First Nations education while establishing minimum education standards, consistent with provincial standards off-reserve” (Harper, 2014, para. 3). Shortly after the new Bill was proposed, First Nations chiefs voted to reject Bill C-33 (The Canadian Press, 2014), and at this time, it is uncertain if legislation for First Nations education, such as the First Nations Control of First Nations Education Act, will be implemented.

In addition to clearly defined roles and responsibilities, educational services are affected by the level of funding provided to schools to supply these services. The federal government assumes the responsibility to fund schools for on-reserve residents at a level comparable to that of provincial schools (Mendelson, 2006). According to Mendelson (2006), “the preponderance of evidence is that education funding for Aboriginal students on reserve is not currently adequate to meet government-stated standards of equivalent funding to the province, let alone adequate to provide for an equivalent quality of education” (p. 3). In the formative evaluation of the Elementary/Secondary Education Program on reserves prepared by AANDC, most informant interviewees, who included 19 AANDC staff members and four First Nation stakeholders possessing a high level of knowledge of education policies and programming and/or expertise in First Nation education issues, suggested that federal funding was insufficient to provide for adequate educational programming (Aboriginal Affairs and Northern Development Canada, 2010c). Again, concern was voiced regarding potential inequities between provincial and band-operated schools. The funding approach was felt by most informants to be ineffective because it did not address language and culture, technological advancements, student support needs, cooperative education, or the realities of the costs of teacher recruitment and retention. It was seen to be unrealistic for First Nations located in rural or remote regions with less than 1,000 residents to effectively manage an educational program with limited resources (The Standing Committee on Aboriginal Peoples, 2011b). Furthermore, Mendelson (2006) suggested that although harder to measure, a better criterion would be whether funding was sufficient to permit an equivalent quality of education for students living on reserve. The National Panel recommended that there be

a statutory funding formula built into a First Nations education act in order to solve this problem and ensure that funding was needs-based, predictable, and sustainable (McDonald, 2012; Rae, 2013). One of the changes made to the First Nations Education Act in the First Nations Control of First Nations Education included “a commitment to adequate, stable, predictable, and sustainable funding” (Harper, para. 7). This funding would replace the complex structures then in place with new three funding streams: a statutory funding stream that had a reasonable rate of growth; transition funding to support the new legislative framework; and funding for long-term investments in on-reserve school infrastructure (Harper, 2014). Furthermore, the new Bill promised \$1.9 billion in funding, which included \$1.252 billion for core funding over a three-year period (Harper, 2014), as well a guaranteed growth rate of 4.5 per cent annually for funding thereafter (Atleo, 2014, Harper, 2014). As mentioned previously, it is uncertain if a First Nations education act will be implemented in the future, and if it was, how it would affect the funding of KiHS.

Other factors that influenced the quality and quantity of what is provided for educational services in federally-funded schools are difficulties associated with recruiting and retaining staff and the lack of Aboriginal teachers. Teacher recruitment and turnover is a major issue in many First Nation communities, and it is felt that these are critical factors affecting the delivery of educational services in remote First Nation schools (Anderson, Horton, & Orwick, 2004; Mueller, Carr-Stewart, Steeves, & Marshall, 2011). Teacher turnover rates can be as high as 40% in Northern Ontario First Nation communities, with the main issues of retention related to pay scale, benefit packages, retirement packages, professional development opportunities, and acceptance in the

community. Mueller, Carr-Stewart, Steeves, and Marshall (2011), in their study of teacher turnover in Saskatchewan First Nation schools, found that the chief factor influencing teacher salaries and benefits was the level of funding received from the federal government. They stated the following:

Funding transfers, from the federal government through the Department of Indian Affairs to First Nations who manage educational services on Canada's behalf, have not addressed the historical disparity in teacher salaries between teachers employed in provincial schools and those employed in schools located on reserves. Furthermore, lack of or limited pension and benefits funding, due to limited federal transfers, continues to detract from employment in First Nations schools. (para. 5)

The 2010 report on the Elementary/Secondary Education Program indicated that more Aboriginal teachers were needed in Aboriginal schools (Aboriginal Affairs and Northern Development Canada, 2010c). In the *Aboriginal Peoples Survey*, a survey administered every six years to provide data on the social and economic conditions of Aboriginal peoples living off-reserve, it was found that only 14% of Aboriginal students had an Aboriginal teacher or teacher aide (Statistics Canada, 2008). This low number of Aboriginal teachers was not only limited to off-reserve communities. In Poplar Hill First Nations, one of the communities in the study, there was only one Aboriginal teacher out of six teachers in the elementary school at the time of this study, and the sole high school teacher was not of Aboriginal descent (Black, 2014). These statistics are important because, as some researchers have found (e.g., O'Donnell & Tait, 2003), the presence of Aboriginal teachers in the classroom may result in a more positive education experience

and an increase in culturally-relevant educational services provided to Aboriginal students.

### **Special Education**

One of the main differences in the provision of education services between the jurisdictions is in the area of special education. School boards under provincial jurisdiction are required under the *Education Act (1990)* to “provide or enter into an agreement with another board to provide in accordance with the regulations special education programs and special education services for its exceptional pupils” (Government of Ontario, 2011, s. 170.1). Band-operated schools on reserves are not subject to the special education provisions of the *Education Act (R.S.O. 1990, c. E.2)*, nor are students with special needs attending these schools entitled to the guarantee of universal access to education brought in with *Bill 82*. Under the *Indian Act (1876)*, the federal government has jurisdiction over Aboriginal education and is responsible for establishing and maintaining schools and “provid[ing] for and mak[ing] regulations with respect to standards for building, equipment, teaching, education, inspection, and discipline” (s. 114-115). Accordingly, it is the responsibility of the federal government to set the standards for special education provisions and provide the appropriate funding. To achieve these standards, the federal government has implemented two programs, the *Elementary/ Secondary Education Program* and the *Special Education Program*, with the purpose of providing access and establishing accountability (Aboriginal Affairs and Northern Development Canada, 2010b; Aboriginal Affairs and Northern Development Canada, 2010d).

The *Elementary/Secondary Education Program* funds First Nation students whose special education needs have been identified by school administration or health/medical professionals as being between mild to moderate (Aboriginal Affairs and Northern Development Canada, 2011d). This funding supports programming, remedial instruction, clinical services, and special education staff. It is based on the nominal enrolment of Aboriginal students with mild to moderate special educational needs as calculated at the beginning of the school year.

The *Special Education Program* funds students with high-cost special education needs (Aboriginal Affairs and Northern Development Canada, 2013). According to the AANDC departmental planning documents, students with high-cost special education needs generally have been assessed as having chronic health impairments and/or physical disabilities, moderate to severe behavioural disorders, autism, communication disorders, or severe learning disabilities. Students with high-cost special education needs can also include those who are physically dependent, deaf, or blind. Students who have been identified and assessed by medical and health professionals as having severe to profound exceptionalities, such as those noted above, are eligible for this funding.

Unlike the funding for special education from the *Elementary/Secondary Program*, not all schools receive *Special Education Program* funding, as not every school will have students with high-cost special needs. At least 75% of this funding from AANDC is used for direct services, which are the classroom and school-based services that meet individual students' needs (Aboriginal Affairs and Northern Development Canada, 2010d). For example, *Special Education Program* funding is generally used to cover the costs associated with the acquisition of professional



assessments or student assessments, salaries and benefits of special education staff, and the costs associated with assistive technology purchases (Aboriginal Affairs and Northern Development Canada, 2011c). As outlined in *Elementary/Secondary Program* guidelines, the remainder of the funding, which can be no more than 25%, is for services to develop special education programs and services, such as professional development, research and development, and information services for parents (Aboriginal Affairs and Northern Development Canada, 2011c). The amount of funding provided by the *Special Education Program* is formula-based and considers a number of factors including the number of students with high-cost special needs, school size, and programming needs (Aboriginal Affairs and Northern Development Canada, 2011b). This amount is determined by information collected from schools by May 1<sup>st</sup> of each school year, and is only distributed if schools submit a report showing attendance of students with high-cost special needs.

Neither of these programs provides definite regulations for what is required of band-run schools in providing special education programs (Aboriginal Affairs and Northern Development Canada, 2010d; Aboriginal Affairs and Northern Development Canada, 2011b). Instead, there is only a general objective of the *Special Education Program* to provide “access to quality special education programs and services that are culturally sensitive and comparable to generally accepted provincial standards in that locality” (Government of Canada, 2011b, p. 1). This absence of specific regulations has both positive and negative effects. On the one hand, by not having detailed procedures and regulations, band-run schools are able to allow for local programming and culturally-relevant education. On the other hand, without these procedures and regulations in place, on-reserve schools are not subject to the same standards with respect to special education

as those of other Ontario or Canadian schools, particularly, the obligations to provide identification, placement, and funding for students with exceptionalities. As a result, Aboriginal students attending on-reserve schools may not be receiving all of the special education services that they would receive if they were attending an off-reserve school.

Examples of this disparity in regulations and the resulting effects can be seen through a comparison of provincially and federally-run systems of education. Under the *Education Act (1990)*, Ontario school boards are required to “implement procedures for early and ongoing identification of the learning abilities and needs of pupils, and shall prescribe standards in accordance with which such procedures be implemented” (Government of Ontario, 2011, s. 8.3). The federal government, however, does not communicate specific regulations requiring First Nation schools to identify their students with exceptionalities, despite the high need for assessment and identification of these Aboriginal students. Only if schools are requesting funding for high-needs students through the *Special Education Program* are they required to formally identify students with exceptionalities and put an Individual Education Plan (IEP) in place (Aboriginal Affairs and Northern Development Canada, 2010d).

Even without directives for identification, many on-reserve schools do not have the resources to identify students with exceptionalities. Schools on reserves cannot afford their own team of specialists, such as psychologists or speech pathologists for professional assessments, nor the high cost to send students to see one. A trip can cost up to \$4000 to send a student and accompanying adult living in a remote northern reserve to an urban centre to see such specialists (Brown, 2005). Katherine Knott, former Director of Education for AANDC, admits there is inadequate funding to assess every student

(Brown, 2005). For instance, David Kakegamic, the education director in Sandy Lake First stated, “I have 94 students on a waiting list for formal assessment, but no money to get that done. We need the resources to help our children be ready to learn at par with children in Thunder Bay or Toronto [provincially-funded schools]” (cited in Brown, 2005, p. 1). His request for resources was subsequently turned down by the federal government.

The most beneficial placement cannot always be offered even when Aboriginal students with exceptionalities are identified. For example, while several students at KiHS would benefit most from a Life Skills program, the school cannot provide this option for the financial reasons discussed below. A Life Skills program is a non-credit program and includes various components such as personal care, home management, leisure and recreation, basic literacy and numeracy, and social development (Ontario Cooperative Education Association, 2011; Ontario Ministry of Education, 2012a). With only one teacher to mentor grades 9 to 12 in a single-room situated learning centre at KiHS, it is not feasible to hire an additional teacher to provide programming to students who would benefit from a Life Skills program, especially if the need is evident throughout several remote communities. The requisite space, materials, staff, and funds to provide this program are not available, a common situation for many band-operated schools located in remote areas. Therefore, for students with moderate to profound special education needs, the required high cost resources may only be available off-reserve. As E. Rex Isaac (March 22, 2011), a band councilor in Walpole Island First Nation, explains,

In Ontario, the provincial average of special needs children is approximately 10%. In First Nations, it is tripled. We are not receiving any more dollars. If we

have a student who has extreme special needs, we have two options. One option is we send them off the reserve, away from their people, their homes and those who love and support them; the second option is that we expend the majority of our budget for special education of that one child at the expense of all other children (The Standing Senate Committee on Aboriginal Peoples, 2011a, para. 25).

Lastly, to provide special education services or programs, qualified staff is required. Under the *Education Act (1990)*, educators are required to have special education qualifications to teach special education programs (Government of Ontario, 2011). However, for reasons discussed earlier, First Nation schools are not being held up to this standard and do not always require these qualifications of their staff. For example, Tutor Escorts, individuals that work under the supervision of a teacher, are often hired in First Nation schools instead of Education Assistants. However, staff members with this designation are not required to have the same training or to hold a college degree (Lambton Kent District School Board, 2011). For example, Angus Rae, a Tutor Escort in North Spirit Lake, admits that he has no idea how to help his student with brain damage from Fetal Alcohol Syndrome (cited in Brown, 2005, para. 36). Overall, there seems to be a clear gap in education provision between the requirements and standards for public schools and those for First Nation schools in Ontario. Limited directives and standards, as well as insufficient resources, are some of the reasons preventing Aboriginal students with special needs from having access to special education services equivalent to those offered in other areas of the provincial education system.

### **Academic Achievement**

Academic achievement is at the forefront of current research in the area of Aboriginal education. The educational success of Aboriginal youth is well below that of all other Canadian students (Council of Ministers of Education, Canada, 2008; Statistics Canada, 2013). According to the most recent census in 2012, approximately 28% of First Nation peoples living off-reserve, 58% of Inuit, and 23% of Métis, had not completed high school or obtained an alternative diploma or certificate, in comparison to approximately 11% of all Canadians (Statistics Canada, 2013). A comparison of this census with the 2006 results indicates that little progress has been made in improving off-reserve education achievement, with 33% of all Aboriginal on-reserve residents, including First Nation, Inuit, and Métis peoples, having less than a high school diploma, in comparison to nearly 13% of their non-Aboriginal counterparts (Statistics Canada, 2008). The Ontario Secondary Literacy Test (OSLT), which measures whether or not students are meeting the minimum standard for literacy across all subject areas up to the end of Grade 9 (Education Quality and Accountability Office, 2012b), has shown an achievement gap between First Nation and non-Aboriginal students in Ontario. For instance, in the 2012 OSLT, only 28% of first-time eligible First Nation students at KiHS were successful in meeting the minimum standard for literacy, compared with 82% of the general population (Education Quality and Accountability Office, 2012a). Similar results were found in other First Nation schools in Ontario. For example, at Pelican Falls First Nation High School located in Northwestern Ontario, only 21% of first-time eligible students were successful in passing the same test. Given these results and low completion rates, the Federal Auditor General's Report admitted that it may take longer

than the 28 years that they originally anticipated for First Nation secondary school graduation numbers to reach the Canadian average (Office of the Auditor General of Canada, 2011).

The same achievement gap can be seen in the attainment of university degrees. Only 9% of Aboriginal people had earned a university degree in 2011, compared to 26.5% of the non-Aboriginal population (Statistics Canada, 2011). The proportion of university graduates was higher among First Nations people with registered Indian status living off reserve than living on reserve. Of those living off reserve, 10.9% had a university degree compared with 4.7% of those living on reserve.

The education gap between Aboriginals and non-Aboriginals is not only evident at the secondary and post-secondary level, but also at the elementary-school level. In the largest study of its kind in Canada, Minthorn-Biggs and Campbell assessed 1,800 students in elementary schools across 22 Northern Ontario First Nation communities in 2003-2004 (Minthorn-Biggs & Campbell, June 2006). The Canadian Test of Basic Skills, which measures reading, vocabulary, and math ability, was used to assess students' academic achievement. Each child was tested twice within the school year and tests were administered in English. Findings revealed significant deficiencies in both literacy and numeracy, with more than 87% of students at least two grade levels behind recommended academic achievement for Canadian students. According to Minthorn-Biggs and Campbell, these results would classify these students as students with special needs under Ontario's education system. Furthermore, they felt that many of the youth would not be academically prepared to enter either high school or the workforce (I.N.A.C., 2004, June 16).

The results of provincial testing for Aboriginal students are not widely available because voluntary Aboriginal student self-identification only became possible in the 2009/2010 school year (Ontario Ministry of Education, 2010b). Nonetheless, there are preliminary findings on the success of Aboriginal students in comparison to the general student population in the areas of reading, writing, and mathematics. These findings indicate that a significant gap still exists between the two groups. For instance, the results from the 2011-2012 OSSLT showed that 59% of first-time eligible First Nation students passed the literacy test in comparison to 82% of all Ontario students (Ontario Ministry of Education, 2013). In the 2011-2012 EQAO Applied Mathematics assessment, 65% of First Nation students met or exceeded provincial standards in comparison to 82% of all Ontario students. Similar results were found in the 2011-2012 EQAO Academic Mathematics assessment, with 65% of First Nation students versus 84% of English-speaking students meeting or exceeding the standards. In addition, only 59% of First Nation students in the 2011/2012 school year earned eight or more credits in comparison to 82% of all Ontario students.

Despite the implementation of policy for voluntary self-identification, the representation of Aboriginal achievement is not complete. To begin with, not all students will self-identify, and secondly, private schools and federally-funded Aboriginal elementary schools are not required to administer provincial achievement tests. Both of these factors apply to KiHS, the location of this dissertation research study.

Some schools have purposefully disaggregated the results from the provincial tests to compare their Aboriginal students to non-Aboriginal students and to provide more accurate and valid results. For example, The Northwest Catholic School Board located in

Northwestern Ontario found that, in the 2007/2008 school year, 50% of Grade 6 Aboriginal students scored a level 3 or 4 in reading, 52% scored a level 3 or 4 in writing, and 42% scored a level of 3 or 4 in mathematics measurement (The Northwest Catholic School Board, 2008), with level 3 meeting provincial standards, and level 4 exceeding the standards (Education Quality and Accountability Office, 2014). In comparison, the general Ontario population of Grade 6 students had a level 3 or 4 score in reading, writing, and mathematics of 64%, 61%, and 59%, respectively (Education Quality and Accountability Office, 2011). The provincial test used was the *Assessment of Reading, Writing and Mathematics, Junior Division* (The Northwest Catholic School Board, 2008), which was created by the Education Quality and Accountability Office to measure the reading, writing, and math skills that students were expected to have attained by the end of Grade 6 (Education Quality and Accountability Office, 2012b).

Several initiatives in Ontario have attempted to close the educational gap between Aboriginal and non-Aboriginal students. Having identified Aboriginal education as a priority issue, the Ontario Ministry of Education launched an Aboriginal Education Strategy in 2007, with detailed initiatives to support the achievement of Aboriginal students in elementary and secondary school (Ontario Ministry of Education, 2009). Accordingly, the Ministry identified two major goals to be met by the year 2016: “to improve achievement among First Nation, Métis, and Inuit students and to close the gap between Aboriginal and non-Aboriginal students in the areas of literacy and numeracy, retention of students in school, graduation rates, and advancement to postsecondary studies” (Ontario Ministry of Education, 2007, p. 5). To meet their target, the Ministry has developed *The Ontario First Nation, Métis, and Inuit Education Policy Framework*,



which provides strategies that the Ministry of Education, school boards, and schools can use collectively in order to improve Aboriginal achievement, help close the gap in achievement between Aboriginal and non-Aboriginal students, and increase public confidence in publicly funded education (Ontario Ministry of Education, 2007a). Along with the list of strategies to meet the goal of the framework, there are performance measures for each strategy. The framework asserts that it will make a difference by increasing the number of Aboriginal staff, improving students' literacy and numeracy skills, providing education on teaching methods suitable for Aboriginal students, and encouraging more parents to get involved in their children's education (Ontario Ministry of Education, 2011).

Several other initiatives are found under the Aboriginal Education Strategy to assist in closing the achievement gap of First Nations students (Ontario Ministry of Education, 2009). One of these initiatives is to develop and implement curriculum resources with Aboriginal content. From the time of implementation, this initiative has increased the number of curriculum expectations containing Aboriginal content in the Ontario Elementary and Secondary Curriculum, as well as the number of online resources to assist educators in teaching the content. Elementary and secondary curricula revised after November 2007 in Ontario are to include expectations, examples, and teacher prompts that focus on First Nation, Métis, and Inuit histories, cultures, and perspectives (Ontario Ministry of Education, 2015a). The purpose behind these curriculum changes is to foster a stronger sense of identity and a positive self-image for Aboriginal students, as well as for all Ontario students and educators to explore, understand, and appreciate the contributions that Aboriginal communities have made to the province (Ontario Ministry

of Education, 2009b). To assist teachers in incorporating these expectations into their classrooms, the Ontario Ministry of Education created the *Aboriginal Perspectives: A Teacher's Toolkit*. This collection of digital electronic resources lists the expectations that contain Aboriginal perspectives for the revised subject areas, and provides teaching strategies to achieve these expectations; however, the extent of the guidance provided in the toolkit is limited. For instance, only one teaching strategy is suggested for the Careers Studies (GLC2O) course that KiHS offers, and two strategies are provided for the Working with Infants and Young Children (HPW3) course (Ontario Ministry of Education, 2014). Therefore, despite the initiative to increase Aboriginal content for Ontario students, resources containing both an Aboriginal perspective and the Ontario curriculum are not yet readily available for all subject areas and courses, including the Grade 9 Math course that was revised in this dissertation research study.

Recently, this initiative to develop and implement curriculum resources with Aboriginal content, along with other strategies arising from the *Ontario First Nation, Métis, and Inuit Education Policy Framework*, have been formally reviewed by the Ontario Ministry of Education (Ontario Ministry of Education, 2013). A report released in August 2013 entitled *A Solid Foundation: Second progress report on the implementation of the Ontario First Nation, Métis, and Inuit Education Policy Framework* discusses the progress made in implementing the goals under the Aboriginal Education Strategy, including many key milestones that have already been achieved. This report also includes Ontario's first baseline data on Aboriginal student achievement, priorities for continued implementation of the Framework, and the next steps for advancing the overall goals of the Strategy.

Discussions of Aboriginal success have also been occurring at the national level. In 2009, the Council of Ministers of Education, Canada held a summit on Aboriginal education in the first-ever national dialogue on how to eliminate the gap between the educational achievement of Aboriginal and non-Aboriginal students (Council of Ministers of Education, Canada, 2010). The participants included ministers of education, ministers of Aboriginal Affairs, First Nations, Métis, and Inuit leaders, and federal government officials. Strengthening Aboriginal language and culture, planning for transitions across schools, and increasing access, retention, graduation rates were some of the themes identified through the summit for improving achievement. The following themes relating to administration were also identified: sharing responsibility and accountability; reporting and benchmarking success; providing programs and services; and engaging partners in First Nations, Métis, and Inuit education.

Following the summit on Aboriginal education, the federal government requested three additional reports to better inform their consideration of changes to First Nation education. One of these reports was to summarize the findings from *The National Panel on First Nations Elementary and Secondary Education on Reserve*, which, as previously mentioned, was created by the Assembly of First Nations and AANDC in order to provide the government with insight into how to improve educational outcomes of First Nation students living on-reserve, as well as to develop strategies for improving governance for First Nations education (Haldane, Lafond, & Krause, 2011). Former National Chief Atleo (2011) contended that a community-based consultative process, like the one seen in this panel, was the foundation of the development of First Nation education systems (Standing Senate Committee on Aboriginal Peoples, 2011b).

Involving the community was seen as essential if positive changes were to occur to in Aboriginal educational (Burns, 2001; Corson, 1998; Standing Senate Committee on Aboriginal Peoples, 2011b). The report, entitled *Nurturing the Learning Spirit of First Nations Students*, was presented to the National Chief of the Assembly of First Nations and the Minister of AANDC on February 8, 2012 (Assembly of First Nations, 2012). This report provided the government with recommendations on what could be done to start the process of improving academic achievement for First Nation students living on reserves.

Some of the key factors identified in the report for student success were language and cultural programming, and academic curriculum. In addition, Internet connectivity and access to other technologies were seen as vital elements in delivering quality education to First Nation students, especially as many (including the majority of students at KiHS) lived in remote communities (Canada Newswire, 2011).

Another document for consideration on how to improve the outcomes of First Nation students was the *Report on Priority Actions in View of Improving First Nation Education*. Written by three First Nation organizations (First Nations Education Council of Quebec, the Federation of Saskatchewan Indian Nations, and Nishnawbe Aski Nation of Northern Ontario), the report was presented to the federal government and the Assembly of First Nations in November 2011 (Narine, 2012). There were 20 recommendations in the document, with seven focusing on funding and 13 dealing with jurisdictional issues (Federation of Saskatchewan Indian Nations, First Nations Education Council of Quebec, & Nishnawbe Aski Nation of Northern Ontario, 2011).

Shortly after this report was published, the Standing Senate Committee on Aboriginal Peoples issued a report to the government entitled *Reforming First Nations*

*Education: From Crisis to Hope.* The document was a result of hearings held throughout Canada in 2010 (Narine, 2012). Four recommendations were made, all of which focused on the development of a First Nations education act. The committee felt that development of this act would recognize the authority of First Nations for their education, and with an increase in funding, would contribute to sustained and increased levels of educational achievement (Standing Senate Committee on Aboriginal Peoples, 2011b). Furthermore, the recommendations called for a Canada-First Nation Action Plan that would reform education and allow First Nations to opt into the First Nations Education Act. However, the most recent draft proposal of the First Nations Control of First Nations Education Act does not present an option for opting into the legislation (Aboriginal Affairs and Northern Development Canada, 2014); therefore, KiHS would be required to follow the regulations outlined in the Act.

While it is clear that the academic achievement of Aboriginal students is not on par with the rest of Canadian students at the provincial and national levels, there is a discussion about whether the criteria for measuring success accurately reflect Aboriginal perspectives on learning. The Canadian Council on Learning (2009b), in partnership with Aboriginal learning experts across Canada, proposed a framework for measuring Aboriginal learning called the Holistic Lifelong Learning Measurement Framework. There are three main components of this framework: Sources and Domains of Knowledge; The Lifelong Learning Journey; and Community Well-being. Each of these components has a set of indicators to assess learning across the life cycle and in a variety of settings, including the community and the land. With reference to comparative assessment of Aboriginal and non-Aboriginal students' achievement, the Council feels

that without a comprehensive approach to Aboriginal learning, the resulting information may not only fail to accurately measure learning, but also produce information that is irrelevant to Aboriginal communities or fails to inform effective social policy. Although the above framework provides all of the components for a comprehensive view on learning, there are still several gaps that preclude a complete assessment of Aboriginal learning today. For example, there are information gaps in certain domains such as Self, Natural History, and Land use where insufficient data were available. These gaps may be a reflection in which data were available, but limited to certain Aboriginal groups (e.g., First Nations living off-reserve) or certain life stages, such as K-12 education.

Overall, there is a widespread recognition of the education gap between Aboriginal and non-Aboriginal students in Canada. Apart from the initiatives discussed above, numerous reports have been written in attempts to identify the issues contributing to this gap, as well as to offer solutions to this problem. Even if these suggestions are implemented, according to the literature presented, it may still take considerable time to achieve noticeable changes in Aboriginal educational achievement. In the study presented in this dissertation, the teachers' perceptions of success of the course in meeting the needs of Aboriginal students is compared to previous experiences of working with Aboriginal students at KiHS, not to the achievement of non-Aboriginal students.

As previously mentioned in the discussion of academic achievement, student success may be increased by incorporating Aboriginal culture and perspectives into educational curriculum, and therefore this practice and other educational practices that can meet the needs of Aboriginal students are the focus of the next section.

### **Educational Needs of Aboriginal Students**

The lifestyle of Aboriginal people, especially those living on remote reserves, is different from that of most Canadians, and correspondingly, so are their educational needs (Faries, 2009). The educational practices advocated to meet these needs will be outlined next, along with a description of how these practices are related to the way of life of Aboriginal people. The review of literature in this area has been divided into several themes: incorporating culture into instruction and curriculum; the use of holistic education; flexibility in expectations and schedule; the use of social interaction; achieving strong student, parent, and community relationships; acknowledging the importance of family; strengthening self-esteem; and engaging learners.

**Incorporating culture.** Recommendations are found throughout the literature that teachers of Aboriginal students should be knowledgeable about the culture of this population and incorporate it into the classroom (Congress of Aboriginal Peoples, 2010; Faries, 2009; Maina, 1997; Ontario Ministry of Education, 2007a; Swanson, 2003; Toulouse, 2006). It is further suggested that culture-based knowledge is crucial and should be the foundation of learning (Faries, 2009; Maina, 1997). Swanson (2003) advises that teachers be respectful of Aboriginal people's approach to life and take this perspective into consideration in their teaching methods and course content. Similarly, Maina (1997) recommends that educators identify the educational strategies that most successfully build on the cultural identity of Aboriginal children, while still providing the skills necessary for participating in the multicultural Canadian society. With the recent interest in improving Aboriginal student achievement, as discussed in the previous section, Grand Chief Beardy advised that improving Aboriginal education should never

be at the expense of their culture identity (Garrick, 2012). Some researchers and policy makers contend that with increased focus on Aboriginal culture, the achievement of Aboriginal students will improve. For instance, the Ontario Ministry of Education (2007) stated that the “overriding issues affecting Aboriginal student achievement are a lack of awareness among teachers of the particular learning styles of Aboriginal students, and a lack of understanding within schools and school boards of First Nation, Métis, and Inuit cultures, histories, and perspectives” (p. 6). Furthermore, curriculum that reflects Aboriginal cultures and perspectives, as well as teaching strategies appropriate to Aboriginal learners’ needs, are two of the main factors that contribute to student success (Ontario Ministry of Education, 2007). Faries (2009) argues that when students are continually taught about their people and culture, they will naturally develop a positive self-identify as an Aboriginal person and that this type of education will create a strong foundation for students to build upon, resulting in higher success rates at all levels in education. Likewise, Swanson (2003) contends that culturally suitable tasks and situations can help increase learner success, which aligns with the purpose of this study, that is, to identify the design elements of online courses that effectively met the needs of Aboriginal students with MID.

According to the Council of Ministers of Education, Canada (2008), “existing curricula and teaching methods do not sufficiently reflect aboriginal needs and values” (p. 1). In order for educators to incorporate culture into their instructional methods and course content, they need to be well-informed in Aboriginal cultural needs and values. Schools in Ontario have been encouraged to increase knowledge of Aboriginal culture among all school staff, develop teachers’ awareness of the learning styles of Aboriginal



students, and employ instructional methods designed for their learning (Ontario Ministry of Education, 2007). However, the number of well-trained Aboriginal teachers is small (Council of Ministers of Education, Canada, 2008).

The literature suggests that post-secondary schools need to attract and prepare more Aboriginal people to be fully-qualified teachers and educational assistants in their communities because they are knowledgeable about their own cultures and traditions (Cherubini, Hodson, Manley-Casimir & Muir, 2010; Congress of Aboriginal Peoples, 2010; Ontario Ministry of Education, 2007). It is further recommended that teacher preparation programs prepare all future teachers to work with Aboriginal students (Cherubini et al., 2010; Congress of Aboriginal Peoples, 2010; Ontario Ministry of Education, 2007). In fact, the Assembly of First Nations would like to see that all provinces require schools, universities, and colleges to expand their mandatory requirements to include Native Studies courses for all diploma and degree programs in education (Council of Ministers of Education, Canada, 2010).

**The use of holistic education.** Incorporating culture into the classroom is not only an effective classroom practice for meeting the educational needs of students, it is also recommended as a means of addressing the needs of the whole learner. Many individuals and organizations advocate for a holistic approach to education (Council of Ministers of Education, Canada, 2010; Goulet, 2001; Swanson, 2003). This vision of holistic education was described by the Assembly of First Nations as follows: “First Nation learners will achieve their full potential supported by a comprehensive system under First Nation jurisdiction that addresses their intellectual, spiritual, emotional and physical needs through quality lifelong learning, grounded in First Nations' languages,

cultures, traditions, values and worldviews” (Mendelson & Usher, 2007, para. 4). As Walter Linklater, an Elder, stated at the Summit of Aboriginal Education, “education will be holistic; it will be spiritual and in tune with the teachers of our people” (Council of Ministers of Education, Canada, 2010, p. 5). In a study of effective instructional practices, Goulet (2001) found that successful teachers of Aboriginal students used a holistic model, incorporating culture and language, along with community norms and values into their classrooms.

As identified in *Redefining how Success is Measured in First Nations, Inuit and Métis Learning* (Canadian Council on Learning, 2007), an Aboriginal perspective on learning includes a holistic approach, where learning engages the entire individual (e.g., emotional, physical, spiritual, and intellectual) and the community, and emphasizes the interconnectedness of all life under the creator. Including culturally-relevant content and using instructional practices that meet the needs of the whole learner are objectives of KiHS, as illustrated by the design of the learning management system, as well as in the lessons available to students. The course revised for this study and delivered by KiHS followed the standards for a holistic model of education.

The Canadian Council on Learning (2007) has developed three Holistic Lifelong Learning Models to represent the Aboriginal perspective on learning. The three models depict the different views for First Nation, Métis, and Inuit peoples, respectively. The First Nations Holistic Lifelong Learning Model best meets the needs of the students of KiHS, because they are predominately of First Nations heritage, and this model was utilized for this dissertation research study (See Figure 2, below). The model uses the metaphor of a tree and is premised on the understanding that First Nation learners live in

a world of continual reformation where interactive cycles occur, and that all life is interconnected. The branches in this model represent individual well-being and harmony, with each branch corresponding to a dimension of personal development. The leaves represent the collective well-being – cultural, social, economic, and political. The falling leaves symbolize the community’s collective well-being and the rejuvenation of the individual’s learning cycle. The raindrops symbolize the learning guides, such as the mentors and online instructors at KiHS, while the roots are the sources and domains of knowledge. Lastly, the learning rings in the model represent the different stages of learning that an individual goes through, and includes the secondary education that students in this research study received at KiHS.

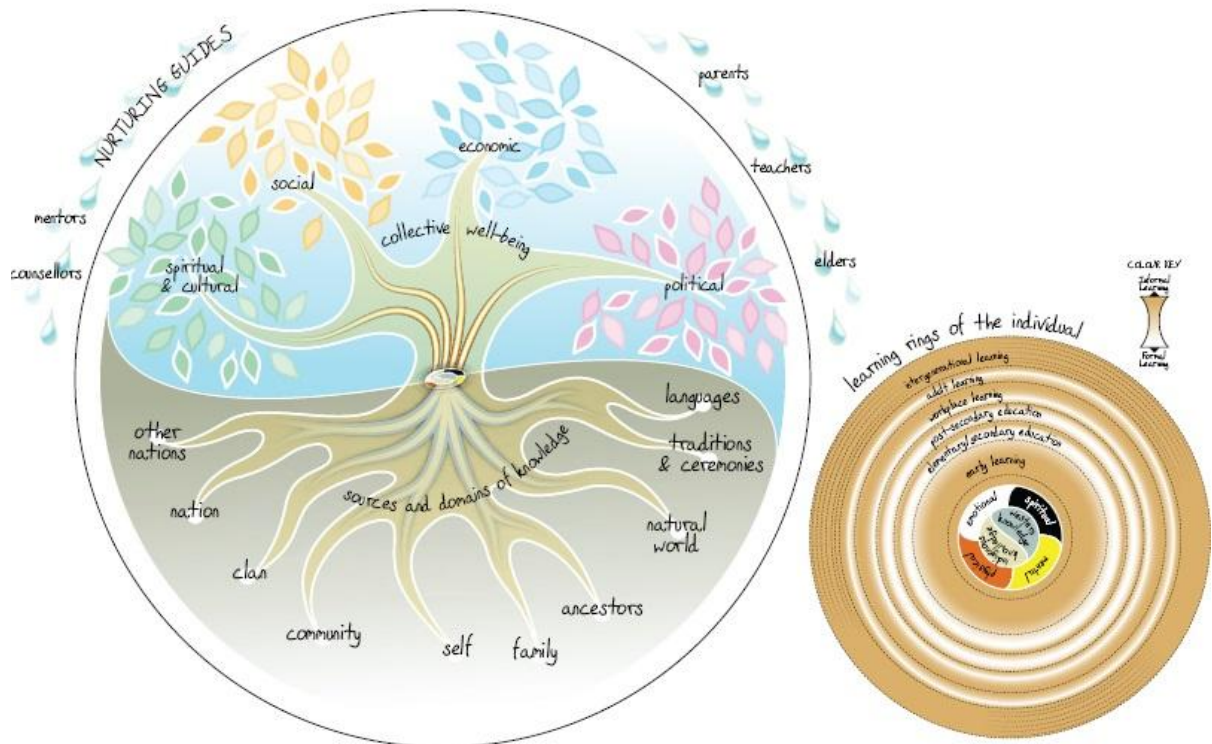


Figure 2. First Nations Holistic Lifelong Learning Model. From *Canadian Council on Learning*, 2007. Copyright 2007 by the Canadian Council on Learning.

Despite the support for holistic education, there are drawbacks. Swanson (2003) explains that most Aboriginal students can benefit from a holistic approach to education; however, she cautions that a holistic approach may not work in all circumstances, because some small communities strongly identify with the values of Western culture rather than traditional Aboriginal values. For example, Ouje-Bougoumou, a predominately Christian Cree community in Quebec, banned all forms of First Nations spirituality, calling it “shamanism,” a practice of contacting and communicating with the spiritual world (Francis, 2011). The ban came after controversy over a sweat lodge built in the backyard of a family’s home. Kasabonika Lake First Nations, located in Northern Ontario, is another community that has placed restrictions on displays of spirituality (Hunter, 2005). It has banned all new forms of traditional practices, such as drumming and sweat lodges, while permitting existing traditional customs and activities. Some KiHS communities do not allow traditional practices either. Students at KiHS may therefore opt out of Native Studies lessons that discuss these controversial topics.

Educating the new generation requires the successful integration of Western styles of education with traditional ways (Canadian Council on Learning, 2007; Swanson, 2003). Teachers are encouraged to help students accept these cultural differences while still honouring their own beliefs and values (Swanson, 2003).

**Flexibility in expectations and schedule.** Some researchers advocate flexible scheduling and expectations when working with Aboriginal students (e.g., Goulet, 2001; Wishart, 2009). Views about time, for example, are different for many Aboriginal peoples in comparison to other Canadians (Swanson, 2003). As Swanson (2003) points out, “the current Western educational system dictates precise dates and times for

attendance, allowing little or no deviation from this schedule” (p. 23), which does not align with the needs of Aboriginal people who are pursuing a traditional lifestyle and often require a more flexible school timetable to accommodate some of these practices. For example, hunting and trapping play a central role in many First Nation communities (Harvey, 2012), including the communities in this study, and students may participate in week-long events, such as hunting tournaments and feasts dedicated to hunting that occur in the spring and fall in many Northern Ontario reserves.

Another factor influencing many Aboriginal communities, in particular, is the effect of the former residential school system, discussed in a later section, which can include resistance on the part of some families to attending schools with structured environments (Swanson, 2003).

In order to maximize educational progress for Aboriginal students, it is therefore advisable that educators be adaptable and organize learning around local cultural practices by, for example, using a modified school calendar (Swanson, 2003). For these reasons, Swanson (2003) recommends a flexible school schedule to accommodate resistance to structured schedules and to accommodate cultural activities. In fact, many schools, including KiHS, already have flexible expectations for attendance by excusing absences for hunting weeks and other traditional days.

Swanson (2003) further suggests that schools implementing a modified schedule also take the time to make contact with students and encourage them to return to the program after breaks in schooling. Having dialogue with students in and outside of the classroom is an effective teaching practice that strengthens the relationship between student and teacher (Goulet, 2001). After a long break, such as a hunting week, teachers

at KiHS often call students or visit them outside of classroom hours to encourage them to come back to school.

Teachers can also be flexible in daily expectations, particularly in the areas of learning style. First Nation students' learning styles are often described as reflective rather than action-oriented, with the need for adequate time to reflect and observe (Maina, 1997). This tendency provides a rationale for having asynchronous interactions in online courses, which is the model of online learning used at KiHS. Maina's (1997) proposes several reasons why developing a culturally-relevant pedagogy is necessary for First Nation learners; for example, she suggests that the preference for reflective thinking may explain why many First Nation learners do not respond orally to classroom questions requiring immediate answers.

**Use of social interaction.** Another practice recommended for teaching Aboriginal learners is the use of social interaction and oral history. This recommendation derives from the practice of storytelling for passing knowledge down from generation to generation (Swanson, 2003), and from the preference of group harmony over individual accomplishments in many Aboriginal cultures of the past (Maina, 1997). Even today, a preference for a collaborative approach to completing tasks can be seen among many Aboriginal students (Hilberg & Tharp, 2002). For these reasons, Swanson (2003) advocates the provision of social interaction within the classroom through activities such as cooperative learning groups and group discussions. These suggested activities were incorporated into the design of the online course used in this study as a way to increase social interaction and to build relationships, which will be discussed next.

**Achieving strong student, parent, and community relationships.** Building relationships with students, parents, and community members is also seen as beneficial to learning (Goulet, 2001; Ontario Ministry of Education, 2007). A school environment that encourages student and parent engagement is another factor contributing to the success of Aboriginal students (Ontario Ministry of Education, 2007). By improving family engagement, student retention is also likely to increase (Congress of Aboriginal Peoples, 2010). In Goulet's (2001) ethnographic research on the study of effective teaching practices, it was found that forming relationships with Aboriginal students, parents, and their community was a key component to success. Using interviews, Goulet determined that relationship building involved getting to know each student individually, and recognizing and acknowledging their strengths. Some important practices cited were having informal, personal dialogues with students, visiting with students, and making the classroom a safe and welcoming place where students could share their personal lives and express themselves. Circle meetings were used by one teacher as a way for students to express themselves and for the teacher to become aware of problems that students may be facing outside of the classroom. By forming such relationships with students, teachers were able to adjust instruction and expectations for engagement and participation accordingly, as well as to build on students' strengths. Goulet (2001) further suggests that teachers need to pay attention to the present realities of the communities where they teach, stating that "we have a responsibility to participate in the struggle against the continuing effects of oppression, because effective teaching practices take place in relationship with the teacher, student, family, school, community, as well as the broader

society, keeping in mind that all of us are situated in, and affected by, the complex historical contexts of culture, race, and class” (p. 80).

Building relationships with parents and communities is an integral part of the teaching practice for the teachers at KiHS, not only to seek support for student learning, but also to build partnerships outside of any hierarchical structures that some parents may resist because of past negative colonial relationships they have experienced (Cherubini & Hodson, 2008). As Cherubini and Hodson (2008) state “meaningfully engaging Aboriginal parents and communities in the education of their children is no easy task and it should not be surprising that trust, or rather the lack of trust, is an ongoing impediment to be constantly negotiated” (p. 25). Establishing trust is a long-term process requiring continual positive, friendly, respectful, and meaningful engagement of Aboriginal families and communities (Cherubini & Hodson, 2008). At KiHS, teachers build relationships with parents and community members through various means, such as open houses, home visits, field trips, and invitations to elders to be guest speakers and share skills. Although establishing relationships with parents and community members is seen as critical to the success of Aboriginal students, this practice was not related to course design, and therefore was not included in this study.

**Acknowledging the importance of family.** The relationship of teachers with students, parents, and the community is not the only relationship that needs to be considered; the family relationship should also be acknowledged. Swanson (2003) found in her experience working with First Nation students in Northern Ontario that the family unit is strongly valued and families work together in all areas of life. Although family may be strongly valued in traditional Aboriginal culture, the reality of family life may



manifest differently. Family dysfunction and breakdown is not uncommon in Aboriginal families in Canada, resulting from issues related to the loss of language and culture within Aboriginal communities, poverty, poor health, and the lack of parenting knowledge brought about by experiences with the residential school system (Beaucage, 2011).

The Office of the Auditor General of Canada (2008) noted, in March 2007, that 8,300 on-reserve children were in care, representing over 5% of all children 0 to 18 years old. It was estimated that this proportion was nearly eight times that of children in care living off reserves. The Canadian Incidence Study of Reported Child Abuse and Neglect found that, in 2003, 15% of the total number of substantiated maltreatment cases in Canada (excluding Quebec) involved children of Aboriginal heritage (Public Health Agency of Canada, 2005a).

Furthermore, Aboriginal families are usually quite large, so students may be asked to watch other family members during school hours, or they may be parents themselves (Swanson, 2003). For example, the Aboriginal Peoples Survey found that 25% of Aboriginal women aged 15 to 19 years, who left elementary or secondary school early, listed pregnancy or the need to care for children as their reason for leaving (Statistics Canada, 2003). The most common explanation reported for not completing post-secondary studies was family responsibilities (Statistics Canada, 2003). Kawalilak, Wells, Connell, and Beamer (2012) found that one of the barriers to success for learners in remote Aboriginal communities was the lack of child care support. In fact, most communities in their study did not have childcare facilities, and lack of childcare or the need to provide childcare for family members was an often-cited reason for absences or

missed assignments. Studying at home, or taking online courses such as those offered at KiHS, is possible while children are napping or asleep at night.

Over-crowded housing describes the home situation for approximately 26% of First Nation peoples living on reserves (Statistics Canada, 2008), and may affect student learning when the home environment is not conducive to quiet study. In this case, situated learning centres, such as the ones at KiHS, can provide a quiet place for students to work and study.

Another difference that can be seen in Aboriginal families is that children often mature and achieve independence earlier than other Canadian children because parents often perceive their child as a mature person earlier (Swanson, 2003). Consequently, students may have minimal supervision or discipline, even when it comes to school attendance, and may not develop the self-discipline and behaviour regulation needed for independent learning.

All of these family-related factors can hinder motivation. Swanson (2003) proposed that the role of educators is to be sensitive to the importance of family and to help students balance their commitment to family and self. Given that family life can vary in Aboriginal communities, teachers should be aware of the dynamics and context of the students' families and how it affects them both inside and outside of the classroom.

**Strengthening self-esteem.** Another key factor affecting the academic success of Aboriginal students is self-esteem (Hilberg & Tharp, 2002; Swanson, 2003; Toulouse 2008). Educators and schools must pay attention to students' self-esteem and its components (Toulouse, 2006). Aboriginal self-esteem is described as the balanced and positive connection between the emotional, mental, intellectual, and spiritual realms

(Toulouse, 2006). Toulouse (2006) contends that Aboriginal student success is dependent on respecting this vision of self-esteem and requires changes in how teachers work with these learners. In consideration of the role that self-esteem has on academic success, it is suggested that pedagogy and the classroom environment be inclusive of Aboriginal culture, language, and worldview (Toulouse, 2006).

**Engaging learners.** Engaging Aboriginal learners is important for increasing retention in school (Congress of Aboriginal Peoples, 2010). A study undertaken by the Congress of Aboriginal Peoples (2010) summarizes the risk factors related to non-completion of secondary school for Aboriginal youth, as well as promising practices and programs that may increase student retention. The study found that early course success, together with positive transitions from elementary to secondary school, are contributing factors to student engagement and positive perceptions of education. Factors that can be promoted to help protect students from school disengagement include resiliency, positive self-image, parental and community involvement, connections to Aboriginal role models and supports, early intervention, and relevant programming. In addition, recommended practices to promote student engagement with Aboriginal students in Canada include the following: provide resources with Aboriginal content for all teachers; promote understanding and awareness in non-Aboriginal teachers; and integrate authentic curriculum.

In view of the research discussed earlier on the effect that relevant programming can have on student achievement, incorporating content and instructional techniques applicable to the lives of Aboriginal students was included in the set of design features for the online course developed in this study.

## **Residential Schools**

Aboriginal education is not only affected by the present lifestyle of this culture, but also by their past. Part of meeting the educational needs of Aboriginal students today requires an understanding of the historical experience of their parents, grandparents, and great-grandparents in the area of education (Faries, 2009). The former residential school system has had substantial effects on Aboriginal lives and education today. Between 1831 and 1998, a school system with 130 boarding, industrial, and residential schools operated across Canada (Legacy of Hope Foundation, 2009). At its peak in 1930, 80 schools were in operation (Statistics Canada, 2003). The last federally-run school closed as recently as 1996, and the last band-run residential school shut down in 1998 (“A Timeline,” 2011; Legacy of Hope Foundation, 2009).

The residential school system was funded by the federal government and was usually operated by churches of varying denominations (Statistics Canada, 2003). Aboriginal children across Canada were sent to these schools, often separated from their families and their communities at a young age for extended periods of time (Cherubini & Hodson, 2008; Statistics Canada, 2003). It is estimated that 80,000 to 90,000 former students of residential schools in Canada are still alive today (Garrick, 2011; The Healing Legacy, 2009). Not all students who attended these schools had negative experiences, but the incidences of abuse reported by former students are abundant (Aboriginal Healing Foundation, 2002; Legacy of Hope Foundation, 2009; Statistics Canada, 2003).

Residential schools were located in three of the KiHS communities: Weagamow First Nation, Poplar Hill First Nation, and Fort William First Nation. The last of these local schools to be closed down was the Poplar Hill Indian Residential School in 1989

(National Residential School Survivors' Society, 2008). As other residential schools were located in towns or cities in close proximity to the other KiHS communities, it is likely that community members from these locations also attended residential schools. Therefore, the effects of these institutions need to be taken into account when planning school experiences and environments. Furthermore, the students at KiHS, who mostly live in small communities surrounded by many relatives, likely have family members with negative experiences in a residential school.

One of the key objectives of the residential school system was the assimilation of Aboriginal children and, as a result, Aboriginal peoples experienced the loss of language and culture (Aboriginal Healing Foundation 2002; Faries, 2009; Legacy of Hope Foundation, 2009; Statistics Canada, 2003). Students were commonly forbidden to speak their native language, practice their culture, or engage in traditional modes of spirituality (Garrick, 2011; Legacy of Hope Foundation, 2009). Underfunding of schools often contributed to physical, emotional, and intellectual deprivation; for example, food was often scarce and of poor quality (Aboriginal Healing Foundation, 2002; Legacy of Hope Foundation, 2009).

There have been numerous testimonies of physical abuse and neglect, in the form of practices such as beatings, whippings, and starvation (Aboriginal Healing Foundation, 2002; Legacy of Hope Foundation, 2009; Statistics Canada, 2003), as well as sexual abuse (Aboriginal Healing Foundation, 2002). Student health was affected by overcrowding, insufficient clothing, lack of heat and proper ventilation, inferior building construction, poor drainage, and inadequate medical supplies and staff medical training

(Legacy of Hope Foundation, 2009). Countless former students recount experiencing feelings of shame, humiliation, and abandonment (Legacy of Hope Foundation, 2009).

The quality of education was lower at residential schools than at non-Aboriginal schools for several reasons, including of the lack of formal training for teachers and the underfunding of schools (Aboriginal Healing Foundation, 2002; Legacy of Hope Foundation, 2009).

Although these schools no longer exist, the effects can be seen across the generations (Churubini et al., 2010; Faries, 2009; Garrick, 2011; Legacy of Hope Foundation, 2009; Statistics Canada, 2003). One of the main effects of residential schools is mistrust in the education system on the part of Aboriginal parents and grandparents (Ontario Ministry of Education, 2011a; Statistics Canada, 2003). In addition, traditional teachings that were typically conveyed orally could no longer be transmitted, as students often could no longer speak their native language (The Legacy of Healing, 2009). Traditional child-rearing techniques were not always passed down through generations, as students of residential schools were removed from their parents for most of the year (Garrick, 2011; Legacy of Hope Foundation, 2009). Children were also not present to learn traditional skills such as hunting and fishing, which partially contributed to the change in the Aboriginal diet seen today (Legacy of Hope Foundation, 2009). As a result, large numbers of former students report lacking parenting skills and the ability to teach family values, as well as other life skills (Aboriginal Healing Foundation, 2002; Garrick, 2011; Legacy of Hope Foundation, 2009).

Other documented side effects of residential schools include alcoholism, drug abuse, violence, and suicide (Garrick, 2011; Legacy of Hope Foundation, 2009). In

addition to these effects, Faries (2009) states that, “negative experience in education has resulted in apathy and lack of interest in education, therefore education is not promoted nor valued by family members who have been negatively impacted by education” (p. 1). Schools became a contested, hostile, and foreign space for those with family members who had negative experiences while attending residential schools (Cherubini & Hodson, 2008). In fact, the Aboriginal Peoples Survey found that one of the factors associated with relatively lower perceived achievement at school was having a parent who had attended a residential school (Statistics Canada, 2008). Mendelson (2006) contends that the resulting mistrust of schools will not be completely eliminated until the Aboriginal community is assured that its cultural and linguistic heritage is being respected and enriched in its schools. The Government of Canada formally recognized the harm that residential schools caused for many Aboriginal peoples with an official apology made by Prime Minister Stephen Harper in 2009 (“A Timeline,” 2011; Garrick, 2011).

Educators need to have an understanding of how Aboriginal peoples’ perspective on the current school system has been affected by their own or their family members’ experiences in residential schools (Churubini et al., 2010; Faries 2009; Ontario Ministry of Education, 2011a). According to Statistics Canada’s 2006 Aboriginal Peoples Survey, 17% of off-reserve First Nations youth aged six to 14 years, with registered Indian status, had at least one parent who had attended a residential school (Statistics Canada, 2009). Today, these youth would be aged 15 to 23 years, and be a portion of the age group of students potentially attending KiHS, and therefore their views on education may be influenced by family members who had negative experiences while attending residential schools. As a result, some of the students in this dissertation research study may have felt

some of the inter-generational effects discussed above, because their family members attended residential schools.

### **Technology in First Nation Communities**

According to the Statistics Canada 2006 Aboriginal Peoples Survey, 18% of all off-reserve Aboriginal individuals and 20% of those living in rural communities and smaller towns took some form of post-secondary programming via distance education (Canadian Council on Learning, 2009b). Excluded from this survey were people living on-reserve, which would include those individuals living on reserves located in isolated communities, as represented by the students in this study. As no secondary or post-secondary institutions are located near the communities that KiHS serves, it is likely that the percentage of individuals participating in distance education would be higher. The benefits of using technology in First Nation communities, specifically for distance and online learning, are discussed below.

In an exploratory qualitative study, Kawalilak, Wells, Connell, and Beamer (2012) examined the online education opportunities for Aboriginal adult learners in First Nation communities in rural Alberta, as well as the corresponding support and learning needs from the perspectives of Aboriginal students, Aboriginal community leaders, teachers in rural Aboriginal communities, and college leaders. Their study confirmed an interest in expanding e-learning access to rural Aboriginal communities. Participants identified face-to-face learning opportunities, on-site support, encouragement, integration of hands-on learning, and interaction with other learners as the most critical components they wanted in online education. Modes of delivery were viewed as less important than the human interaction and support needs of rural Aboriginal learners. Recommendations



related to the design of online courses that were useful to this dissertation research study included the following: linking learners to support services online; integrating Aboriginal knowledge and culture into curriculum; aligning the pace of coursework to learners' needs; and engaging learners in virtual dialogue with teachers and learners.

Steel and Fahy (2011) also looked at how distance education could support adult Aboriginal learners in a study on attracting, preparing, and retaining adult learners in rural and remote northern communities in Alberta. To gather input from students and others in northern communities, interviews, community consultations, and a written survey questionnaire were used. The surveys were distributed among past, current, and potential students in northern communities in Alberta. The majority (69%) of the survey participants (n=248) in their study identified themselves as Aboriginal and living on a reserve. Participants listed lack of funding, lack of transportation, lack of childcare, location of program, and fear as the top five barriers they encountered when pursuing an education. The results from the survey suggest that distance education might help to address the barriers to participation in formal learning for under-represented populations, including Aboriginal learners, in rural and remote communities.

Philpott, Sharpe, and Neville (2009) interviewed Aboriginal students living in five rural coastal communities in Labrador, Canada, as well as their parents and educators to determine their perspectives on the success of web-delivered learning. A qualitative, grounded theory was utilized in this study. In total, 29 individual interviews and six focus groups were conducted, involving a total of 56 participants.

Online education was seen as a practical delivery option for these learners, because it provided the opportunity to take courses required to fulfill secondary school

educational requirements, as well as the option to take elective courses not normally offered in their schools (Philpott, Sharpe & Neville, 2009). The results showed that e-learning was an essential need in these communities, and that distance delivery was well-suited to these communities because of the rural nature of life in the region and delays experienced due to travel, weather, and/or cultural/community events. In addition, based on the perceptions of the students as well as their parents and educators, students seemed to experience feelings of success in e-learning courses at a level comparable to their provincial counterparts. Furthermore, online instructors were seen as being central to this success, and the online environment seemed to foster personal skills such as time management, communication, independence, computer literacy, leadership skills, and a work ethic for the students.

In addition to the positive views on e-learning, participants also provided feedback on areas for improvement. The areas of organization, communication, motivation, and context were identified. Organizational suggestions were to improve technical support, increase financial support, improve on-site supervision, limit student access to Facebook, and improve scheduling. Participants felt that communication could be improved between e-teachers and parents, e-teachers and students, e-teachers and school staff, and parents and school. It was also suggested that motivation could be improved by supporting student readiness skills for online courses, by identifying and communicating student attributes for success in online courses, and improving the appeal of online courses with design revisions, such as creating lessons that were less text-based. Lastly, suggestions for improvement in contextual areas included increasing bandwidth, having a qualified teacher on-site, providing emotional and social support for students,

and providing an alternative space within the school, such as a quieter location, for students doing web-based courses. The suggestion most relevant to this study was to improve the design of online courses so that they were less text-based.

Molyneaux, O'Donnell, Kakakspan, Walmark, Budka, and Gibson (2012) conducted a study exploring the link between social media and community resilience in the Sioux Lookout region of Northwestern Ontario. An online survey was distributed to users of Knet email, an email service provided to Sioux Lookout District First Nations. The survey included 29 quantitative and qualitative questions related to technology use, evaluation of the online services provided by Keewatinook Okimakanak, and the participant demographics. A total of 663 responses were collected, with respondents representing a wide range of community members.

The researchers found that members of First Nation communities in this area were frequent users of social networking sites (SNS), with more than four-fifths of the participants using the Internet or social media in relation to activities to celebrate and practice their culture. Although many respondents (63%) reported using email daily, the use of SNS was more frequent, with 73% of survey respondents using SNS daily. SNS and other online tools were regularly used by community members to exchange information with members of their own communities as well as other communities within and beyond the region. The following activities were mentioned by participants as strengthening cultural identity, cultural continuity, and community resilience: posting photographs and stories; listening to music and looking at artwork created by Aboriginal people; posting announcements of cultural events; sharing stories; and discussing land-based and traditional activities. Many survey respondents stated the need for additional

bandwidth to view and share video material. Overall, the findings strongly suggested that SNS activity was contributing to social capital, strengthening bonding and bridging networks within and among the communities, and providing a valuable opportunity for sharing information and stories that supported the development of culture and the maintenance of cultural preservation.

The communities in the Molyneaux et al. (2012) study were supported by a broadband network provided by the tribal council Keewaytinook Okimakanak (KO), “Northern Chief” in Oji-Cree. KO/K-Net Services also provide the Internet connectivity, email, videoconferencing, and website hosting for KiHS. The participants were located in the same communities that KiHS serves. All staff members at KiHS use K-Net email for communication with students and other staff members. It is possible that the use of the MoodleFN platform may provide similar functions as SNS, as students are able to view Aboriginal content and events, share stories and artwork, and communicate with students from other First Nation communities in the area using the learning management system. In view of the fact that KiHS is situated in the same bandwidth-restricted environment, consideration of the bandwidth that resources would require was taken into account when selecting interactive material and instructional videos in the revised course for this dissertation research study.

The report, *Aboriginal Voice Final Report: From Digital Divide to Digital Opportunity*, resulted from a two-year national study that explored the meaning of technology for Aboriginal Canadians (The Crossing Boundaries National Council, 2006, p.14). Sections in this report outlined the importance of information and communication technology (ICT) to Aboriginal people and gave advice on how to utilize e-learning in

ways that aligned with Aboriginal perspectives on learning. The report stated that e-learning offered “huge opportunities to leapfrog cultural and learning barriers to transform the way that Aboriginal education and training is done” (The Crossing Boundaries National Council, 2006, p.14) and provided a set of powerful tools to tackle educational participation, retention, and graduation rates. Technology was seen as being able to integrate culture and learning in order to create a more culturally-appropriate education that could possibly ensure a more holistic experience for students. The report also recommended that governments make Aboriginal e-learning a national priority and that a national online e-learning portal be established. KiHS and the Sunchild e-Learning Community were mentioned as examples of online schools that could serve as models of how technology could be tailored to fit Aboriginal students’ needs. The report discussed how to integrate the Aboriginal perspective on learning, which was said to be primarily focused on learning by example and experience, into the online learning environment. In general, the report considered e-learning to be a way of delivering education that was meaningful to Aboriginal students and that met their academic needs. The following suggestions for e-learning programs were applicable to the online course used in this dissertation research study: provide independent and interactive learning; allow self-paced learning; modify terms and curriculum to make them more culturally appropriate; and bridge learning of content to skills. For example, the revised course was flexible in allowing students to submit assignments based on their own schedule. While no students required this option, they were able to get permission to proceed with their work over the following term.

While this chapter discussed meeting the academic needs of Aboriginal students, meeting the academic needs of Aboriginal students with MID requires further considerations. Therefore, Chapter III will review the literature on special education policy in Ontario, as well as the literature on MID and how to meet the educational needs of learners with this exceptionality.

### Chapter III: Review of Literature

#### **Special Needs in Education**

The literature reviewed in the previous chapter focused on Aboriginal education in Canada, and when possible, concentrated specifically on First Nations education. To address the research question, it was also necessary to examine the literature on special education for students with MID in an online learning environment. Therefore, the literature reviewed in this chapter will discuss MID, along with the benefits of online learning for students with special needs, and design strategies that promote accessibility of online content. The literature provided valuable background information about the design of online courses for the Aboriginal students with MID in this study.

To begin the discussion of special education for students with MID, the various terms in common use to describe the educational programming of students with special needs in Ontario will be reviewed. Two of the terms commonly found in the education field, *special education* and *inclusive education*, can be used to describe the same academic setting offered for students with special needs, but differ in the scope of their settings. These terms are defined below, together with the distinctions between them.

#### **Special Education**

In schools within Ontario, special education refers to an educational program for students whose needs cannot be met through regular instructional and assessment practices (Ontario Ministry of Education, 2012b). These programs can include accommodations to help meet the curriculum expectations, modifications to curriculum expectations or to the age-appropriate grade-level expectations, and/or alternative programming that is not part of the provincial curriculum. Students may be placed in a

variety of classroom settings to best suit their needs. Placement options available in Ontario schools are found in the table below.

Table 2

*Placement Options for Students in Special Education Settings*

Placement Option	Definition
A regular class with indirect support	The student is in the regular class for the entire day, and the teacher receives specialized support for that student.
A regular class with resource assistance	The student is in the regular class for most or all of the day and receives specialized instruction within the classroom from a qualified special education teacher
A regular class with withdrawal assistance	The student is in the regular class and receives specialized instruction outside of the classroom from a qualified special education teacher. The time outside of the classroom is less than 50% of the school day.
A special education class with partial integration	The student is in a special education class for at least 50% of the school day, but is integrated with a regular class for at least one period daily.
A full-time special education class	The student is in a special education class for the entire school day.

At KiHS, the only placement option for students wishing to attend the learning centres is “regular class with indirect support” (the first placement option in the table above), due to the lack of space and the small population of the communities. The majority of the learning centres are one-room buildings staffed by a single mentor. The local school system does not have the infrastructure or student enrollment to support the additional space or staff necessary to offer other placement options. Therefore, this setting was the context for all students in this study who attended the learning centres.

**Inclusive Education**

In education, the term *inclusive education* has many interpretations (Bennett, 2009). In general, it refers to inclusion of all students, regardless of exceptionality, into



the regular classroom and with an active involvement in the school climate. The Ontario Ministry of Education (2011b) defines inclusive education as follows: “Education that is based on the principles of acceptance and inclusion of all students. Students see themselves reflected in their curriculum, their physical surroundings and the broader environment, in which diversity is honoured and all individuals are respected” (p. 2).

Inclusion differs from special education in terms of the placement of students. In special education, inclusion in the regular classroom may be part of the placement options, but is not the only option available. Alternatively, inclusive education advocates for a context in which students with exceptionalities receive their education in the same location as the other students in the school; they are not placed in a special education classroom. Inclusion is practiced at KiHS, in that students actively participate in the same school activities, regardless of their special needs. KiHS does not have any policies in place with regards to inclusion or procedures to follow in the event that a student’s needs cannot be met in the online environment or by the learning centre mentor. Students with needs that cannot be met at KiHS have the option of attending a secondary school off-reserve.

### **Models of Disabilities**

Perspectives on the definition of disability have changed over time. One of the perspectives is the Medical Model, which is the approach taken in this study. The Medical Model implies that the origin of the disability is in the person and that “disability is defined by the manifestation of a health condition in the form of anomalies or impairment of physical or mental structures or functions” (Simeonsson, 2006). In this model, documentation of a disability usually occurs through recordings of diagnoses,

syndromes, or signs and symptoms that are then used to meet the criteria for assignment to a category. Correspondingly, the needs of an individual with a disability are considered to be solely medical (Smart & Smart, 2006).

The Medical Model is the most well-known model to the general public, and carries with it the power and prestige of the medical profession (Smart & Smart, 2006). One of the strengths of this model is its strong explanatory power, which is considered to exceed the explanatory power of the other models of disability (Smart & Smart, 2006). This model is not considered to be an interaction model because the definition and treatment of the disability are considered to be situated within the individual with the disability. Because this model emphasizes categorization of individuals with disabilities, stigmatization of the individual as a category is a reality and concern.

While the Medical Model has been largely replaced by other models, described later, the current system for education funding for First Nations schools favours the Medical Model, requiring a formal diagnosis for students with high-cost special needs in order to receive additional funding under the Special Education Program (Aboriginal Affairs and Northern Development Canada, 2013). Formal assessment is required by the end of the subsequent year that a student is claimed as having high-cost special needs. In Ontario schools, including the First Nations school in this study, diagnoses fall under five categories of exceptionalities identified by the Education Act: behaviour; communication; intellectual; physical; and multiple (Ontario Ministry of Education, 2001). Examples and definitions of exceptionalities are included under each category.

The two types of approaches that are typical used in school systems within Canada to help identify students are the intervention-based approach and the assessment-

based approach (Aboriginal Affairs and Northern Development Canada, 2013). The outcomes of each are the same, that is the identification of a student's exceptionality and development of an IEP, but the steps in these approaches differ. In the intervention-based approach, teachers with the appropriate training to use and interpret assessment instruments will assess students and develop the necessary intervention measures to meet the student's immediate need(s) until formal assessment can occur. The IEP is created before the formal assessment in order to address the student's needs as soon as they are recognized. In the assessment-based approach, students are evaluated and identified first by health and mental professionals before an IEP is put into place.

While the Medical Model is used to define disabilities in Ontario provincial and federally-funded schools, to provide a complete understanding of online course design for learners with disabilities, more recent perspectives on the definition of disability are briefly discussed below.

The Functional Model is another model that has generally framed definitional, measurement, and classification issues related to disability (Simeonsson, 2006). This model defines disability as the basis of functional limitations. While this model still recognizes the importance of biology, it also recognizes that the environment with its functional demands can cause, contribute to, and exaggerate disability (Smart & Smart, 2006). Needs are considered to be those of adapting the environment and functional requirements to fit the requirements of the individual with the disability. In this model, it is less likely that individuals with disabilities will be stigmatized because of the following factors: categorization by disability type is less likely; the power differential is lessened when the individual is viewed as a person and not as a category or diagnosis; and partial

responsibility for responding to the disability relies on society to provide an accessible and nonprejudiced environment. Because the cultural identification of individuals can define their functions, roles, and environment, the Functional Model provides a “better basis from which to understand and respond to the disabilities experienced by individuals who are not White, middleclass, heterosexual, male, or Euro-America” (Smart & Smart, 2006).

The Social Model, also referred to as the Minority Group Model, resulted as a reaction to the Medical Model described earlier (Simeonsson, 2006). In this model, disability is defined as “a social construction in that the limitations and disadvantages experienced by people with disabilities have nothing to do with the disability but are only social constructions and therefore unwarranted” (Smart & Smart, 2006). This model emphasizes the environmental barriers and denial of human rights (Simeonsson, 2006), and thus the needs of the individual with a disability are considered to be full social integration and civil rights (Smart & Smart, 2006). Three aspects are inherent in this definition: people with disabilities must define disability; people with disabilities must refuse to allow others, such as professionals, to define the disability, determine the outcomes of their lives, or judge the quality of their life; and people with disabilities refuse the “disabled role” (Smart & Smart, 2006). In this model, the dependence on an academic discipline or professional area of expertise is minimized and the individual with the disability is seen to be the expert. Unlike the previous two models, which put individuals into categories, the Social Model resists medical categorization and views it as a source of prejudice and discrimination. This model, like the Functional Model, is

interactional, in that the disability of the individual interacts with other factors beyond the individual such as functions or environment.

Incorporating the characteristics of both the medical model and social model of disability (World Health Organization, 2002), the World Health Organization defines disability as “a complex phenomenon, reflecting the interaction between features of a person’s body and features of the society in which he or she lives” (World Health Organization, 2015, para. 2). Similar to the social model of disability, removing environmental and social barriers is seen as necessary for overcoming difficulties faced by people with disabilities.

In developing accessibility standards in e-learning, the IMS Global Learning Consortium provided a more education specific definition of disability that also incorporated a social model of disability:

The term disability has been re-defined as a mismatch between the needs of the learner and the education offered. It is therefore not a personal trait but an artifact of the relationship between the learner and the learning environment or education delivery. (IMS Global Learning Consortium, 2004, section 2)

Although there are more recently developed models (see for example Seale, 2014), as the Medical Model is the one used at KiHS, it is the one that is used to outline the characteristics and needs of mild intellectual disability in the following section.

### **Special Education for Students with Mild Intellectual Disability (MID)**

Narrowing in on the precise disability being addressed in the dissertation research study, resources related to MID will now be discussed. This discussion begins with information about the disability, and then moves on to implications for the classroom,

strategies for working with students, as well as information intended for First Nation schools.

Mild Intellectual Disability (MID) is one of the categories of special needs recognized in Ontario and is defined as follows:

A learning disorder characterized by an ability to profit educationally within a regular class with the aid of considerable curriculum modification and supportive service; an inability to profit educationally within a regular class because of slow intellectual development; a potential for academic learning, independent social adjustment, and economic self-support. (Ontario Ministry of Education, 2001, p. 20)

The American Psychiatric Society (2013c) provides a more detailed description of the disability in the *Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-5)*.

The DSM-5, a resource widely used by mental health professionals in Canada and the United States to diagnose and classify mental disorders (American Psychiatric Association, 2012a; Leung, 2012), defines intellectual disability as a disability that “involves impairments of general mental abilities that impact adaptive functioning in three domains, or areas” (p. 1). These areas include the conceptual, social, and practical domain. The conceptual domain consists of skills in language, reading, writing, math, reasoning, knowledge and memory. The social domain includes empathy, social judgment, interpersonal communication skills, and the ability to make and maintain relationships. The practical domain focuses on self-management in areas such as personal care, job responsibilities, money management, recreation, and task organization.

The onset of these intellectual and adaptive deficits occurs during the period of people's lives in which they experience the fastest rate of development that is, before the age of 18 years. The American Psychiatric Society considers intellectual disability to involve an IQ score approximately two standard deviations or more below the population (e.g., an IQ score of about 70 or below). For the purpose of this study, the definition found in the DSV-5 is used due to the extensive use of this resource by medical professionals in Canada (Medical Council of Canada, 2015).

According to the American Association of Intellectual and Developmental Disorders (AAIDD) manual, *Intellectual Disability: Definition, Classification, and Systems of Supports*, students with MID have adaptive behaviour below average, determined by standardized testing and defined as performance that is at least two standard deviations below the mean of either (a) one type of adaptive behaviour: conceptual, social, or practical; or (b) an overall score on standardized measure of conceptual, social, and practical skills (Schalock, Borthwick-Duffy, Buntinx, Coulter, & Craig, 2010). Adaptive behaviour refers to how well an individual meets the standards of personal independence and social responsibility expected of their particular age and/or cultural group (Winzer, 2008).

Another criterion for identifying MID includes limitations in intellectual functioning. An IQ score of approximately 70 to 75, or two standard deviations below the norm, obtained from standardized tests, or two standard deviations below the norm indicates a limitation in intellectual functioning (AAIDD, 2013; Schalock, Borthwick-Duffy, Buntinx, Coulter, & Craig, 2010; More & Oldridge, 1999; Weber & Bennett, 2004). In the DSM-5, intellectual disability is generally considered to be two standard

deviations or more below the population, which is the equivalent to an IQ score of approximately 70 or below. Approximately 80% to 90% of those diagnosed with intellectual disability have higher IQ scores, slightly below the ceiling of 70 to 75 (Snell et al., 2009). Individuals with IQ scores of 55 to 70 are usually independent, as well as capable of academic achievement to grade five or more with intermittent support (Sigelman & Rider, 2014; Weber & Bennett, 2004).

MID accounts for the largest segment, about 85%, of individuals with intellectual disability (American Psychiatric Association, 2012b). In publicly funded schools in Ontario, MID is the second most common type of exceptionality, after learning disability. MID is identified among approximately 8% of students formally identified with some form of intellectual disability (Ontario Ministry of Education, 2010a). The percentage of students with MID may have been higher as this percentage included only those who had been formally identified, which accounted for 68% of students receiving special education services in Ontario schools. The remaining 32% of students were those who were not identified, but were receiving special education services. The three most common types of special needs formally identified were learning disability (29%), MID (8%), and behaviour (5%).

Over time there have been changes in how intellectual disability is defined and diagnosed. As the focus has shifted from viewing intellectual disability as a condition existing solely within the individual to a focus on the interplay between the individual and the environment, the terminology and criteria for diagnosis have adapted accordingly (Schalock & Luckasson, 2013; Winzer 2008). Some major contributors to the field, such as the American Psychological Association (APA) and the American Association on



Intellectual and Developmental Disabilities (AAIDD), have recently updated their current best practices regarding naming, defining, diagnosing, classifying, and planning supports for people with intellectual disability (Schalock & Luckasson, 2013). For example, the AAIDD, the oldest and largest interdisciplinary professional society in the world concerned with intellectual and developmental disabilities (American Association on Intellectual and Developmental Disabilities, 2013; Tassé, Luckasson, & Nygren, 2013), published a new edition of *Intellectual Disability: Definition, Classification, and Systems of Supports* in 2010 to better reflect the current best practice guidelines (Schalock & Luckasson, 2013). These three organizations, the APA, AAIDD, and WHO, have created some of the most widely used systems of classification (Tassé, 2013). These systems for naming, diagnosing, and classifying intellectual disability, along with recent changes, will be discussed below.

In the DSM-5, released in May 2013, revisions were made to the terminology for those with intellectual disabilities (American Psychiatric Association, 2013a). In this new edition, the term *mental retardation* was changed to *intellectual disability* in order to reflect the fact that the earlier term was no longer used internationally and that *intellectual disability* was now the term more widely used (American Psychiatric Association, 2013a). Other terms currently in use, but not seen as frequently, are *intellectually challenged* and *developmentally disabled* (Winzer, 2008).

Despite this recent change in the DSM-5, it is anticipated that the terminology may again undergo revision to align with the World Health Organization's (WHO) 11<sup>th</sup> edition of its International Classification of Diseases (ICD) to be released in 2017 (American Psychiatric Association, 2013b). The ICD is a classification system of all

health conditions; it is used throughout the world, and includes more than 10,000 disease and disorder codes (Tassé, Luckasson, & Nygren, 2013). Intellectual disability was first incorporated into the ICD in 1990 (Fujiura, 2013); however, the ICD classifies diseases, not disabilities, and for this reason one of the anticipated revisions will change the term “*intellectual disability*” to “*intellectual developmental disorder (IDD)*” (Salvador-Carulla et al., 2011).

By defining intellectual disability as a health condition (disorder) under the ICD, rather than a disability within the WHO’s International Classification of Functioning, Disability and Health (ICF), the visibility of the disability is increased. Access to supports will also increase because the ICD, not the ICF, is used by WHO member countries to define the responsibility of governments to provide health care and services to their citizens. If intellectual disability is to be considered a health condition, the term *disability* needs to be removed from the name. However, as disabilities are seen as potential consequences of a health condition, the name IDD will not conflict with the current use of the term *intellectual disability*, the definition used by the AAIDD, or the functional definition based on the *ICF* model.

There is some controversy, however, over this change in terminology. For example, Ford, Acosta, and Sutcliffe (2013) claim that the new term would cause confusion as the term *intellectual disability* is already in widespread use. They further state that people will confuse it with the acronym *IDD* which is commonly used to indicate the population of people with intellectual disability and developmental disabilities. Due to not all those with developmental disabilities having an intellectual disability, the use of *IDD* may inadvertently identify an incorrect population.

In January 2012, the AAIDD formed a small group of experts in the field of intellectual disabilities to respond to the proposal submitted by the WHO Working Group for changes in the ICD. One of their chief concerns was the change in terminology (Tassé, Luckasson, & Nygren, 2013). It was recommended that the category name become *Disorders of Intellectual Disability* rather than *Intellectual Developmental Disorders*. By inserting the word *disorders* before the widely recognized term *intellectual disability*, the category name would still use the familiar term that replaced *mental retardation*, while retaining the taxonomy of the ICD.

In preparation for the shift in focus, the term *intellectual developmental disorder* accompanies *intellectual disability* in parenthesis in the DSM-5 (American Psychiatric Association, 2013b). The term *intellectual* is anticipated to remain the same as it is well understood and widely used in most countries under the WHO for both clinical and policy applications (Salvador-Carulla et al., 2011). Because the symptoms of MID in an individual must begin during the period of fastest development, and the term *developmental* implies a process and a lifespan perspective, the term was proposed to accompany the new name (American Psychiatric Association, 2013; Salvador-Carulla et al., 2011). The term *disorder* would fit with the characteristics of intellectual disability, as it implies that there are other concerns beyond intelligence, as well as multiple etiologies and comorbidities in existence. To support their goal to recognize intellectual disability as a health condition rather than a disability, the WHO Working Group, a group of stakeholders responsible for making recommendations for the upcoming changes to the ICD for the classification of intellectual disabilities, has proposed moving IDD from a

separate entity into the larger group of neurodevelopmental disorders (Salvador-Carulla et al., 2011).

A similar change in emphasis was also seen in the DSM-5. The earlier DSM-IV was multi-axial, with each axis providing information about the diagnosis; intellectual disabilities were excluded from Axis I of mental disorders and placed on Axis II with personality disorders (American Psychiatric Association, 2013c). In the DSM-5, all mental disorders are considered on a single axis and given equal weight, which may mean that intellectual disorders will receive more attention in research and practice. Ultimately, the result may be that more resources become available for teachers, such as the those at KiHS, to support their work with students with intellectual disabilities.

In addition to the change in terminology, the criteria for diagnosis of an intellectual disability have also undergone revision. The DSM-5 relies more on adaptive functioning than the previous version did, for both diagnosing intellectual disability and for determining the level of severity (Kauffman, 2013). The DSM-IV required deficits in adaptive functioning in two or more skill areas for diagnosis of an intellectual disability. In the newer edition, the manual characterizes an intellectual disability as having deficits in at least one of three domains, each of which includes several skills areas. The three domains and their corresponding skill areas are described below.

- The conceptual domain: including skills in language, reading, writing, math, reasoning, knowledge, and memory.
- The social domain: involving empathy, social judgment, interpersonal communication skills, the ability to make and retain friendships, and similar capacities.

- The practical domain: focusing on self-management in areas such as personal care, job responsibilities, money management, recreation, and organizing school and work tasks (American Psychiatric Association, 2013c).

Although the categories of severity for intellectual disability were not altered in the new DSM-5, the criteria used to determine the severity were modified. Severity now falls into one of four categories (mild, moderate, severe, or profound) and is currently determined by adaptive functioning, rather than by IQ scores as it was in previous manuals (American Psychiatric Association, 2013c). For example, the American Psychiatric Association (APA) formerly classified MID in those individuals with an IQ in the range of 50-55 to approximately 70 (American Psychiatric Association, 2012b); but now using adaptive functioning to determine the severity, individuals with MID are those who are viewed as mostly self-sufficient with sufficient supports and can achieve some academic success (Reynolds, Zupanick, & Dombeck, 2013). By removing IQ scores from the diagnostic criteria, the DSM-5 ensures that IQ is not emphasized as the defining factor of an individual's ability (American Psychiatric Association, 2013c).

The WHO Working Group supports the use of the four clinical categories of severity of *mild*, *moderate*, *severe*, and *profound*, as well as the provisional categories of *unspecified* and *other* in the ICD (Salvador-Carulla et al., 2011). The provisional diagnosis of *unspecific IDD* is reserved for children younger than four years of age because it is difficult to assess intellectual disability or severity levels at that age. The term *other IDD* is to be used for individuals over the age of four when IDD, or intellectual disability, cannot be determined due to barriers in assessment. However,

unlike the APA, the WHO Working Group contends that clinical severity levels should rely on a clinical description of the characteristics of each subcategory, and that the IQ score should be one of these descriptors.

In common with the DSM-5 (American Psychiatric Association 2013a) and the ICD (Salvador-Carulla et al., 2011), the AAIDD has identified a categorical system for classifying intellectual disabilities (Reynolds, Zupanick, & Dombeck, 2013). Keeping with the recent shift from an emphasis on deficits to one that focuses on the supports needed for individuals to interact functionally with their environment (Bryant, 2012), the AAIDD assesses severity based on the intensity of supports required (Reynolds, Zupanick, & Dombeck, 2013).

The needs are usually determined using the *Supports Intensity Scale* (Thompson et al., 2004), a standardized supports need instrument, with the following categories: intermittent support, limited support, and extensive support (Reynolds, Zupanick, & Dombeck, 2013). Many individuals with intellectual disability do not require regular support, and may only require it during times of transition, uncertainty, or stress. Such individuals would be identified as requiring intermittent support under the standards of AAIDD, and would typically be categorized under the APA standards as having MID, the disability or disorder addressed in this dissertation research study.

While all the classifications systems rely on categories, some experts argue that a multi-dimensional approach for assessing intellectual disabilities is more accurate and useful, as individuals people within the same category may require far different types and intensities of support. The WHO Working Group argues against discontinuing the use of

categories because of the current diagnostic and clinical utility of the ICD, as well its wide use in many public health systems (Salvador-Carulla et al., 2011).

Although it has its own classification system, the AAIDD has provided recommendations to the WHO Secretariat regarding the classification of intellectual disability in the revised ICD. The AAIDD recommends using the following terms to categorize the severity of intellectual disability: *marked*, *extensive*, *pervasive*, and *other* (Tassé, Luckasson, & Nygren, 2013). It is suggested that the previous ICD categories of *severe* and *profound* be combined under one category, *pervasive*, because grouping all individuals with IQ scores below 40 together is seen as being more scientifically and psychometrically supported than trying to accurately measure and differentiate among individuals with IQ scores below 40. The category of *other* would be used as a provisional diagnosis for those who cannot be accurately assessed because of age or the presence of sensory, physical, and/or behavioral difficulties and would replace the proposed categories of *unspecified* and *other*.

Despite all of the different changes and viewpoints discussed above, the AAIDD, APA, and WHO agree that intellectual disability has three defining elements: limitations in intellectual function, behavioural limitations in adapting to environmental demands, and early age of onset (Luckasson & Schalock, 2013). While the definitions and criteria used for identification of MID in Ontario schools are relatively up-to-date with the research, they may require modifications in light of recent and anticipated changes in the field.

School boards across Ontario use a variety of assessment methods to identify students with MID. These methods can include IQ tests, adaptive skills tests, skills-based

assessments, and levels of academic achievement (Ontario Ministry of Education, 2002). The DSM-5 emphasizes the need to use both clinical assessment and standardized tests of intelligence when diagnosing intellectual disability, with the severity of impairment based on adaptive functioning rather than IQ scores alone (American Psychiatric Association, 2013c).

The first criterion for diagnosis is significant limitations in adaptive functioning in at least one of the following domains: conceptual, social, and practical life skills. The assessment of intelligence across these three domains will ensure that clinicians base their diagnosis on the impact of the deficit, which is important for developing a treatment plan. It is suggested that evidence of deficits in adaptive functioning be gathered from more than one source (American Psychiatric Association, 2000). Reliable sources can include teacher evaluation and medical, educational, and developmental history. Furthermore, several other scales have been developed to measure adaptive functioning and behaviour, such as the Vineland Adaptive Behavior Scales and the American Association on Mental Retardation's Adaptive Behavior Scale. The other criterion needed for diagnosis of intellectual disability is that the individual's symptoms must begin during the developmental period, which according to the AAIDD is before the age of 18. The DSM-5 provides no reference to the age at which this developmental period ends.

To ensure that IQ scores are not overemphasized as the defining factor of an individual's overall ability, the DSM-5 no longer uses IQ scores in their diagnostic criteria, but instead, only uses them as one consideration in the overall assessment of the individual (American Psychiatric Association, 2013c). Intellectual disability is defined as sub-average functioning with an IQ of less than 70, with MID categorized at an IQ rang



of 50-55 to 70 (American Psychiatric Association, 2000). Intellectual functioning and the corresponding IQ level can be determined with the use of standardized, individually-administered intelligence tests, such as the Wechsler Intellectual Scales for Children, 3<sup>rd</sup> Edition, the Stanford-Binet, 4<sup>th</sup> Edition, or the Kaufman Assessment Battery for Children.

The cause of an intellectual disability is not always known. In approximately 30% to 40% of cases, no clear etiology is determined, with specific etiology being more difficult to determine in milder forms of the disability (American Academy of Child & Adolescent Psychiatry, 1999; American Psychiatric Association, 2000). Of those identified, the causes may be primarily biological or psychosocial, or a combination of both (American Psychiatric Association, 2000). The predisposing factors are prenatal causes (e.g., genetic disorders, toxins), malformations of unknown causation (e.g., malformation of the central nervous system), perinatal causes (e.g., delivery problems), and postnatal causes (e.g., exposure to toxins) (American Academy of Child & Adolescent Psychiatry, 1999).

Intellectual disabilities frequently co-occur with a mental illness, with a prevalence estimated at being three to four times greater than in the general population (American Psychiatric Association, 2000) and occurring in approximately 30% to 70% of individuals with intellectual disabilities (American Academy of Child & Adolescent Psychiatry, 1999). Various types of mental disorders can be observed (American Psychiatric Association, 2000); the most common disorders seen at KiHS are pervasive developmental disorders and anxiety disorders.

Individuals diagnosed with an outcome under the Fetal Alcohol Syndrome Disorders (FASD) umbrella may also be considered to have an intellectual disability

depending on how the outcome affects the learner, as FASD can result in a combination of physical, behavioural, and intellectual problems (More & Oldridge, 1999; Weber & Bennett, 2004). The term FASD encompasses a range of outcomes linked by maternal consumption of alcohol during pregnancy, which under Canadian diagnostic guidelines include Fetal alcohol Syndrome (FAS), partial FAS (p-FAS), and Alcohol-Related Neurodevelopmental Disorders (ARND) (Chudley et al., 2005; National Collaborating Centre for Aboriginal Health, 2010). In Canada and the United States, FASD is considered to be a leading cause of preventable intellectual disability (Hardman, Drew, & Egan, 2014; Public Health Agency of Canada, 2014). Furthermore, external prenatal causes account for an estimated 11% of all causes of intellectual disability, and alcohol is included in the known toxins affecting prenatal development (American Academy of Child & Adolescent Psychiatry, 1999). It is estimated that FASD affects approximately one percent of Canadians (PHAC, 2014). Given the history of colonization and devaluation of culture, and that the extent and outcomes of FASD are linked to the social and economic environment of mothers and children, the rates of FASD may be higher in some First Nations and Inuit communities (National Collaborating Centre for Aboriginal Health, 2010; PHAC, 2005b).

In Canada, special educational funding for on-reserve schools is not limited to having a formal diagnosis, but is partly determined by the number of students with high-cost special needs, which can include students who exhibit characteristics of MID, but who have not been formally diagnosed (Aboriginal Affairs and Northern Development Canada, 2011c). Funding can go towards services such formal assessment, teacher aides, assistive technologies and equipment, and occupational therapy. Therefore, being aware

of the characteristics of this disability can help secure special education funding, when required for students yet to be diagnosed.

Knowing how the characteristics of MID affect the student's performance in the classroom or in the online environment, as well as the influence on their learning processes, is important for both the mentors at KiHS and the instructors who develop the courses. In this study, the implications of MID were considered in order to establish the set of course design strategies, ultimately used in the development of the revised course.

Students with MID usually develop social and communication skills from birth to age 5 years (American Psychiatric Association, 2000), although they may reach physical milestones later than the norm and perform below age-related standards in motor areas (Weber & Bennett, 2004). They are often not distinguishable from children without an intellectual disability until at a later age when the achievement gap begins to widen (American Psychiatric Association, 2000). Learning and memory can be affected by MID, including the abilities to pay attention, communicate verbally, generalize, and understand similarities and differences; motivation and short-term memory may also be affected (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002; Weber & Bennett, 2004; Winzer 2008).

Students with short-term memory problems can learn strategies if taught, but tend not to use memory strategies spontaneously (Weber & Bennett, 2004). Once something is learned and stored in long-term memory, the student with MID will be able to recall it as well as any other student. Speech and language problems are also common, with verbal and written skills often being below age-related norms; deficiencies in written skills are usually the most pronounced. Academic achievement is also affected in

students with intellectual disabilities, most noticeably in reading comprehension and in mathematical skills, such as reasoning and problem-solving (Ontario Ministry of Education, 2002; Weber & Bennett, 2004). Abstract concepts can be particularly troublesome (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002). In addition, students may be easily confused by abstract and figurative language, and may interpret language literally (Ontario Ministry of Education, 2002).

Delays in adaptive skills are also common in students with MID (Ministry of Education, 2002). For example, students require consistency in routines and require assistance with personal care. Students may also display what Weber and Bennett (2004) call “learned helplessness,” where they will allow others to complete tasks for them. Furthermore, individuals with MID often experience difficulties with social interaction and may demonstrate immature behaviour, difficulty understanding non-verbal cues, difficulty with social language and behaviour, difficulty understanding and expressing a broad range of emotions, and obsessive/compulsive behaviour (Ontario Ministry of Education, 2002).

In the past, educators frequently believed that students with MID could not benefit from the regular curriculum (Metro Consortium for Students with Mild Intellectual Disabilities, 2002). However, by late adolescence, students can acquire academic skills up to approximately the sixth-grade level (American Psychiatric Association, 2000), though this level of achievement is not absolute for every individual. While not all students with MID can benefit from the regular grade level curriculum, they are capable of meeting curriculum expectations (American Psychiatric Association, 2000,

Winzer, 2008). Students with MID benefit from an education model that combines special education services with maximum exposure to the general education curriculum and non-disabled peers, and emphasis should be placed on students not only participating, but also progressing in the general curriculum to the greatest extent possible (Metro Consortium for Students with Mild Intellectual Disabilities, 2002).

In their research on the impact of education contexts on long-term outcomes for students with disabilities, Ryndak, Alper, Hughes, and McDonnell (2012) recommend that additional student input is needed in educational planning, based on their future plans and goals. They also contend that one of the dilemmas facing schools today is how to maximize students' educational experiences related to both general education content and functional needs. At KiHS, students with MID can take a variety of program paths with some enrolled only in alternative courses addressing functional needs, such as "Self Help" or "Self, Language and Communication Development," some exclusively enrolled in credit courses, and some taking a mix of courses.

Bouck and Joshi (2012) examined the acceptance of a functional curriculum in schools for students with MID, the post-school outcomes (independent living, employment, and post-secondary attendance), and the relationship between curriculum focus on school and post-school outcomes for these students. The study analyzed the National Longitudinal Transition Study-2 (NLTS2) and the secondary data from the NLTS2 to examine students with MID, functional curriculum, and post-school outcomes (Bouck & Joshi, 2012). Frequency distributions, cross tabulations and logistic regression were utilized in the analysis of the secondary data. The NLTS2 was a government-sponsored project that documented the educational, vocational, social, and personal

experiences of students from across the United States who were enrolled in a special education program as they transitioned from high school to adulthood. The findings from NLTS2 generalized students into 12 disability categories and to each single-year group. The study involved 60,664 students diagnosed with MID who were 13 to 17 years old in 2000 and followed them through until 2009 when they were 21 to 25 years old. A functional curriculum approach is “characterized by the consideration of teaching students with MID the skills to help them be productive members of society, and support positive post-school outcomes” (p. 146). In Ontario secondary schools, such as KiHS, a functional curriculum approach would be akin to alternative courses, which focus on preparing students for daily living (Ontario Ministry of Education, 2004).

The results indicated that a low percentage (17.5%) of students reported experiencing a functional curriculum as their curricular focus. Bouck and Joshi (2012) found that the implementation of a functional curriculum in school did not impact students’ post-school outcomes (independent living, employment, and post-secondary attendance), for both the immediate and the long-term post-school outcomes. However, implementation of a functional curriculum also did not result in students experiencing lower post-school outcomes. Therefore, students with MID at KiHS should not be limited to receiving a functional curriculum, such as the curriculum found in alternative courses in Ontario secondary schools.

To accommodate the implications of the research discussed above, numerous strategies are available to support teachers working with students with MID. While most of the literature is focused primarily on face-to-face, classroom-based instruction, many of the suggestions found in the research, and discussed below, can be adapted to online

courses. As students with MID may be more comfortable with regularized routines and expectations, educators are encouraged to pay attention to structure in their instruction and learning environment (Ontario Ministry of Education, 2002; Weber & Bennett, 2004). Instructional strategies can include repetition of certain sequences until they are assimilated by learners and/or temporarily reducing the number of choices students are expected to make (Weber & Bennett, 2004).

In light of the guidelines discussed above, it seemed likely that students at KiHS would benefit from attending learning centres where the learning environment, including both the physical and virtual environment, was structured. In the physical environment, this structure could involve the mentor developing an individualized schedule for the students. In the online course revised for this study, structure took the form of a consistent template and a review of previous material at the beginning of new lessons.

As students with MID may take longer to learn the curriculum, it is important to maximize time on task and to provide extended and numerous opportunities for practice (Ontario Ministry of Education, 2002). When presenting lessons, it is suggested that the tasks be based on real-life applications at a level appropriate to the student (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002). To further assist students with curriculum, teachers of students with MID are encouraged to implement the following strategies:

- use assistive technology (Metro Consortium for Students with Mild Intellectual Disabilities, 2002);
- chunk the instruction into smaller steps;
- provide opportunities for the student to work with others;

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- sequence the steps involved in learning a skill or concept;
- use a variety of instructional methods;
- use drill and practice;
- teach the same concept or skill in many situations (Ontario Ministry of Education, 2002);
- give clear, specific written directions;
- use visuals, practical examples, and demonstrations to reinforce concepts;
- introduce key concepts and vocabulary at the beginning of a new lesson or unit (College Committee on Disability Issues, 2006);
- repeat and simplify instructions;
- adapt pace;
- use concrete examples;
- speak clearly, loudly or quietly, depending on what works best for the student (British Columbia Ministry of Education, n.d.).

When assessing students with MID, students should be given multiple opportunities to demonstrate their learning, and these methods should reflect their strengths (Ontario Ministry of Education, 2002). The following are some of the strategies and accommodations that teachers may use for assessment (Ontario Ministry of Education, 2002):

- use alternative forms of assessment;
- divide the test into parts;
- highlight key words in questions;
- simplify the wording of assignments or tests;



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- read or clarify questions;
- provide practice questions;
- provide a quiet work environment;
- use frequent short assessments rather than one long assessment;
- allow the student flexibility, as appropriate, in the number of questions to be answered relating to the same skill;
- change question types from essay to fill-in-the-blank, multiple-choice, short-answer, and so on;
- allow extended time for task completion (British Columbia Ministry of Education, n.d.; College Committee on Disability Issues, 2006; Ontario Ministry of Education, 2002);
- allow the student to use assistive technology, such as text-to-speech software (College Committee on Disability Issues, 2006; Ontario Ministry of Education, 2002); and
- allow dictation to a scribe (British Columbia Ministry of Education, n.d.; Ontario Ministry of Education).

Other suggestions for working with students with MID, which do not directly relate to the revision of the course in this study, but are applicable to the learning environment at KiHS, include the following: helping students to develop momentum and commitment (Ontario Ministry of Education, 2002; Weber & Bennett, 2004); asking students to repeat directions to strengthen and check for understanding (British Columbia Ministry of Education, n.d); clarifying questions on assignments (College Committee on Disability Issues, 2006); providing reinforcement and feedback (Metro Consortium for

Students with Mild Intellectual Disabilities, 2002); and maintaining a positive attitude, as students with MID can and do learn (Weber & Bennett, 2004). Accommodations that are not part of course design, but appear to be helpful with this group are extra time for tests/exams, reduced course load, and counseling to assist with course selection (Lacène, 2008).

The scope of the literature can be focused even further, for the purposes of this study, by addressing First Nations students with MID. More and Oldridge (1999) provide a process for screening students for special education assessments in First Nation communities. Even though this process is not meant to diagnose students, it can help identify individuals for referrals or for particular teaching and learning strategies. In addition to the screening resource, More and Oldridge identify a number of assessment tools for measuring intellectual functioning and adaptive behaviour of those individuals identified as potentially having MID.

A companion document accompanies the screening resource discussed above, providing guidelines and suggestions for special education interventions for First Nation students with special needs (More, 1999). In common with the previous document, this resource focuses on individual exceptionalities, including MID. The interventions suggested are categorized according to various teaching practices, such as giving instructions, adapting the classroom environment, adapting the representation of knowledge, and adapting materials. The following strategies from the document were implemented into the revised online course for the study and in the KiHS learning centre environment:

- giving structured overviews at the beginning of lessons;

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- highlighting key points;
- repeating directions;
- completing the first example with the student;
- providing a visual cue with written instructions;
- allowing extra time (e.g., reduced course load, no fixed course completion dates);
- using both auditory and visual presentation of information;
- breaking procedures into steps and monitoring comprehension at small stages;
- using concrete examples;
- using different colours for emphasis or coding;
- enlarging materials;
- using manipulatives;
- putting less information on a page;
- varying instructional methods;
- keeping evaluation strategies simple; and
- varying evaluation strategies.

The two resources discussed above (More & Oldridge, 1999; More, 1999) are suited for KiHS students and the dissertation research study described herein. No other resources were located that addressed both Canadian Aboriginal students and strategies for meeting the needs of students with MID. As discussed previously, Aboriginal students often have lifestyle and learning needs that are unique to their culture, and therefore, their special education programming should be tailored to these needs. While the description of the needs of Aboriginal students with MID and many of the instructional strategies to meet those needs were comparable to resources developed for

generic use in various cultures, there was additional information that made it more suitable to Aboriginal students. For instance, More and Oldridge (1999) refer to the reality that very few schools on reserves have qualified classroom assistants or appropriate resources, and that these constraints must be kept in mind when formulating individual education plans. More and Oldridge's resource is also useful to this study because the strategies listed can easily be applied to the online environment. For example, highlighting of key points, provision of visual cues, and use of audio and visual representations of material can all be done within the Moodle learning management system (LMS) used at KiHS. Those students at KiHS requiring manipulatives can access them within the learning centres or have them provided through the mail. The age of the resource is not significant because the description of the exceptionality has not changed, and many of the classroom strategies can be tailored for use in the online environment.

### **Online Learning for Students with Special Needs**

Throughout Canada, online learning is being introduced in all levels (K-12 and post-secondary) and areas of education. The same students who would be found in a face-to-face classroom, including those with disabilities, can now be found in online schools, or in blended learning environments, which use a combination of both face-to-face and online teaching. Online learning can be beneficial to students by providing access to learning opportunities that were previously not available to them (Moisey & Hughes, 2008; Richardson, 2009). The research on how online learning can meet the needs of students with disabilities will be discussed in further detail below, along with suggestions for teachers working with these students in the online learning environment.

E-learning is able to meet the needs of many students with disabilities through the flexibility of time, location, and instructional mode that the technology makes possible (Canadian Council on Learning, 2009a; Fichten et al., 2009). Those with disabilities are capable of high levels of academic achievement, as long as the appropriate accommodations and supports are provided (Richardson, 2009). Success of students with disabilities, such as MID, can be improved in online learning environments as adaptive technology can be easily incorporated, and social stigma is reduced (Repetto, Cavanaugh, Wayer, & Lui, 2010). In addition, digital media utilized in e-learning environments can support individuals with MID through its capacity to support multiple means of presentation and interaction (Brown, 2010).

Professional development for those working with students in the online environment can also be beneficial in ensuring that the needs of students with disabilities are met. Professional development in special education topics is recommended so that teachers and other school support staff can better understand the needs of disabled students and how to accommodate them in an online learning environment (Repetto, Cavanaugh, Wayer, & Lui, 2010; Rice, Dawley, Gassell, & Flores, 2008). Through professional development, special education teachers can develop an awareness of online learning as a viable educational option for students with disabilities. In their study investigating the needs of K-12 online teachers (n=884), Rice, Dawley, Gassell, and Flores (2008) found that most virtual teachers had little experience working with students with disabilities in the classroom, let alone in an online setting. Yet, the majority of online teachers reported a strong need for professional development in special education, with 91% of virtual teachers wanting further training in providing intervention and/or

enrichment activities and 90% wanting more instruction in how to modify and customize activities to meet learners' needs. Fichten et al. (2009), in their study exploring e-learning problems and solutions, suggested that training staff on how to make learning accessible would be one means of addressing problems involving inaccessibility of websites and course management systems, as reported by participants. Participants in their study included 223 students with disabilities, 58 campus disability service providers, 28 professors, and 33 e-learning professionals from Canadian colleges and universities who, using an online questionnaire, answered questions regarding demographics and e-learning.

In the past, resources on how to address students with special needs in the classroom and online have been provided to staff at KiHS, as well as short professional development sessions on various topics in special education relevant to the First Nations culture and learning. No previous education in special education or in online teaching for students with special needs is required for employees at KiHS, nor is professional development in this area mandated, beyond what is provided in these short sessions.

To increase engagement of students with disabilities, and ultimately increase graduation rates for learners with disabilities, the use of the "5C" approach in online learning environments is recommended (Repetto, Cavanaugh, Wayer & Lui, 2010). This 5Cs represent the following four components:

- 1) Connect - making connections between school and a student's future
- 2) Climate - providing a safe and caring learning environment
- 3) Control - assisting students in taking control of their learning and behaviours

4) Curriculum – engaging students with curriculum that supports their learning with effective teaching strategies and academic supports

5) Care – providing a caring community where students know they are valued

When developing online programs with the 5Cs in mind, it is suggested that online curriculum is rigorous and relevant to the lives of students, and that teachers and administrators take students' needs into account when developing curriculum and creating school policy. Policies should be created that foster a safe climate and caring community for learners. In addition, online programs should be accessible, supportive, and include differentiated instruction, as well as include a module providing guidance to students with disabilities on how to navigate and be successful in online courses. Some of these suggestions, such as a providing a flexible and rigorous curriculum, were considered in the design of the revised course in this study as a way to meet the needs of students with MID.

Further research on how online learning can meet the needs of individuals with disabilities is recommended. For example, Repetto et al. (2010) acknowledge that research on online learning for students with disabilities is still evolving and propose that further research be done by online schools and special education leaders to identify how students with disabilities are being served and are functioning in online programs. This recommendation aligns with the purpose of this research dissertation study, that is, to determine how to improve the design of courses at KiHS to better suit the needs of students with MID or students with similar needs, as it was already determined that the needs of these students at KiHS were not being fully met in the online courses.

### **Models of Course Design**

As this research dissertation study examined course design strategies for students with MID, it was necessary to review models of course design in the literature. Books, online refereed journals, websites, books, reports, and printed and online publications. The same databases previously mentioned at the beginning of Chapter II were used to locate journal articles. The review of literature found no models of course design specifically for students with intellectual disabilities. However, many models of course design for general education were available, each with varying views of what elements should be included. Models were selected for review based on their relevancy to the study, including application to online learning, application to the instructional environment at KiHS, and ability to meet the needs of the students. Several of these models are discussed below, along with a description of the model selected for this study.

Ausubel (1960) developed what he called *advanced organizers* in order to facilitate learning and retention of knowledge. Advanced organizers are defined as “introductory materials at a higher level of abstraction, generality, and inclusiveness than the learning passage itself, and an overview as a summary presentation of the principle ideas in a passage that is *not necessarily* written at a higher level of abstraction, generality, and inclusiveness, but achieves its effect largely by the simple omission of specific detail” (Ausubel, 1978, p. 252). They are not considered to be the same as summaries or overviews, but rather are intended to bridge the gap between what learners already know and what they need to know before they can successfully learn the new material. Ausubel contended that advanced organizers facilitate the incorporation and longevity of meaningful verbal material in two ways. First, they access and mobilize



previously learned content and are then integrated with the new learning, thus making the new material more familiar and meaningful. Second, advance organizers provide anchorage for the new learning material, which promotes initial incorporation and later resistance to loss from memory. Two types of organizers exist: expository organizers and comparative organizers. Expository organizers are used when the learning material is entirely unfamiliar, whereas comparative organizers are used when the learning material is relatively familiar or able to be related to previously learned ideas. In comparative organizer, the similarities and differences between the new ideas and the previously learned ideas are explicitly pointed out. Instructors utilize advanced organizers by considering the nature of the learning material, the age of the learners, and the learners' familiarity with the learning, and prepare an advanced organizer accordingly.

After reviewing instructional design theories, models, and research, Merrill (2002) identified a set of interrelated prescriptive principles of instructional design. The following five principles were identified:

- The *demonstration* principle: Learning is promoted when the learner observes a demonstration.
- The *application* principle: Learning is promoted when the learner applies the new knowledge.
- The *task-centered* principle: Learning is promoted when the learner engages in a task-centered instructional strategy.
- The *activation* principle: Learning is promoted when the learner activates relevant prior knowledge or experience

- The *integration* principle: Learning is promoted when the learner integrates the new knowledge into their everyday world.

Merrill contended that these five principles can be applied to any program or practice; however, Reigeluth and Carr (2009) argued that for instruction to be of high quality, instruction must be different in different situations. Therefore, situational principles, that is, principles that are only applied in some situations, were developed to increase the precision of guidance for instruction. According to Reigeluth and Carr (2009), two types of *situationalities* exist (their term used to describe the contextual factors that influence the effects of method) each calling for different methods: those based on approaches to instruction (means), and those based on learning outcomes (ends). Means-based situationalities encompass instructional methods such as role play, synectics, mastery learning, direct instruction, discussion, conflict resolution, peer learning, experiential learning, problem-based learning, and simulation-based learning. Ends-based situationalities include guidance on the design of instruction to achieve the following types of learning outcomes: knowledge, comprehension, application, analysis, synthesis, evaluation, affective development, and integrated learning. Reigeluth and Carr (2009) provided a description of situational principles for five of these 18 situationalities.

The models discussed above focus primarily on the instructional methods in course design; however, for the purpose of this study, instructional design models that considered additional areas when designing a course were explored. For example, Gagne (1974) proposed a series of nine instructional events for the instructional process, which relate to the mental conditions of learning (cited in Gagne, Wager, Golas, & Keller,

2005). These events, described below, can be altered and not all events need to be present in every lesson for effective instruction.

The first instructional event is to control attention, which involves capturing the attention of the learning. Communicating the objectives of the lesson is the next requirement of instruction, and should also form the basis for assessment. The purpose behind providing the list of learning objectives is to initiate the internal process of expectancy and motivate the learners. The third instructional event is to stimulate the recall of prior learning before presenting the new content for the lesson. Gagne (1974) contended that recalled memories must be contiguous with the new content for effective learning to occur. Prompting and guiding the learning is the next event in the sequence and occurs frequently as part of the instructor's function. In order to transfer learning, instructors should encourage generalization, by using techniques that stimulate the learner to apply what has just been learned. The last three events are providing feedback to the learner, assessing the learner's performance, and enhancing the retention and transfer of the learning (Gagne, Wager, Golas, & Keller, 2005). These nine instructional events correspond to the changes made in the template for the revised course used in this study. For example, additional sections were added to the lesson template in order to communicate the learning objectives and review previous content, corresponding to Gagne's second and third instructional events, respectively.

Ellis, Light, and Pryde (1999) developed a model of the components of course design in five interrelated areas: *Goals, Context, Content, Teaching Methods, and Assessment*. This model was developed using material originating from a Teaching Resources and Continuing Education (TRACE) workshop, as well as literature on the

topic (University of Waterloo, n.d). According to Ellis (personal communication, June 22, 1015), the original model drew from literature in the areas of teaching strategies (Davis, 1993; Forsyth, Jolliffe, & Stevens,1999; Lowman,1995; Menges & Weimer, 1996; Neff & Weimer, 1990; Newble & Cannon, 1995; Pregent, 1994; Weimer, 1993) and course design (Bean, 1996; Diamond, 1998; Lovell-Troy & Eickmann, 1992; Walvoord & Anderson, 1998). The five components evolving from this literature in the model used at University of Waterloo will be discussed in the following sections.

*Goals* are the knowledge or skills that the instructor wishes the students to know or to be able to do as the result of taking the course (Ellis, 2008). The *context* is comprised of the factors that may influence the course design, such as the student characteristics, other courses within the program, course description, and course location. Determining what will be taught in the course is addressed in the *content* component of the model. Next, *teaching methods* refer to the instructional methodology or pedagogy used to support the students in order to attain the goals of the course. The last component, *assessment*, involves selecting types of measurement to evaluate whether students have attained the goals that the instructor set out at the start of the process. Instructors are encouraged to keep the overall course goals in mind throughout the design process in order to ensure that the components contribute to and fit well with the goals of the course.

This model was designed to be a practical design tool; therefore specific design considerations are provided for each area of course design (Ellis, 2008). For example, in the area of contextual methods, the model provided considerations, such as “who are my students?” and “how can I respect the diverse abilities and needs of my students (e.g.,

language or cultural differences)?” In the area of assessment, examples of considerations are “what assessment tools will I use?” and “what weights will I assign to my assessment methods?”

Since inception, the model and the accompanying design considerations have been updated to reflect new research, such as literature from Fink (2003) and Bain (2004) (Ellis, 2008). One of these updates is that some categories labels have been modified. For example, *goals* have become *intended learning outcomes*.

Simonson, Smaldino, Albright, and Zvacek (2009) identified six areas to be addressed in planning the design of distance education courses: learners; content; teaching strategies/media selection; technology/resources; preparation for online instruction; evaluation of the quality of instruction. These areas are similar to the model developed by Ellis, Light, and Pryde (1999), but in this model the design is specifically for courses in a distance education setting. Simonson et al. suggested beginning the process by identifying the learners. This stage is equivalent to the *context* component in the model developed by Ellis, Light, and Pryde (1999), as it considers the learners’ backgrounds, characteristics, and distinctive learning needs that may require specialized instruction. The next area involved is determining the content to be covered. The content is based not only on what is related to the curriculum, but what is appropriate for the learners (Simonson, Smaldino, Albright, & Zvacek, 2009). The instructor must adapt the content to suit the students who are expected to learn it. The goals for the course are established in concert with the content. Another consideration in the design of a course is the selection of teaching strategies. This area of consideration includes the modes of presentation, media selection, and the visual appearance of course materials, such as the

font size, font type, and use of white space. It is recommended that instructors analyze the learning environment when addressing the technology and resources that will be available to students. Instructors are also encouraged to look at what planning is required for online course delivery, such as establishing the communications framework. Lastly, formative evaluation of the quality of instruction is an important consideration and includes determining what improvements can be made to create a more successful educational experience for students. Simonson et al. contend that in addition to the content, learners, and instructional setting, there are other areas not directly related to the design of the online course that should be considered. These include the schedule for posting the course online, creation of student handouts, distribution of course materials (e.g., textbooks), and presence of site coordinators.

Simonson et al. (2009) also proposed an organizational guideline called “The Unit-Module-Topic Model” that outlined a way to organize university-level courses, while taking into account the design considerations discussed above. The model provided precise organizational, content, assessment, and instructional guidelines for online courses delivered in three semesters, that are approximately equivalent to a semester credit offered in classroom-delivered instruction using 15 50-minute classes. Although this model would not fit the organizational layout of the school year at KiHS, some of the strategies for organizing the course, such as the use of units and modules, were used in the revision of the course used in this study.

Willis and Lockee (2004) developed a course design model for distance learning with components similar to those identified by Ellis, Light, and Pryde (1999) and Simonson et al. (2009). This theoretical model takes into account considerations specific

to distance learning, and places emphasis on the practical considerations in the design process. The model begins by determining *instructional needs*, which includes assessments of the technological context, learners, and content. During this stage, the technological infrastructure, learners, and course content are examined to determine if the instructional needs can be met through a distance education approach. Once it is determined that the instructional needs can feasibly be met, a *statement of goals* and a *statement of objectives* can be made. *Performance strategies*, the next stage in the design process, describes the approach for implementation of the goals and objectives. The remaining stages in this model have both a linear and circular flow because they are dependent on one another. *Task orientation* and *media and materials* are determined next and are interrelated to the subsequent stage of *instructional delivery*. These stages are followed by selecting the methods of *practice and feedback* that will assess students' knowledge of the course content and identify erroneous areas. The final components in this model are *evaluation* and *final feedback* where the course is evaluated to determine if any changes to the content or design are required.

The previously reviewed five models have commonalities in the components of course design. For example, all included goals of the course, instructional strategies, and assessment methods. The main difference lies in the layout and flow of these components. For example, Willis and Lockee's (2004) model was both linear and circular, whereas the model developed by Ellis, Light, and Pryde (1999) was neither linear nor circular, but instead was comprised of five interrelated components with the primary consideration being the goals of the course. The model developed by Simonson et al. (2009) was comparable to the model developed by Ellis, Light, and Pryde, but there

were some key differences that made it unsuitable for the online environment at KiHS. For example, the Simonson et al. model had a non-linear flow similar to the model developed by Ellis, Light, and Pryde, and also addressed the same components of course design as did Ellis, Light, and Pryde. However, their model was strongly focused on organization, rather than all of the components of course design. As the research question in this study examined the perceived effectiveness of the design elements used in revised course in meeting the needs of students with MID, the model that considered all components of design to be interrelated and equal, as at KiHS, was determined to be most appropriate. Furthermore, the Unit-Topic Model, an organizational guideline also developed by Simonson et al. (2009), is based on a university semester credit of approximately 12.5 hours of instruction, whereas a secondary school credit is based on 110 hours of instruction, making the Unit-Topic Model incompatible for the timetable at KiHS. Therefore, the model developed by Ellis, Light, and Pryde (1999) was used for the design of the revised course in this study because of the interrelatedness of its components, the fit with the purpose of the study, and the simplicity of use.

### **Online Course Design for Students with Disabilities**

The literature related to online education for students with cognitive impairments is limited (Keeler & Horney, 2007). Similarly, the literature related to disabilities and distance education is also limited, as Kinash and Crichton (2007) commented,

A small number of publications are positioned at the overlap between distance education and disability. Of those, very few are research, and the source publications are largely conferences and journals within the field disability studies rather than in mainstream education technology. (p. 194)



The remainder of the literature reviewed addresses online course design for students with disabilities, and when possible, for students with cognitive disabilities.

Increasing accessibility to online learning for those with disabilities, including MID, is a common outcome of many of the design suggestions located in the review of literature. For example, to make online learning more accessible to those with cognitive disabilities, it is recommended that designers use well-organized and uncluttered web pages, avoid using unnecessary graphics or pop-up windows, and make web pages easy to navigate (Crow, 2006). Additional suggestions for the design of web pages includes the following: present a logical flow of content, use appropriate titles and headings, and make text large enough to be easily seen. Greater access to e-learning environments can also be ensured through the appropriate adaptation of technology, such as assistive technology, and related resources (Canadian Council on Learning, 2009a). Fichten et al. (2009) suggested that schools should consider developing and adopting e-learning accessibility guidelines, such as the ones described below, for use in development of e-learning and purchases made to support e-learning.

In addition to the suggestions for increasing accessibility in online learning discussed above, formal standards and guidelines exist to make web pages accessible to all learners. Two sets of guidelines, Section 508, and Web Content Accessibility Guidelines (WCAG), outline the industry-accepted best practices within the field of accessibility (IEEE, 2010), and therefore will be discussed in further detail below. Other international standards and guidelines exist, such as BITV 2, RGAA, and Stanca Act. However, since these standards and guidelines apply to countries outside of North America and do not pertain to this study, they will not be included in the discussion.

Section 508 of the United States Rehabilitation Act requires that federal agencies make their electronic and information technology products fully accessible. The technical standards cover software applications and operating systems; web-based intranet and Internet information and applications; telecommunications products, such as cell phones or voice mail systems; videos or multimedia products; self-contained, closed products, such as copiers and fax machines; and desktop and portable computers. Under these standards, performance criteria exist to ensure that the individual components work together to create an accessible product. These performance criteria also evaluate individual technologies or components not covered under the technical standards discussed above. Lastly, standards exist to address access to all information, documentation, and support provided to end users of the technologies covered by Section 508. This includes user manuals and customer support communications.

The World Wide Web Consortium (W3C) published the Web Content Accessibility Guidelines (WCAG) 2.0 in 2008 as a reference guide for accessibility principles and web page design (IEEE, 2010). The Standard of Web Accessibility that was implemented in 2011 by the Government of Canada requires all government websites to conform to WCAG 2.0 guidelines (Government of Ontario, 2011c). As of July 2011, the Integrated Accessibility Standard under the Accessibility for Ontarians with Disabilities Act requires that all Ontario government websites conform to these standards as well (Government of Ontario, 2014).

The WCAG consists of 12 guidelines organized under four principles: perceivable; operable; understandable; and robust (Web Accessibility Initiative, 2013). Each of these guidelines has testable criteria for success at three levels: A; AA; and

AAA. The *perceivable* guidelines require that text alternatives are provided for non-text content, alternatives are provided for multimedia, content can be presented in different ways, and users can see and hear content easily (Web Accessibility Initiative, 2012). The *operable* guidelines require that users can do everything from a keyboard, users can have enough time to read and use content, content does not cause seizures, and content is easy to find and navigate. The *understandable* guidelines require that web page developers make text readable and understandable, make content appear and operate in predictable ways, and help users avoid and correct mistakes. The *robust* principle requires that compatibility of the website is maximized with current and future user tools.

The Institute of Electrical and Electronics Engineers (IEEE) developed their own list of accessibility considerations and best practices for websites (IEEE, 2010). The IEEE defines web accessibility as “the ease with which people with disabilities can perceive, understand, navigate, interact with, and contribute to the Web” (IEEE, 2014, para. 5). Within their accessibility policy, IEEE strives to not only meet their standards and guidelines for web accessibility, but also to meet those of Section 508 and WCAG (IEEE, 2010). According to IEEE, the following accessibility considerations and best practices are to be considered when developing a website:

- Keyboard accessibility – All content should be accessible by the keyboard alone.
- Consistency – The layout, colour, and terminology should be consistent.
- Colour – Designs should be tested with colourblind simulators and contrast viewers.

- Tables – Tables should be used for data presentation, not for layouts, and should be properly tagged.
- Links – An option to skip navigation should be provided. Links should be properly tagged.
- Text Resizing – Text size should not be “hard-coded.”
- Audio – All audio/visual media should also be available as a text transcript.
- Images – All images should have descriptive embedded text that conveys the purpose of the image.
- Header tags – Proper header tags should be used to make navigation easier for users of assistive technologies.
- Element ordering – Content should be presented in a way that will allow screen readers to present content in a logical order.

There are many evaluative tools available today that use a variety of international standards or guidelines, such as the ones discussed above, which focus on improving accessibility of web pages. Several of these tools are described below, including information about the guidelines and/or standards used for evaluation.

As part of their Rational Policy Tester® Accessibility Edition, IMB offers software that helps ensure user accessibility on websites (IBM, 2014). The software helps web developers determine the level of compliance with government standards, including the U.S. Section 503 standards, and guidelines such as the WCAG guidelines, the UK’s Disability Discrimination Act, and other international standards. Originally, the accessibility test within the Policy Tester® application was available as a free online tool

under the name Watchfire WebXACT. WebXACT replaced Bobby, a well-known online tool that validated websites for accessibility. The original Bobby test is no longer available as a free service or as a standalone product (CAST, 2013).

Accessibility Valet® is an online tool that allows users to check web page accessibility against either Section 508 or W3C WCAG standards (Accessibility Valet, n.d.). This tool is available as a free service for checking a single web page, or available as a paid subscription for unlimited use.

AChecker® is an open source Web accessibility evaluation tool developed in part by the Government of Ontario's Enabling Change Program (ATutor, n.d.). It can review the accessibility of web pages based on a variety of international accessibility guidelines, including WCAG 1.0 and 2.0, Section 508, BITV 2, and the Stanca Act.

One of the few free tools that allow users to evaluate an entire website for accessibility is EvalAccess 2.0 (EvalAccess 2.0, n.d.). Developed by the University of the Basque Country in Spain, this tool tests accessibility of single URLs or complete websites for WCAG 1.0 compliance. The generated report describes each error detected, while also linking the error to the corresponding WCAG guideline.

The HiSoftware® CynthiaSays™ portal helps users identify accessibility errors in their web content related to either Section 508 standards or the WCAG guidelines (HiSoftware Incorporated, 2014). This tool was developed through a joint education and outreach project by HiSoftware®, ICDRI, and the Internet Society Disability and Special Needs Chapter. This free service is meant for non-commercial educational purposes, and provides reports that are clear and easy to understand.

Another free online tool is the Web Accessibility Evaluation tool (WAVE), originally launched in 2001 to evaluate the accessibility of websites and provide recommendations for repairing accessibility errors (WebAIM, 2004). This tool was developed by Web Accessibility in Mind (WebAIM), an organization working to provide others with the knowledge, skills, tools, leadership strategies, and vision to make their content accessible to people with disabilities. WAVE uses various guidelines and standards for web accessibility, including checks for compliance issues found in the Section 508 and WCAG 2.0 guidelines. Users have the option of selecting specific guidelines and standards to use for evaluation. This tool is also available as a toolbar for use with the Firefox browser.

In addition to websites hosting accessibility tools, many web browsers also offer accessibility tools as an add-on. Firefox currently offers a variety of add-ons, such as tool bars and extensions that measure the accessibility of websites. WAVE Toolbar, Accessibility Evaluation Toolbar, Fangs Screen Reader Emulator, Juicy Studio Accessibility Toolbar, and Web Developer Toolbar are just a few examples of add-ons available for this browser. Like Firefox, Chrome also offers a selection of extensions for evaluating the accessibility of websites. Some of these extensions include Web Developer Toolbar, Accessibility Developer Tools, and Color Contrast Analyzer (Stanford University, 2014). Internet Explorer offers the fewest number of add-ons for their browser, with the Web Accessibility Toolbar (The Paciello Group, 2014) being the only one located in the review of literature.

The literature on increasing accessibility generally falls into two approaches: utilization of assistive technology and universal instructional design. These approaches will be described and research related to both will be discussed below.

Assistive technology is defined as “any item, piece of equipment, software or product system that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities” (Assistive Technology Industry Association, 2012, para. 2). Assistive technology used in the online environment can include the following: computer hardware, such as keyboards and pointing devices; and computer software, such as screen-readers, text-to-speech software, and voice-recognition software. For students with MID, assistive technology, such as text-to-speech software, can be useful for those experiencing reading difficulties. The use of assistive technology is considered an accommodation in an IEP because it helps remove barriers to learning (Ministry of Education, 2004). Because assistive technology can be beneficial to students with MID, and this research study attempted to provide accommodations in the online learning environment, use of assistive technology was an accommodation that influenced the design of the online course used in this study.

Applications (apps) provided for mobile technology, such as iPads and Smart Phones, can serve as assistive technology to meet the support needs of children and adults with intellectual and related developmental disabilities (Douglas, Wojcik, & Thompson, 2012). The selected apps should allow children to communicate more effectively with others, use pictorial schedules, self-monitor behaviour, and create reminders. As one device can store numerous apps, this feature can simplify organization for individuals and make assistive technology more affordable. iPads are available at KiHS for all students,

and each device has a selection of features and applications, such as speech selection, Dragon<sup>®</sup> Dictation, and talking calculators, which can support students with certain forms of disability.

With careful planning and application of individual supports such as assistive technology, the mismatch experienced by people with intellectual disabilities, between their personal competency and environmental demands, can be reduced (Luckasson & Schalock, 2012). Teachers are encouraged to first look at whether the assistive technology reduces this mismatch. Suggestions for assistive technology to address deficiencies in intellectual abilities include the following: computer-assisted learning, such as interactive learning objects; portable repositories of information, such as a glossary linked to lessons; and aids to facilitate cognitive functioning, such as weekly tabs in Moodle to organize lessons. Voice-activated computer access, use of software such as Dragon Naturally Speaking<sup>™</sup> and interactional computer-based devices can assist adaptive behaviour. For students who have difficulties with social interaction, assistive technology, such as Skype<sup>™</sup> or Adobe<sup>®</sup> Connect<sup>™</sup> web conferencing, which facilitates online contact with others, can encourage involvement by offering a choice of options for participation.

Some barriers may exist for the use of assistive technology for those with disabilities. For example, a study by Bryant, Soonwha, and Ok (2012) identified and rated the use of assistive technology devices being used by individuals with intellectual and developmental disabilities in relation to support needs identified in the *Supports Intensity Scale (SIS)* (Thompson et al., 2004). A survey was used to collect responses from 158 service providers who identified use of assistive technology devices by their



clients with intellectual and developmental disabilities according to support activities in the seven SIS areas. The findings indicated that the majority of clients were not using assistive technology devices to support their needs in the SIS areas, despite the capability of assistive technology to assist in bridging the gap between the individual's competencies and the demands of a variety of educational and community contexts (Bryant, Soonwha, & Ok, 2012). The *SIS*, commissioned by the AAIDD, is used in assessing the support needs of adults in seven activity areas: Home Living, Community Living, Lifelong Learning, Employment, Health and Safety, Social, and Protection and Advocacy. Three of the most often-cited barriers for using assistive technology were lack of funding for devices, lack of training of service providers and assistive technology users, and poor person-technology match. Training in the choice and use of assistive technology is something that could be strengthened at KiHS, as some mentors have been resistant to assisting students in the use of assistive technology in the past. Even though training is not directly related to the design of the course in this study, the assistive technologies that mentors would be comfortable facilitating the use of were considered when developing resources.

Along with the use of assistive technology, the design of a course can remove the barriers to learning that students with disabilities may encounter. The term *universal design* originated in the 1970s and refers to a movement in architecture and product development, the purpose of which was to create places or things that were accessible to all people (Center for Applied Special Technology, 2012c). In educational settings, universal design is also referred to as *universal design for learning*, or *universal instructional design (UID)*. In this setting, universal design refers to “a set of principles

for curriculum development that gives all individuals equal opportunities to learn,” that “provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone--not a single, one-size-fits-all solution, but rather flexible approaches that can be customized and adjusted for individual needs” (Center for Applied Special Technology, 2012a, para. 1). The course design guideline of using well-organized and uncluttered web pages discussed earlier (Crow, 2006) is an example of universal design as it makes the pages accessible to all learners even those who are blind and use screen reader software (Elias, 2010), and is also an example of the instructional accommodation of providing simple, uncluttered formats which could be found on an IEP for a student with MID (Ontario Ministry of Education, 2004b).

UID benefits both the teacher and the student, and several of these benefits are discussed. When curriculum is designed from the outset to meet the needs of the greatest number of students, there is less need for adaptations to the learning environment (Pliner & Johnson, 2004) and it is less likely that changes, accommodations, or adaptations to the curriculum will be required (Centre for Applied Special Technology, 2012c). Students do not need to rely as heavily on support systems when instructional practices are inclusive of diverse learning styles and needs (Pliner & Johnson, 2004). Similar to assistive technology, UID can also address some of the support needs related to learning as identified in the *SIS* (Thompson et al., 2004), described earlier. In the study by Wehmeyer, Tassé, Davies, and Stock (2012) investigating the support needs of adults with intellectual disabilities, it was found that those students with MID had the highest support needs for “Lifelong Learning” and the lowest needs in “Home Living” using the *SIS*. Furthermore, of all of the disabilities reviewed in the study (e.g., mild intellectual

disability, moderate intellectual disability, severe/profound intellectual disability, intellectual disability and autism, intellectual disability and psychiatric disorder, and intellectual disability and physical impairment), participants with MID had the lowest level of support needs across all of the domains. The researchers felt that “by defining the disability as a function of the reciprocal interaction between the environment and the student’s functional limitations, the focus of the problem shifts from being a deficit within the student to the identification and design of supports to address the individual’s functioning within the context with an enhanced focus on adaptations, accommodations, and modifications to the context” (p. 11). It is here that technology is seen as a critical support tool to accommodate a student’s limitations and to reduce the gap between their capacity and the demands of the context. For instance, to address the support needs of individuals with MID in the Lifelong Learning domain, it is suggested that UID principles be applied to the design and development of curricular materials; for example, the design could be compatible with assistive technology. Technology, such as text-to-speech software, can then be utilized in the online learning environment to make instructional materials, particularly the text that is predominant in core academic areas, more usable by students with intellectual disabilities who may have difficulties with reading, memory, and/or attention. At KiHS, courses are mostly text-based and would benefit from a design that allows them to be easily accessible, with or without assistive technology, to students with MID.

Three principles of universal instructional design exist: providing multiple means of assessment; providing multiple means of action and expression; and providing multiple means of engagement (Center for Applied Special Technology, 2011). Each of

these three principles in turn has three guidelines. As these are directly applicable to the KiHS context, they will be discussed in detail below.

The first principle is to provide multiple means of representation (The Center for Applied Special Technology, 2011). Guidelines under this principle include providing options for perception. This involves providing the same information through different modalities, such as seeing or hearing, and providing information in a manner that is adjustable by the learner, such as text that can be enlarged or audio volume that can be amplified. Another guideline is to offer alternative representations for language, mathematical expressions, and symbols. Providing options for comprehension is the last guideline, and involves a design that can provide the scaffolding necessary for learners to transform the information into useable knowledge and apply it in their lives.

The second principle of universal design is to provide multiple means of action and expression (Center for Applied Special Technology, 2011). The first guideline that accompanies this principle is to provide options for physical action, such as the provision of curriculum materials with which all learners can interact. The last two guidelines are to provide options for expression and communication, and to provide options for executive function. Executive functions are the capabilities that “allow humans to overcome impulsive, short-term reactions to their environment and instead to set long-term goals, plan effective strategies for reaching those goals, monitor their progress, and modify strategies as needed” (p. 25). In universal design, this involves efforts to increase executive capacity in two ways: by scaffolding lower-level skills so that they require less executive processing; and by scaffolding higher-level executive skills so that they are more developed and effective.

Providing multiple means of engagement is the last principle of universal design and it is based on the fact that learners differ in the ways in which they can be engaged or motivated to learn (Center for Applied Special Technology, 2011). Under this principle is the guideline of providing options for maintaining attention and engaging learners' interest. Providing options for sustaining effort and persistence is another guideline. It involves designing the external environment to provide options that increase accessibility by supporting learners who differ in motivation and self-regulation skills. The last guideline is to provide options for self-regulation. The purpose of this guideline is to develop learners' intrinsic abilities to regulate their emotions and actions, which complements the previous two guidelines that support motivation and engagement through design features of the extrinsic environment.

UID principles, such as those described above, can be applied in the online learning environment (Center for Applied Special Technology, 2012d). The following UID principles were identified and tailored to distance education by Elias (2010): equitable use; flexible use; simple and intuitive course design interface; perceptible information; tolerance for user error; technical and physical effort; learning and community support; and instructional climate.

- *Equitable use* in the online environment means that the design is useful and accessible for students with diverse abilities and in diverse locations. This also includes providing the same means of use for all students or in an equivalent form when identical use is not possible.

- *Flexible use* describes how the learning design provides learners with choice in methods of use to accommodate schedules, levels of connectivity, individual abilities, and preferences.
- *Simple and intuitive use* suggests that the course interface design should be easy to understand, regardless of the student's skills, experience, or knowledge and that unnecessary complexity should be removed from the design.
- *Perceptible information* refers to the ability of the design to communicate necessary information effectively to the user, regardless of the user's sensory abilities or the ambient conditions.
- The principle of *low physical and technical effort* describes an online environment that can be used efficiently comfortably by the student, with minimal physical and mental fatigue.
- A learning environment that promotes interaction and communication among students and teachers is encouraged under the principle of *community of learners and support*.
- The last principle of *instructional climate* suggests that the online environment be welcoming and inclusive of all students.

These UID principles, along with three core principles discussed earlier, were consulted in revising the online course. The use of universal design in the Moodle LMS used at KiHS, and the one used for this study, is described below.

UID principles can be effectively applied in the Moodle platform to enhance accessibility of online courses. In a study by Elias (2010), the Moodle LMS (version

1.92), along with the accompanying modules and themes, was shown to meet 79% of the UID criteria, although the sample course in Elias' study met only 26% of the criteria.

The implication of these findings is that the default platforms made available to teachers, including those in this research study, must have the modules beyond the standard Moodle features installed, if they are to enhance accessibility for users. For example, although KiHS used a newer version of Moodle (version 2.5), some plug-ins that can enhance accessibility, such as PoodLL, require installation into the default platform. PoodLL is a set of plug-ins that adds audio and video recording functionality to Moodle, as well as allows students to draw pictures or take webcam pictures for assignment submissions (Moodle, 2014).

Numerous recommendations emerging from the review of literature on UID were valuable in the design of the revised course. To start, it was suggested that the interface be kept simple and that unnecessary complexity be avoided (Elias, 2010). The interface should be easy for users to navigate and understand, regardless of their experience, knowledge, and skills. The link to support services should be consistently placed on all pages. Furthermore, course content should be presented in multiple formats and learners should be offered alternative methods of assessment. Graphic representation of concepts, such as the use of diagrams or mind maps, can increase content accessibility. Mind maps are available as a module in Moodle. Alternatively, external concept mapping software, is also available and the resulting graphic can then be integrated into the Moodle LMS. Text-to-speech software, such as Kurzweil 3000™ or ReadAloud, screen and font preferences, captions, and screen/cursor magnifiers can allow perceptual information to be more easily accessed by learners with expressive or receptive language needs. By

shifting the focus from mechanics of writing to communicating ideas in a fluid manner (Weber & Bennett, 2004), these text-to-speech software programs may also help students with MID, as written language is typically below age norms for these individuals.

Courses can be offered in a text-only option to make using these programs easier.

Similarly, word prediction software can be valuable for students with spelling difficulties, because it predicts words based on frequency and context (Special Needs Opportunity Window, 2011b). Many of the features of these technologies can be found directly in Moodle modules and themes, eliminating the need for incorporating external technology and at the same time, simplifying the experience for the learner.

In addition to meeting organizational and language-related learning needs, there are recommendations for strategies to meet the sensory or perceptual needs of individuals with disabilities. For example, within Moodle, screen preferences and font size can be changed, and captions and text-to-speech options are also available within the LMS (Elias, 2010). Physical effort can be reduced by limiting the use of external links and by providing students with voice recognition and word prediction software (Elias, 2010, Special Needs Opportunity Window, 2011a, 2011b). Voice recognition software allows students to dictate text into the computer or to give basic commands, such as opening a program or saving a file to the computer (Special Needs Opportunity Window, 2011a). Because students with MID may have difficulty with fine motor skills (More & Oldridge, 1999), using voice input rather than the keyboard or using word prediction software can lessen physical effort because the number of keystrokes required for inputting text is diminished (Ontario Ministry of Education, 2005a; Special Needs Opportunity Window, 2011b).



Lastly, students with disabilities can benefit from having supports readily available to them (Elias, 2010). For example, accessibility to the instructor by students is viewed as an essential part of course accessibility (Elias, 2010). It is suggested that clear expectations about feedback and communication for instructors and students should be set out prior to the course start.

Some researchers, such as Rowland (2004) and Brown (2010), have provided recommendations to address the particular needs of those with cognitive disabilities, rather than the general needs of the disability as a whole, or UID principles to meet the needs of all learners. Although the students in the subgroups included within the cognitive disabilities category may have similar challenges, such as difficulties relating to attention, memory, perception, information processing, and problem-solving, not all students with MID will experience problems with each of these areas (Rowland, 2004).

To address the needs of students with attention difficulties, it is recommended that course design limits the use of distractions, such as scrolling or blinking items or pop-ups (Rowland, 2004, Brown, 2010). Such distractions draw attention to that area of the screen and make it difficult for students to focus on other content (Hudson, Weakley, & Firminger, 2005; Mariger, 2006).

Design considerations to benefit individuals with memory-related difficulties include that course designers make use of “breadcrumbs,” a navigational aid that displays all visited pages leading to the currently viewed page (Rowland, 2004). In addition, consistent use of text style, such as the text that denotes hyperlinks, may be useful for those with memory deficits. Lastly, navigation that is consistent across the site and

between courses may help increase the likelihood that information will be moved into functional memory.

For individuals who struggle with receptive language and processing, numerous design strategies are available. Guidelines include using the clearest and simplest language appropriate for the content, pairing graphics with text, allowing fonts to be enlarged, providing text contrast, and adding white space to the page (Rowland, 2004). Long passages of text should be broken down into smaller sections and organized with appropriate headings, with the main points of the topic appearing first, followed by the less important information (Brown, 2010). Graphics can be used to help promote comprehension by connecting the image with text. Because not all websites are purposely designed for those with disabilities, it is recommended that teachers limit the number of websites to visit and, if using external websites, select those at an appropriate reading level.

Students with MID may not only experience difficulties in receptive language, but also with expressive language (Brown, 2010; Weber & Bennett, 2004). Given that threaded discussions require the use of both receptive and expressive language skills, they should be avoided when designing a course (Brown, 2010). One of the most pronounced deficiencies in language is in written skills (Weber & Bennett, 2004). Therefore, teachers are encouraged to offer alternatives to written expression, such as audio or video recordings (Brown, 2010). In addition, students with intellectual disabilities often struggle with demonstrating what they have learned. Offering multiple means of assessment is therefore advised for these students (Brown, 2010).

Lastly, because people with intellectual disabilities may have difficulties solving problems as they arise, it is recommended that web page designers check for valid links on a regular basis, make sure forms work properly, and provide a mechanism to answer questions or provide support to the user if needed.

Overall, the majority of the strategies and guidelines for course design discussed above are applicable to the learning environment and student group that is the focus of this study. Even if students do not experience difficulties in the specific areas described, they can still benefit from design principles that simplify layout and language, allow for easy navigation, and provide user support. In turn, this research study may assist in filling the gaps in research in the area of online course design for individuals with intellectual disabilities.

### **Secondary Review of Literature**

In the initial review of literature, an investigation into mathematics instruction for students with MID was not undertaken because, at the time, it was not known which course would be revised in the intervention. After the Grade 9 Math course was selected, a secondary review of the literature was performed in order to obtain design considerations for the specific subject area. Little research was found in this search for strategies for working with students with MID in math. However, those suggestions found were all valuable and provided additional considerations for the course design. Some of the research used to inform the mathematics course design in this study is highlighted below.

In a review of literature on mathematics for students with intellectual disabilities, Butler, Miller, Lee, and Pierce (2001) found that the focus of mathematics interventions

for elementary school students with mild-to-moderate intellectual disability had shifted from basic skills instruction to computation and problem-solving instruction. Students benefited from interventions emphasizing frequent feedback, explicit instruction, and ample drill-and-practice. The researchers also found that strategy instruction, where students were taught the techniques to learn new skills (National Dissemination Centre for Students with Disabilities, 2010), promoted student independence in addition to increasing mathematics performance. Although the students in their research were at the elementary school level, the suggestions for instructional strategies could potentially be applied to the secondary school level, and therefore to this research study, because students with MID across all ages often struggle with computation and problem-solving (Ontario Ministry of Education, 2002; Weber & Bennett, 2004).

To develop mathematics skills for students with MID at all grade levels, teachers are advised to use real-life situations for learning and practicing skills; concrete materials, manipulatives, charts, and visuals as aids, drill-and-practice software; and pictorial cues (Ontario Ministry of Education, 2002). Other practices that can be useful for students are using sample sheets that illustrate problem types or explain difficult words, using colour-coded numbers in place-value tasks, and highlighting key words. With careful planning, all of the recommendations mentioned above for math instruction were able to be incorporated into the revised online course used in the dissertation research study.

### **Summary**

As no literature was found that specifically addressed Aboriginal students with mild intellectual disabilities in online secondary schools, each of these aspects was explored independently in the literature review. Research revealed that the educational

achievement of Canadian Aboriginal students was lower than that of other Canadian students and that the primary solutions for bridging this gap included appropriate instructional methods and a culturally-relevant curriculum. The course used in this study was built upon this research on Aboriginal learners, and also took into consideration the literature on students with MID, as well as the recommendations for accessibility and design principles emerging from the review of resources addressing students with disabilities in online learning environments.

The remainder of the dissertation will outline the study and its findings, and discuss the results. Chapter IV will describe the methodology of the study, including the data collection procedures, research design, data analysis, procedure of the study, ethical considerations, and limitations and delimitations.

## Chapter IV: Methodology

The purpose of this study was to determine how to improve the design of online courses at KiHS to better meet the needs of students with mild intellectual disability or students not formally identified, but with similar needs. Previously, teachers at KiHS felt that the needs of students with MID were not being fully met in the online environment. For example, students were not provided with instructional and/or assessment accommodations within their online courses. All students were presented with the same course materials and activities, and it was necessary for a mentor or instructor to supply any needed accommodations. Research on how to meet the needs of Aboriginal students with MID through appropriate online course design was important for staff satisfaction with these courses.

The following research question was developed to address the problem: What elements of an online course specifically designed to meet the needs of high school students with mild intellectual disability, effectively met the needs of these students, as perceived by the teachers of the students completing this course? Several steps were undertaken in the research process to identify the design elements, including research to identify elements of design that could potentially meet the needs of students with MID at KiHS, revising an online course to incorporate these design elements, and evaluating the perceived success of the design elements used in the revised course in meeting the needs of students with MID enrolled in the course. A detailed description of these steps, along with the overall research design, is provided below.

### **Research Design**

The location of this study was in the Northwestern region of Ontario. The school in this study was KiHS, an accredited online secondary school with situated learning centres in 13 First Nation communities. The participants were teachers at KiHS, and included classroom mentors and online instructors. The students enrolled in the revised course were individuals identified as having MID, or similar needs, and were students attending one of the 13 learning centres.

The methodology used in the study was action research. Action research is defined as “the study of a social situation carried out by those involved in that situation in order to improve both their practice and the quality of their understanding” (Winter & Munn-Giddings, 2001, p. 8). As the study was seeking improvement in course design in an individual school, this method was considered appropriate because action research is a useful approach for change and improvement at the local level (Cohen, Manion, & Morrison, 2007). While a consensus-building methodology, such as the Nominal Group Technique (NGT) or Delphi method, would be an effective way to generate ideas for course design and allow individuals to participate equally, it was not selected for this study because of the time commitment required of participants, and because participants may not be guaranteed anonymity (for example, when using NGT) (Karapiperis & Apostolou, 2006).

Action research has a large scope; it can be used in almost any setting where a solution is sought, and can be undertaken by individuals or groups of people (Cunningham, 2008; Cohen, Manion, & Morrison, 2007). In educational settings, action research can be used in a variety of areas, such as teaching methods, learning strategies,

professional development, and administrative procedures. It can be undertaken by a range of individuals such as teachers, researchers, students, administrators, and school board representatives (Alberta Teachers' Association, 2000; Cohen, Manion, & Morrison, 2007; McNiff & Whitehead, 2006).

Action research is seen as collaborative (Winter & Munn-Giddings, 2001; Cohen Manion, & Morrison, 2007), which is important because the researcher in this study was taking into consideration the opinions of multiple colleagues in order to determine which design elements would be beneficial in online courses to meet the needs of students with MID. These colleagues were also involved as instructors or mentors in the implementation of the revised course that incorporated these design elements. Their opinion on the success of the revised course in meeting these needs was also used to evaluate the outcome.

Because of the collaborative nature of the study, the methodology used could also be considered participatory action research (PAR), a subset of action research (MacDonald, 2012). In PAR, the role of the researcher is a facilitator, guide, formulator, and summarizer of knowledge (Cohen, Manion, & Morrison, 2007). In collaboration with the researcher, it is the community group (for this study, the collective staff at KiHS), which determines what the existing issues are, and which ones they want to change (Maguire, 1987).

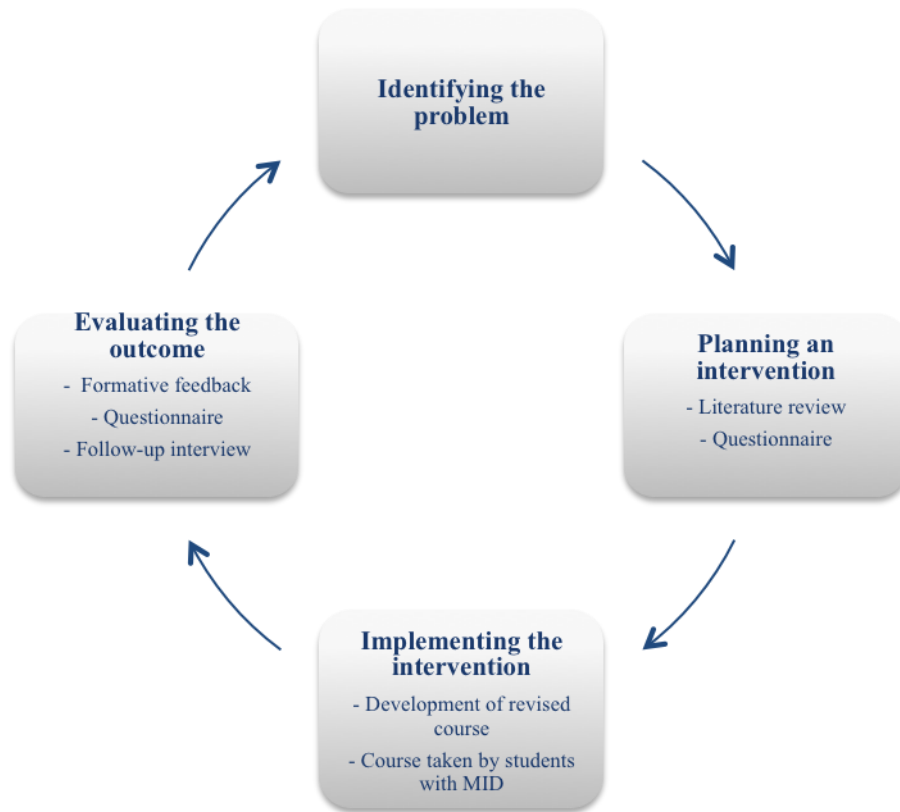
Lastly, action research is open-minded about what it counts as evidence (Winter & Munn-Giddings, 2001). In the study reported in this dissertation, teachers' professional opinions were collected and analyzed, then used as a guide for revising the course, and later used as primary data for evaluating the revised course. In PAR, focus



groups, participant observation, field notes, interviews, questionnaires, informal discussions, and personal logs are effective methods for collecting data (Baum, MacDougall, & Smith, 2006; McTaggart, 1991). The techniques used to collect evidence in this study were informal discussions, questionnaires, interviews, research notes, and personal log.

The four stages in action research are identifying the problem, planning an intervention, implementing the intervention, and evaluating the outcome (Cohen, Manion, & Morrison, 2007) (Figure 1). Action research does not necessarily end after one sequence of these stages (Cunningham, 2008). Rather, action research is a cycle where the researcher(s) may go back and make modifications to the intervention based on the evaluation of the outcome. In the study, formative evaluation occurred while the revised course, the intervention, was being delivered. Modifications were made to the design based on this feedback from teachers. A summative evaluation was undertaken through the use of a second questionnaire and follow-up interview after the course was delivered. If the study had determined that the course required further modification after the summative evaluation, another cycle of action research would have been undertaken again at a later time.

These stages and their implementation in the dissertation research study are discussed in detail below.



*Figure 3.* Stages of action research in this research study. Diagram created from *Research Methods in Education* (p. 312), by L. Cohen, L. Manion, and K. Morrison, 2007, New York, NY: Routledge. Copyright 2015 by Angela Batsford-Mermans.

### **Identifying the Problem**

The first step in the research process was to identify the problem. The problem had already been identified by staff members at KiHS prior to the beginning of the study: namely, that those students with MID were not being provided with courses that met their academic needs. Research on how to meet the needs of students with MID through appropriate online course design was seen as an important endeavor for increasing staff satisfaction with courses offered at KiHS. The research question that developed from this problem was: What elements of an online course specifically designed to meet the needs

of high school students with mild intellectual disability, effectively met the needs of these students, as perceived by the teachers of the students completing this course?

### **Planning the Intervention**

After the problem was identified, the next step was to plan how to address it. As presented in Chapters II and III, a review of literature was used to provide a framework for the study in the areas of Aboriginal education in Canada, online learning for students with exceptionalities, and mathematics instruction for students with MID. This information assisted in the creation of a set of course design principles, which were adopted in the revision of the online course to make it more suitable for Aboriginal students with MID. It was necessary to make these revisions at the course design level because of the differences in editing access between mentors and instructors. In addition, the review of literature was used to demonstrate the validity of the preliminary questionnaire (Whittemore, Chase, & Mandle, 2001). The preliminary questionnaire, which collected data on the participants and suggestions for course design, is discussed below.

**Instrumentation.** A structured questionnaire, developed and administered by the researcher, was used to collect both quantitative and qualitative data for this stage of the action research cycle. The questionnaire was distributed to mentors and instructors that were employed by KiHS at the beginning of the 2012/2013 school year.

The questionnaire was developed using the course design model from Ellis, Light, and Pryde (1999), as well as the “Stop, Start, Continue” format used in staff meetings at KiHS for school improvement. In addition, a set of design considerations for

questionnaires from Cohen, Manion, and Morrison (2007) was consulted when planning the questionnaire. The questionnaire contained 11 questions.

The quantitative portion of the questionnaire (Appendix A) elicited information about the participant, such as teaching experience and experience working with students with an intellectual disability in order to understand the experience and background knowledge of the teacher providing suggestions for course improvement. This section of the survey produced requested numeric responses for the number of years of teaching experience in several different areas, such as instructing online, working at KiHS, working with students with special needs, and working with students with MID. In total, five questions collected this quantitative data.

The qualitative portion of the questionnaire had two questions requesting additional background information about respondents and four questions addressing course design at KiHS. Two open-ended questions were used to gather additional background knowledge of the experience of participants. Specifically, these questions asked participants to describe their teaching experience and qualifications in the areas of course design and special education. Four open-ended questions were provided on course design. Three questions sought suggestions from participants for accommodating students with MID in the online learning environment, specifically with regard to the design of the online courses presented using the Moodle LMS. The last question addressing course design asked participants to select the KiHS course that, in their opinion, most required changes in the course design to better accommodate students with MID (See Appendix A for the questionnaire and Appendix H for a table of the responses).

Participants were asked to give their suggestions regarding course design based on the five components of design developed by Ellis, Light, and Pryde (1999), as discussed in Chapter III. In this model, course design included five interrelated components of course design (i.e., goals, content, context, methods, and assessment) that were used to help instructors develop a course and complete ongoing revisions as necessary (Ellis, 2008). For instance, if an instructor chose to respond to course evaluations by changing a component of a course, he/she would be able to use this model to determine how the change affected other areas of the course design.

The course design part of the questionnaire followed the “Stop, Continue, and Start” format used at staff meetings and professional development sessions at KiHS. The Stop-Start-Continue activity is used for a variety of purposes related to evaluation, including organizational improvement (Steinbrecher, 2009). The activity fosters communication between teams or individuals to develop a balanced perspective of areas of strength, weakness, and opportunity (Mills Consulting Group, 2005). In a group discussion, such as a professional development session, the group brainstorms suggestions for improvement and organizes the recommendations under the appropriate heading of “Stop,” “Start,” or “Continue.” At KiHS, it functions as a method to facilitate discussion about school improvement and also as a way to organize and record recommendations.

The design considerations for questionnaires from Cohen, Manion, and Morrison (2007) that were adhered to when planning the questionnaire included the following: keep response categories simple; be simple, clear, and brief; ask only one thing at a time in a question; use single sentences per item wherever possible; ensure that the data

acquired will answer the research question; avoid leading questions; avoid threatening questions; decide on the most appropriate type of question for the response required; avoid making the questions too hard; ensure respondents know how to enter a reply to each question; and avoid, where possible, splitting an item over more than one page.

Together, the review of literature and the responses from the preliminary questionnaire, provided the information required to plan the intervention (e.g., to revise the course) before it was then implemented in the next stage, which will be discussed in detail in the following section.

### **Implementing the Intervention**

The qualitative data gathered from the preliminary questionnaire together with the findings of the literature review were used to develop a set of course design elements that were suited to meet the needs of students with MID at KiHS. This information, along with the resources from the original course, was used by the researcher to revise the course. In Chapter VI, detailed descriptions of the changes made, including examples, are provided. After development, the course was uploaded to the platform at KiHS, and students with MID who had signed up for the course were enrolled for a regular term of eight weeks. These students were selected based on their identification of MID in their IEP, or, for those without a formal medical assessment, they were identified using the collective academic records, medical reports, and professional assessments found in a student's Ontario Student Record. No additional briefing was necessary for the teachers who participated in the study, as the revised course was used in the same manner as other courses at KiHS. During delivery of the course, teachers were encouraged to provide feedback and suggestions about the course design and this information was used by the

researcher to continually revise the Locally Developed Grade 9 Math (MAT1L) course. This stage was important in testing the intervention developed to address the research question. The perceptions of success of the intervention were assessed in the next and final stage.

### **Evaluating the Outcome**

The last stage of the study, the evaluation of the revised course, used a mix of quantitative and qualitative approaches. This stage will be discussed in further detail in Chapter VII.

To begin evaluating the intervention, formative evaluation occurred throughout delivery of MAT1L. Feedback from the course instructor and mentors working with students in the course was used to continually revise the intervention. When deemed necessary by teachers, feedback occurred through email or phone communication to the researcher.

For the final evaluation of the course, a second questionnaire was distributed to participants after delivery of the revised course. These participants were teachers at KiHS, which included the course instructors and mentors (on-site tutors). Only those teachers who had worked directly with students with MID in the revised course completed the questionnaire. The second questionnaire incorporated the set of design considerations developed from the preliminary questionnaire and literature review. This second questionnaire (Appendix B) collected opinions of the teachers on the success of the revised course in meeting the needs of students with MID or similar needs. A four-point Likert-type scale was employed in this questionnaire to cover the following five

areas of course design that were previously used in the preliminary questionnaire: goals, content, context, teaching methods, and assessment (Ellis, Light, & Pryde, 1999).

The purpose of the survey questions in this stage of the action research cycle was to determine to what extent teachers perceived that the revised course met the needs of Aboriginal students with MID or those with similar needs at KiHS. The goal was to determine not only if teachers felt that the overall course met the needs of these students, but also to determine any strengths or weaknesses in the different components of course design. A final open-ended question was used to elicit suggestions about improvements that could be made to the course in order to better meet the needs of these students.

Perceptions of the success of the course in meeting needs of students with MID were also assessed through post-intervention follow-up interviews with course instructors and mentors. These interviewees were those instructors and mentors who had agreed in the second questionnaire to a follow-up interview. The interviews were semi-structured and elicited participants' opinions on the success of the intervention. The use of a semi-structured interview provided a clear structure, sequence, and focus to the inquiry, while allowing the flexibility for the respondents to elaborate on any questions or areas as needed and permitted the interviewer to clarify and explore responses (Cohen, Manion, & Morrison, 2007). This semi-structured format also allowed for the co-construction of knowledge, which is also characteristic of participatory action research (McIntyre, 2008). A set of pre-determined questions with fixed sequencing was used in this interview. The interview questions can be found in Appendix C. Questions were opened-ended to allow for the interviewees to answer in as much detail as they wished (Cohen, Manion, & Morrison, 2007).



In these interviews, participants were asked about course teaching experience, opinions on the success of the revised course, and suggestions for future changes. Information about experience teaching the course was collected in order to understand the background knowledge and experience that the participants had when providing their opinion on the success of the course design and when giving suggestions for future changes. Opinions on whether the design of the course meet the needs of students with MID were elicited in order to determine to what extent the intervention was perceived as successful. Information about what worked and what did not work in the course design, as well as suggestions for future changes, could then be used to further revise the course and to revise other courses for these students.

### **Participants**

For the first stage in this study, 16 participants were selected using purposive sampling. The preliminary questionnaire, which was used for planning the intervention, was sent out to all KiHS staff members who met the following criteria: they were employed at KiHS as a classroom mentor or online instructor at the time of the study; and they were working or had worked directly with a student with a disability.

The second questionnaire, which was used for evaluating the intervention, was only distributed to the participants who had worked with students with MID or similar needs in the revised course. This group consisted of seven mentors and instructors. Of the respondents completing the second questionnaire, three volunteered to take part in a follow-up interview, and two completed the interview.

The researcher, who was the special education teacher at KiHS, was on leave for the period of data collection in the study. This role was replaced by another teacher with

special education qualifications, who also assumed the instructional duties of the researcher. The interim special education teacher was a participant in the study.

Nine students were enrolled in the revised MAT1L course based on their identification as having MID, and not having previously acquired the math credit. Five of these students had been formally identified as having MID using the collective academic records, medical reports, and professional assessments found in their Ontario Student Record. Some of the tests used to identify students with MID were the Wechsler Individual Achievement Test – Second Edition (WIAT-2), Wechsler Intelligence Scale for Children® – Fourth Edition (WISC-IV), Woodcock Johnson Revised Test of Cognitive Ability (WJR), and the Vineland Adaptive Behavior Scale (VABS). These formal diagnoses were made prior to students attending KiHS. The other four students had been informally assessed by the special education team at KiHS as having needs similar to those with MID. Informal diagnoses were made based on discussions and information sharing by key persons, observations, student work products, academic testing, and medical records. Each of these students had an IEP at the time of the study, which included records of their medical, educational, psychological, occupational, physical therapy, behavioural, and speed/language assessments, as well as a list of accommodations. Areas of strength that students possessed included: initiative, task completion, reading (decoding) skills, spelling skills, gross motor skills, visual skills, and kinesthetic/tactile skills. Students were also described as cooperative, friendly, and outgoing. Areas of weaknesses displayed by students were mathematical skills, social skills (making meaning for social situations), adaptive skills, self-advocacy, receptive

skills (comprehension), expressive skills (written), memory skills, problem-solving skills, and self-regulatory skills.

Students who were working in the MAT1L course attended the learning centres in their communities. Each of these communities had a mentor available in the learning centre to assist students with their online assignments. All of the mentors working with students in MAT1L were participants in the study. The course instructor, another study participant, was also available online or by telephone to assist students.

### **Data Collection**

Data was collected in two phases: before the course revision (e.g., planning the intervention) and after the course was implemented (e.g., evaluating the outcome).

During these two stages, the following data collection techniques were used:

- 1) planning an intervention: structured questionnaire, review of literature
- 2) evaluating the outcome: structured questionnaire, semi-structured interviews

#### **Data Collection Phase 1**

Information about online course design considerations for students with MID was gathered during the planning phase of the intervention. This was informed through suggestions from staff members working with these students and through a review of literature. An online questionnaire was used to collect the suggestions from staff members as well as to gather opinions about which course at KiHS was most in need of revision. A link to this questionnaire was distributed via email for two reasons. Firstly, staff members at KiHS work in an online environment, so email is the most commonly used form of communication. Secondly, because the majority of the communities in this research study were situated in remote areas of Northern Ontario, email was the most

timely and reliable method of correspondence. The questionnaire was developed using FluidSurveys™, an online survey tool that allows users to create surveys and collect data from respondents. A link to the online questionnaire was then provided in the email to staff participants.

Other suggestions for course design came from a review of literature. Sources consulted for this review included online refereed journals, websites, books, reports, newspapers, and printed and online publications, as discussed in detail in Chapters 2 and 3.

### **Data Collection Phase 2**

The second phase of data collection occurred after the initial course had been revised and implemented, that is, at the stage of evaluating the intervention. The data evaluating the success of the intervention in meeting the needs of students with MID as perceived by participants were collected after the course had completed its eight-week term. A questionnaire was again used to gather the information and was also distributed via email. Similar to the preliminary questionnaire, it was developed using FluidSurveys™, and a link to the URL was provided in the email to staff who had provided consent to participate in the research study. The perceptions of success were assessed based on opinions of seven staff members who had worked directly with students with MID or those with similar needs in the revised course. Additional information was gathered through face-to-face interviews with two staff members after implementation of the course. The interviews were recorded and transcribed to prepare for analysis. Member checking was also undertaken after transcription of each interview to ensure accuracy of transcribed words and intent. Interviewees were sent copies of the

transcribed interviews along with a summary of their responses for each question.

Neither interviewee responded with corrections.

### **Data Analysis**

The textual and numeric data collected prior to the intervention included information from the review of literature and the results from the preliminary questionnaire administered during the stage of planning the intervention. The textual data retrieved from the literature review and course design suggestions from the questionnaire were to create a set of course design elements used to revise the MATIL course. The textual data were reduced through coding to prepare for analysis. The quantitative and qualitative data from the background questions of the questionnaire were used to describe the education and experience of the respondents.

The coding and analysis of the qualitative data from the literature review, preliminary questionnaire, and secondary questionnaire (to be discussed later) were done electronically through the use of NVivo,<sup>TM</sup> a qualitative data analysis software package produced by QSR International that supports qualitative and mixed methods research (QSR International, 2014). It allows researchers to collect, organize, search, and retrieve, and analyze data from surveys, interviews, focus group discussions, literature reviews, audiovisual presentations, social media, and web pages. NVivo<sup>TM</sup> also supports the exchange of information with other applications, such as Microsoft Word, Microsoft Excel, EndNote, RefWorks, Survey Monkey, and IBM SPSS Statistics (QSR International, 2014).

NVivo<sup>TM</sup> was used to store and organize the raw data from the research study. This included importing the following:

- resources retrieved from the literature review, such as journal articles and documents from the Ontario Ministry of Education;
- data from both questionnaires;
- digitally-recorded audio from the interviews; and
- transcribed data from the interviews.

In order to prepare for analysis, NVivo™ assisted in data reduction, a process that occurred continually throughout the data collection stages.

Throughout the process of reviewing the literature, detailed coding, making nodes as needed (QSR International, 2014), was utilized in analysis of the textual data resulting from the collection of design considerations for Aboriginal students with MID in an online environment. As the literature was reviewed, recurrent themes were identified, appropriate codes were then defined, and text passages were assigned to these codes. The units of analysis when reviewing and coded the data were the educational recommendations for working with Aboriginal students and/or individuals with MID that related to the design of courses. As suggestions occurred in the literature, the text was highlighted and given a code to reflect the theme of the recommendation. The seven original parent codes originating from the topics discussed in the literature were *Aboriginal education needs, MID education needs, instructional strategies, content considerations, accessibility, universal design, and evaluation*. These codes were later reduced to four codes, *general considerations for population, content, instructional strategies, and evaluation*, in order to combine suggestions with common characteristics. The codes corresponded to the components found in course design model used by Ellis, Light, and Pryde (1999), where questions regarding content, context, teaching strategies,

and assessment were used to assist in planning a course and meet the overall learning outcomes, or *goals*, of the course. Therefore, these codes were renamed to *content*, *context*, *teaching strategies*, and *assessment* to align with the model. These codes were also used in the planning of the questionnaires, in order to facilitate organization of course design suggestions. Data were further reduced again by detailed coding, and similar suggestions were grouped together as nodes under the appropriate parent code.

In the preliminary questionnaire used for planning the intervention, the numeric and textual data resulting from the background questions were used as classifications within NVivo™. The classification function allows researchers to add background information about sources (Jørgensen & Jensen, 2011). In this study, the data from these questions allowed the researcher to extrapolate information about the teachers' experience in the areas explored in the study in order to determine the credibility of their suggested design features.

To begin this process, the predefined *person* classification was selected. Each survey respondent was given an identification number, which was used to identify respondents under the node classifications. The numeric data from the background questions were represented as attributes in NVivo™. For instance, the survey question “How many years have you worked at KiHS?” was assigned the attribute “years at KiHS.” Seeing that there were six background questions, each classification (respondent) had six possible attributes. Next, topic coding, that is, the process of assigning references within the data to the categories they related to (QSR International, 2014), was used to organize the textual data retrieved from the questions about course design into nodes. The categories of “Stop,” “Start,” and “Continue” were used as the predefined parent

codes in order to align with the Stop/Start/Continue theme used in the questionnaire. The last question of the survey, asking respondents about which course they felt would benefit most from a revision, was given the parent code “Course to be Revised.” The data within each of these codes were further organized into multiple “child” nodes, or sub-nodes, which, similar to the parent codes, were predefined prior to coding. The child nodes consisted of the five areas of course design that were being addressed in the questionnaire: goals, context, content, teaching methods, and assessment (Ellis, Light, & Pryde, 1999).

Finally, detailed coding was used to analyse the qualitative data, and nodes were created under the areas of course design being discussed. Similar data were added to previously coded content; data unrelated to course design were not coded.

For the second questionnaire, two different methods of analysis were utilized. To begin, the ordinal data from the Likert-type scale, used for the first nine questions of the questionnaire, were entered into Microsoft Excel for analysis. Due to the fact that the last question was open-ended and participants were able to give suggestions regarding areas of improvement in course design, no predetermined nodes were used. Instead, detailed coding was utilized, and nodes were created as needed and organized based on their similarities.

The background information from the second questionnaire was analyzed in a similar manner as the first questionnaire. The participants were organized under node classifications, and their previous experience teaching the MAT1L course was recorded as an attribute.



The recorded data from the interviews were imported into NVivo™. The interviews were then transcribed, summarized, and sent to interviewees for member-checking. During this process, the interviewees were asked if the transcription was accurate, and if the summary effectively captured what they wanted to say. Once the member-checking process was complete, the data were coded using predetermined themes similar to those found in the first questionnaire. Specifically, the parent nodes “Stop,” “Start,” and “Continue” were used, as well as the child nodes of “Goals,” “Context,” “Content,” “Teaching Methods,” and “Assessment.” Sub-nodes were used to organize the suggestions concerning the five components of design being evaluated in the interview. For instance, the sub-node of “less clutter” was organized under the node of “teaching methods.”

Ultimately, the interpretation of the data was from the researcher’s perspective, which was supported by the coding and analysis executed in NVivo™, as well as through peer examination, a strategy recommended by Krefting (1991) to increase the credibility and dependability of qualitative work. Peer examination involves the researcher discussing the research process and findings with an impartial colleague (Krefting, 1991; Merriam, 2009), and may contribute to a deeper, more reflexive analysis of the data (Lincoln & Guba, 1985). In this study, the vice-principal at KiHS participated in the process as he/she was knowledgeable about the research study, but did not participate in the questionnaires or interviews. Prior to the study, the peer examiner was provided with a copy of the research plan and asked to review it. In addition, the peer examiner was provided with the interpretations resulting from the study, and was asked to assess whether the findings were plausible based on the data. Correspondence in this instance

occurred on two separate occasions: the first to provide the data, and the second to discuss the peer reviewer's assessment of the research process and findings.

### **Procedure of the Study**

The study took place from January 9, 2012 to April 30, 2013 (Table 3). The first set of questionnaires was sent out to staff members by email in early September 2012. Online questionnaires were used and the link to these was distributed through email. Follow-up reminders for non-respondents were delivered through email by the school receptionist in attempts to increase the response rate. A total of three follow-up letters were sent out, as recommended by the Office of Population Censuses and Survey (Cohen, Manion, & Morrison, 2007). Cohen, Manion, and Morrison (2007) suggest that the first follow-up letter be sent approximately three weeks after the initial questionnaire is distributed, and subsequent reminders a week after that. This schedule was followed in the study. Therefore, the survey was distributed in week one of term one (September 4, 2012), and follow-up reminders were sent in weeks four (September 24, 2012), five (October 1, 2012), and six (October 8, 2012).

It was anticipated that the questionnaires would be returned by the end of term one and that the participation rate would be high because of the small staff size and typical patterns of behaviour. For example, in an earlier survey of special education qualifications held by staff, all surveys were returned within one week. A similarly prompt and high rate of participation was realized for this study, with a response rate of 87.5% for the first questionnaire after all of the reminders had been sent, and 100% for the second questionnaire. Analysis of the survey data occurred from October 15 to 28, 2012.

Meanwhile, organization of the information retrieved from the review of literature took place during this time and extended for the remainder of term one (September 4, 2012 to October 26, 2012). The product of both the questionnaire and the literature review was a set of design principles to be used to revise the online course in order to be better suited for students with MID.

Term two (October 29, 2012 – December 22, 2012) was used to develop the course. It was reviewed by one of the vice-principals (not the peer reviewer) before it was put online for term three, like any other KiHS course. This review was to ensure that the course met the standards that KiHS had previously developed. For example, links were tested to ensure they were working and opened up in a new tab, spelling and grammar were reviewed, and the schedule was examined to determine that the correct number of lessons was present for each week. The content was not evaluated as part of this review as it is assumed that teachers are knowledgeable in their subject areas.

The revised course, which incorporated the recommended design elements arising from the preliminary questionnaire responses and the literature review, was taught in term three (January 7, 2013 – March 8, 2013). Students with MID or similar needs were enrolled in the course, with their consent as well as the consent of their parents or guardians, through the standard KiHS application form, as long as they had not already received prior credit for the course. The class contained only students with MID, or those individuals identified as requiring similar accommodations: comprising nine students in total. Informal, on-going feedback from the mentors working on-site with these students, as well as the course instructor, was used to continually revise the course during term three.

Table 3

*Timeline of Procedures*

Task	Date
Literature review	January 9 – September 4, 2012
Organization of the review of literature	September 4 – October 26, 2012
First questionnaire distributed	September 4, 2012
1 <sup>st</sup> follow-up reminder sent	September 24, 2012
2 <sup>nd</sup> follow-up reminder sent	October 1, 2012
3 <sup>rd</sup> follow-up reminder sent	October 8, 2012
Analysis of questionnaires	October 15 – October 28, 2012
Secondary Review of Literature	October 28 – November 5, 2012
Development of model course (planning the intervention)	October 29 – December 22, 2012
Instruction of the course (implementing the intervention/evaluating the intervention)	January 7 – March 8, 2013
Data collection and analysis of the intervention (evaluating the intervention)	March 11 – May 21, 2013
Second questionnaire distributed	March 11, 2013
1 <sup>st</sup> follow-up reminder sent	April 1, 2013
2 <sup>nd</sup> follow-up reminder sent	April 8, 2013
3 <sup>rd</sup> follow-up reminder sent	April 15, 2013
Interviews of instructors and mentors	April 16 – April 30, 2013

The last term (March 11, 2013 – May 10, 2013) was used to collect the data from the second questionnaire and the interviews, as well as to analyze and interpret the results. The second questionnaire regarding the perceptions of staff about the success of the revised course was distributed in the first week of the last term. The follow-up reminders followed the same schedule as the preliminary questionnaire (e.g., they were sent out April 1, April 8, and April 15, 2013). The interviews commenced on April 16, 2013 and were completed prior to the end of the month. Transcription, member checking, analysis, and interpretation of the results occurred immediately after the interviews from May 1, 2013 – May 21, 2013.

### **Ethical Considerations**

Prior to commencing this study, ethics approval was granted by the administration at KiHS and the Athabasca University Research Ethics Board.

Informed consent from instructors and mentors at KiHS was obtained in the first stage of the study, using the preliminary questionnaire that was administered online. To ensure informed consent and limit any feelings of coercion, an information letter and consent form were delivered through email by the school receptionist to all current teachers at KiHS, along with any follow-up reminders. Teachers were asked to read the information letter describing the research study and acknowledge they had read it and agreed to participate in the study, prior to commencing the questionnaire. Consent included participation in all parts of the study. Participants were assured of confidentiality in the reporting and publication of the research study. However, because of the nature of action research and the small number of participants, anonymity of the participants to the researcher was not guaranteed. The researcher was the special education teacher and was one of 13 course instructors at KiHS. Therefore, the researcher would most likely know who the respondents were, based on their answers in the preliminary questionnaire. In addition, staff members who agreed to the interview made their identity known to the researcher.

These issues of consent and confidentiality were quite different for the students in the study. Before enrollment in the revised course, students with MID were informed that it was an alternative to the original course. These students had been formally identified on their IEP, through formal medical assessments, as having MID. The course selection process included the same guidance that all students received about course

selection at KiHS. Students enrolled in the revised course required parental permission as they would have for any course that they were enrolled in, unless they were over the age of 18. Students who did not have MID were still enrolled in the course as long as they had an IEP that outlined similar needs, and the same process for consent described above was followed.

Informed consent was not required from any guardians for their children to participate in the study because, by signing the IEP, they had already provided agreement for their child to receive accommodations by staff members at KiHS. Students were considered to be in an inclusive class, as students in the revised course and the original course had the same teacher, and participated in the same class discussions and demonstrations. In addition, students in the revised course and original course were able to work together on assignments and interact with one another in both online and face-to-face modes. The curriculum expectations and content were the same in each course; the difference was in the way that the course content was presented to students.

Student information, such as names or grades, was not used in this research study. For this reason, student confidentiality did not need to be addressed.

### **Limitations and Delimitations**

There were a small number of limitations in this study. Limitations are factors that are out of the researcher's control that may affect the results of the study or how the results are interpreted (Baron, 2008). The parameters of the population were a limitation in this study, based on the enrollment of students at KiHS. KiHS has a unique school environment that provides education to Aboriginal peoples located in a specific region of Northern Ontario that primarily consists of isolated communities. The educational

preferences of this highly specific group of individuals may be vastly different from others, because of unique characteristics of the culture and environment of each community (Swanson, 2003). Therefore, some of the results from this study, particularly those design features originating in the review of literature on Aboriginal education, may not be transferable to other locations and cultures. The design features originating from the review of literature on MID may be more transferable because the criteria for identifying those with MID is standard regardless of culture or location (American Association on Intellectual and Developmental Disabilities, 2010).

Another limitation is that student enrollment in the online course may have been limited by whether they had previously acquired credit for the course or chose to take another course during that term. As a result, not all students with MID at KiHS participated in the revised course.

Students without disabilities were not enrolled in the revised course. This constraint could be considered a limitation as there was no comparison group to ensure that course success was similar for both students with MID and those without disabilities.

This study had a few delimitations, which are the characteristics that establish parameters or limits for the study, and which are within the control of the researcher (Baron, 2008). The study was delimited to students with MID because the wide range of exceptionalities and corresponding needs found in Ontario schools makes it difficult to design an intervention that is appropriate to all students with special needs. For example, students with MID have far different academic needs than students with profound intellectual disabilities, who are dependent on others for all aspects of daily care and have limited communication skills (American Psychiatric Association, 2012b), or those with

behavioural or physical exceptionalities (Weber & Bennett, 2004). Although some of the accommodations and online course design elements that assist students with MID maybe helpful for other students with disabilities, the results of the study are not meant to be transferable to other exceptionalities.

In addition, this study was further delimited to the course accommodations, but not the course modifications, recommended for students with MID. As mentioned in the assumptions of the study in Chapter I, most students with MID require modifications (Ministry of Education, 2001), including the students in this study, in addition to accommodations to the course design, in order to pass a course. However, course modifications do not require any changes to how the students access learning, and therefore, were not included in the design of the revised course. Any modifications necessary for a student were done on an individual basis and did not affect the success of the revised course. For example, students with MID may have difficulties with abstract concepts and language (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002), as well as higher-level thinking processes (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002) and may not be able to successfully complete expectations that require them to analyze or predict. If required, students may have these expectations modified or deleted. This is not atypical as “in most secondary school courses, modifications typically involve changing the number and/or complexity of the *regular grade-level expectations*” (Ontario, Ministry of Education, 2004, p. 28). If the number and kind of modifications are not extensive and do not have a significant impact



on the overall goals for the course, it is likely that the revised course would maintain the credit bearing status for that student.

Another delimitation was the lack of triangulation data. Enrollment and course completion data were obtained, but no student achievement data or log data were able to be collected. Instructional and assessment accommodations provided to students enrolled in the original MAT1L course were not documented prior to the study, nor were the changes made to the design of the course that were external to the Moodle LMS.

Therefore, a comparison of achievement data, such as final grades, from the revised course with the original course would not have provided an accurate reflection of the capacity of the revised course to meet the needs of students with MID. In addition, log data would not provide an accurate reflection of student activity, as students enrolled at KiHS are encouraged to complete their assignments offline because of the likelihood of power outages in the communities using fuel-powered generators to produce electricity. For the reasons discuss above, as well as the fact that the study was addressing a problem based on the opinion of teachers, only perceptions of mentors and instructors, that is, the people teaching the course, were used to judge the effectiveness of the revised course.

To address these limitations and delimitations, efforts were made to ensure credibility, transferability, and dependability by other means, as discussed below.

Credibility was established in several ways throughout the research study. During the design stage, credibility was enhanced by the selection of appropriate instrumentation to gather data. The review of literature gathered information from a wide variety of experts to inform the course design. The preliminary questionnaire was an effective way of quickly gathering teachers' and mentors' personal opinions on how well the current

course design met the needs of students with MID and what could be done to better meet these students' needs. No suitable instruments were found in the review of literature. Therefore, the questionnaire was developed by the researcher, using principles distilled from the literature reviewed earlier. Based on the review process completed through peer examination prior to the commencement of the study, the readability of the questionnaires was seen to be appropriate for the audience and used terms that were familiar to staff. Furthermore, multiple data collection techniques helped demonstrate credibility. Two separate surveys of 13 instructors and mentors and follow-up interviews with two participants were used to collect data. Credibility was further strengthened in the interview stage through the use of member checking. According to Lincoln and Guba (1985), member checking is a technique where "data, analytic categories, interpretations, and conclusions are tested with members of those stakeholding groups from whom the data was originally collected" and "is the most crucial technique for establishing credibility" (p. 314). This step allowed the researcher to ensure that she had accurately transcribed the informants' words, decreasing the chances of misrepresentation (Krefting, 2005). In this study, member checking occurred individually with each interviewee after the interviews had been transcribed. Pilot tests of the questionnaires were not possible due to the small number of teachers (16 teachers) at KiHS.

Finally, throughout the research process, peer examination was used as means for reflexive analysis. Peer examination, as briefly mentioned earlier, involves the researcher "discussing the research process, and findings with impartial colleagues who have experience with qualitative methods" (p. 219) and includes debriefing of insights and problems. Because researchers cannot separate themselves from the research in

qualitative research (Yeh & Inman, 2007) and the close researcher-informant relationship is critical in this method, reflexive analysis is a useful way of ensuring that researchers do not lose their ability to interpret their findings because of over-involvement (Krefting, 2005). Reflexive analysis or reflexivity “involves a reflective self-examination of our own ideas and an open discussion and comparison of our research experiences (Davies & Dodd, 2002, p. 286). Lincoln and Guba (1985) contend that debriefing with colleagues may contribute to deeper reflexive analysis by the researcher through the exploration of the researcher’s bias by the peer, as well as through the clarification of meanings and interpretations of the research. Peer examination in this study was performed by a staff member (the vice principal), who had neither participated in the questionnaires or interviews nor worked directly with students in the revised course.

Transferability was enhanced by thoroughly describing the research context and stating the assumptions of the study.

Dependability was established by increasing the response rate for questionnaires through the use of several follow-up reminders (Cohen, Manion, & Morrison, 2007) and by having mentors and instructors who were already trained and experienced in working with students with special needs. The use of peer examination at the beginning of the study to examine the research plan and implementation was another means of ensuring dependability (Krefting, 2005).

### **Conclusion**

This chapter outlined the methodology of the study that was used to determine the design element in an online course that could help meet the academic needs of Aboriginal

students with MID or similar intellectual deficiencies. This information is summarized below.

The methodology used was participatory action research because the study was seeking improvement at the local level and multiple colleagues provided opinions during the two data collection stages of the action research cycle used in this study. The participants were selected using purposive sampling and this selection initially included 16 instructors and mentors at KiHS who were working or had worked directly with a student with a disability. Informed consent from these staff members was obtained at the beginning of the study. Of these participants, seven directly worked with students during the implementation of the revised course and were asked to complete the second questionnaire. Of these respondents, three volunteered to be interviewed.

Data collection occurred in two stages of the action research cycle: planning the intervention and evaluating the outcome. During the planning stage, data from the literature review and preliminary interviews were collected to inform the intervention, that is, to revise a course at KiHS to incorporate the identified design features. The information pertaining to the perceived success of the design elements in meeting the needs of Aboriginal students with MID was collected in the final stage through the use of a secondary questionnaire and follow-up interviews. After each stage of collection, data were coded and analyzed using NVivo™. Data analysis and interpretation was done from the researcher's perspective, which was supported by the processes executed in NVivo™ and through peer examination.

The findings from the research study may not be transferable to all Aboriginal learners, because, although Aboriginal students in Canada share similar educational

needs, these vary from region to region (Saskatchewan Ministry of Education, 2007). The geographical location of the students in the study was distinctive because of the remoteness of the communities. The study was delimited to a particular range of disabilities known as MID, because of the broad range of disabilities found in an educational setting. Future investigations could be performed to determine the transferability of the findings to other groups of individuals enrolled in online programs, including those with other disabilities or from other cultures.

The next three chapters will present and discuss the findings of the research study. The results from the literature review and preliminary questionnaire used in planning the intervention are found in Chapter V. Chapter VI will discuss the implementation of the intervention, which will include how the results from the literature review and preliminary questionnaire were used to inform the revision of the course at KiHS. The results from the second questionnaire and follow-up interviews evaluating the intervention, along with a discussion of each, will be provided in Chapter VII. Lastly, Chapter VIII will explore the conclusions and implications arising from the findings, as well areas for future investigation.

## Chapter V: Results and Discussion - Planning the Intervention

This chapter presents the results from the stage of planning the intervention. A review of the literature and the results of the preliminary questionnaire were used to create the set of design considerations used to revise MAT1L. Both of these data collection procedures took place during the first term of the 2012/2013 school year at KiHS. The preliminary literature review explored the topics of Aboriginal education, special education for students with mild intellectual disability, and online learning for students with special needs. A secondary review of literature was undertaken after the course for revision was selected in order to obtain design considerations for teaching mathematics, the defined subject area. The preliminary questionnaire was administered to teachers and mentors at KiHS to obtain background information about the participants and design suggestions specific to the needs of students with MID at the secondary school. The results from the literature review and preliminary questionnaire are found in this chapter.

### **Results: Preliminary Review of Literature**

A preliminary review of the literature provided background information for the study, and although there was very limited research in the area of online education for students with intellectual disabilities, there were resources available in other areas pertinent to the culture, disability, and learning environment in this study. The suggestions below were produced from the review of literature to inform, along with the suggestions from the preliminary questionnaire, to inform the revision of the locally developed Grade 9 Math course for Aboriginal students with MID. For the purpose of simplifying the discussion, the recommendations are organized under the appropriate

component of design (Ellis, Light, & Pryde, 1999), namely: Context, Content, Teaching Methods, and Assessment (Table 4). All of these components are interrelated and aligned with the overall goals of the course. The numbers in parenthesis signify the number of publications in the literature review that recommended the design element.

To arrive at this list of suggestions, a search for resources was undertaken in the areas of Aboriginal education, mild intellectual disability, and special education in the online environment. No resources were located that intersected all of these areas, so resources in each of these areas were selected for the literature review. Of the literature reviewed, 42 resources provided design considerations relevant to this dissertation research study (Appendix G). The collection of resources consisted of books, online refereed journals, websites, reports, and printed and online publications. Some examples of journals that provided design consideration include the Alberta Journal of Educational Research, Canadian Journal of Native Education, International Review of Research in Open and Distance Learning, and the Quarterly Review of Distance Education. Examples of authors and organizations of books, reports, websites, and online publications that supplied recommendations relevant to the study include the British Columbia Ministry of Education, Center for Applied Special Technology, Canadian Council on Learning, Institute of Electrical and Electronics Engineers, Ontario Ministry of Education, The Crossing Boundaries National Council, Web Accessibility Initiative, and Weber and Bennett (2004).

The units of analysis were the educational recommendations for working with Aboriginal students and/or individuals with MID within the text that related to the design of courses. The literature was reviewed, and recommendations were marked. As

previously discussed in Chapter IV, parent codes were created and redefined to categorize these recommendations. Seven parent codes originating from the review of literature were created: *Aboriginal education needs*, *MID education needs*, *instructional strategies*, *content considerations*, *accessibility*, *universal design*, and *evaluation*. These codes were redefined to combine themes that had recommendations with similar characteristics. The parent codes of *general considerations for population*, *content*, *instructional strategies*, and *evaluation* were renamed to *content*, *context*, *teaching strategies*, and *assessment* to align with the course design model developed by Ellis, Light, and Pryde (1999). Ellis, Light, and Pryde created a design tool where questions regarding content, context, teaching strategies, and assessment are used to assist in planning a course and meet the overall learning outcomes, or *goals*, of the course (Ellis, 2008). The model developed by Ellis, Light, and Pryde (1999) was used to rename the parent codes because of the similarities in organizing course design considerations, and the practical fit with KiHS and the study going forward.

Next, the textual data pertaining to design considerations located in the review of literature, along with the codes, were input into NVivo<sup>TM</sup>. Detailed coding was used to further analyze the data, and nodes were created under these areas of design.

The areas of design, the parent codes, along with the recommended design element, and the nodes that emerged from the analysis of data are displayed in Table 4. The number in brackets indicates the number of resources from the review of literature that suggested each design element.



Table 4

*Design Recommendations from Review of Literature*

Component of Design	Recommendations
Context	<ul style="list-style-type: none"> <li>• incorporate culture into instruction and content (14);</li> <li>• integrate the Western styles of education with traditional ways (holistic education) (11);</li> <li>• offer flexibility in expectations and schedules/pace of coursework (13);</li> <li>• establish strong student-teacher relationships (9);</li> <li>• provide human interaction/virtual dialogue (5);</li> <li>• be conscious of the importance of family/community (10);</li> <li>• provide opportunities for the student to work with others (8);</li> <li>• link learner support-success services online: (4);</li> <li>• strengthen self-esteem and identity (7);</li> <li>• be conscious of bandwidth-restricted environments (2);</li> <li>• be aware of accessibility standards (8);</li> <li>• use clear and simple language (5);</li> </ul>
Content	<ul style="list-style-type: none"> <li>• match content/activity to the ability levels of the learner(2);</li> <li>• link content to real-life experiences (8);</li> </ul>
Teaching Methods	<ul style="list-style-type: none"> <li>• use a variety of instructional methods (8);</li> <li>• provide opportunity for independent and interactive learning (2);</li> <li>• provide courses that are less text-based (4);</li> <li>• provide graphical representation of concepts, such as the use of diagrams or mind maps (11);</li> <li>• offer alternatives to written expression, such as audio or video recordings (4);</li> <li>• When using audio, speak clearly and at level and speed appropriate for students (3);</li> <li>• provide real-time text captioning for all audio/video components elements (7);</li> <li>• provide a text equivalent for all non-text elements (6);</li> <li>• sequence the steps involved in learning a skill or concept (2);</li> <li>• scaffold learning (2);</li> <li>• chunk information into manageable parts (6);</li> <li>• integrate hands-on learning (4);</li> <li>• use manipulatives (3);</li> <li>• use multiple examples (1);</li> <li>• use concrete examples (4);</li> <li>• teach the same concept or skill in many situations (2);</li> <li>• provide extended and numerous opportunities to practice skills and learn material until assimilated by learners (3);</li> <li>• use drill and practice (2);</li> <li>• introduce key concepts and vocabulary at the beginning of a new lesson or unit (2);</li> </ul>

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	<ul style="list-style-type: none"> <li>• Provide definitions for key vocabulary (5);</li> <li>• highlight key words (4);</li> <li>• bridge learning of content to skills (2);</li> <li>• allow for materials to be enlarged (10);</li> <li>• avoid using unnecessary graphics or pop-up windows (7);</li> <li>• limit use of external links (3);</li> <li>• if using external links, ensure that level is appropriate for learners (1);</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• use a variety of assessment (6);</li> <li>• offer alternative forms of assessment (4);</li> <li>• provide frequent assessment/feedback (5);</li> <li>• give clear, specific written directions (5);</li> <li>• repeat instructions (3);</li> <li>• provide practice questions (2);</li> <li>• provide multiple opportunities to demonstration learning (2).</li> </ul>

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These findings extracted from the review of literature, along with the results from the preliminary questionnaire, informed the revision of the course and addressed the research question. The results from the preliminary questionnaire are presented below.

### **Results: Preliminary Questionnaire**

The response rate to the preliminary questionnaire was 87.5%, with 13 out of 16 mentors and instructors at KiHS completing the survey. There was a fairly even gender balance across respondents with 54% (n=7) of respondents being male and 46% being female (n=6). Of the 13 respondents, 38% (n=5) were of Aboriginal descent. The results from the questionnaire are organized by survey question, which are grouped by topic. To begin, the findings from questions one to seven of the questionnaire describe the participating teachers and mentors, by detailing the background experience and knowledge of respondents. Questions eight to 10 report on the design features that respondents felt should be utilized in courses at KiHS in order to meet the needs of students with MID. These questions were organized under the categories of *stop*, *continue*, or *start* to align with the format used for program improvement at KiHS. The

Stop/Continue/Start, or Stop/Start/Continue activity is used for a variety of purposes related to evaluation, including organizational improvement (Steinbrecher, 2009), and a full description of this activity can be found in Chapter IV. Recommendations for design features to stop, or in other words to discontinue being used in courses at KiHS were collected in Question eight. Question nine elicited the design features that respondents felt should continue being used in courses, and lastly Question 10 describes the design features that should start being utilized. The final survey question, Question 11, records the course that respondents felt most required a revision to meet the needs of students with MID.

#### **Questions One to Seven: Description of Respondents**

The purpose of questions one to seven was to determine the previous experience and knowledge of the respondents providing suggestions for improving online courses for students with special needs, and specifically for those with MID. The details of these questions and their results are found in Table 5 and are described in more detail below.

Table 5

*Background Experience of Respondents*

Years of Teaching Experience		
Years	# of Respondents	Percent
1	2	17%
3	5	42%
5	1	8%
10	1	8%
12	2	17%
15	1	8%
Total	12*	100%

Years of Online Teaching Experience		
Years	# of Respondents	Percent
0	1	8%
1	4	31%
3	3	23%
5	3	23%
6	1	8%
10	1	8%
Total	13	100%

Years of Employment at KiHS		
Years	# of Respondents	Percent
0	1	8%
1	5	38%
3	3	23%
4	1	8%
5	2	15%
6	1	8%
Total	13	100%

Years of Experience Working with Students with Special Needs		
Years	# of Respondents	Percent
0	1	8%
1	2	15%
2	1	8%
3	4	31%
4	1	8%
7	2	15%
12	1	8%
15	1	8%
Total	13	100%

Years of Experience Working with Students with MID		
Years	# of Respondents	Percent
0	1	8%
1	3	25%
2	1	8%
3	2	17%
5	1	8%
7	1	8%
10	2	17%
15	1	8%
Total	12*	100%

Table 5 (continued)

Highest Level of Qualifications/Experience in Special Education		
Level	# of Respondents	Percent
Pre-service education	5	38%
Experience in classroom	3	23%
One week training course	1	8%
<u>Additional Qualifications in Spec. Ed.</u>	<u>4</u>	<u>31%</u>
Total	13	100
Experience in Course Design		
Experience	# of Respondents	Percent
Course development at KiHS	9	75%
Pre-service education	2	17%
<u>Course development in f2f classes</u>	<u>1</u>	<u>8%</u>
Total	12*	100%

\*One non-respondent

**Question one.** Question one asked mentors and instructors about the number of years of experience they had in the teaching profession. Table 5 indicates the numbers of years of teaching experience that were reported, how many respondents reported each amount, and the percentage of respondents that belonged to each group out of the total responses. One questionnaire respondent did not respond to this question and was not included in the percentage of total responses. The average number of years of experience as a teacher was five years. The lowest number of years as a teacher was one year (15%), and the highest was 15 years (8%).

**Question two.** Question two was created to determine the amount of experience that mentors and instructors had in working in an online environment. Because the study looked at course design for online courses, it was important to identify the experience staff had in this area to inform their suggestions. Table 5 lists the numbers of years of online teaching experience that were reported in the questionnaire, the number of respondents who stated having that experience, and the percentage of respondents who reported that experience out of the total responses. Only one respondent (8%) had no previous experience teaching in an online environment prior to the research study. The

staff member with the most experience had been working in the online environment for 10 years. The mean was 3.4 years of experience teaching in an online environment.

**Question three.** Question three also looked at the amount of experience that the staff members had, but this time as an employee at KiHS. This question differs from questions one and two because the online environment at KiHS has been tailored to the needs of the Aboriginal student population and, therefore, knowledge of what the students need at this particular high school was viewed as an important element. Table 5 presents the number of years of employment at KiHS, the number of respondents who reported each amount, and the percentage of respondents who belonged to each group. The largest number of respondents (38%) had only one year of experience working at KiHS. In addition, the lowest number of years of experience was zero or no experience (8%), and the highest was six, with the mean number of years of employment at KiHS being 2.7 years.

**Question four.** The length of time that staff had worked with students with special needs was examined in Question four. Table 5 shows the numbers of years of experience that were disclosed by respondents, how many respondents reported each amount, and the percentage of the total responses for each group. The lowest amount of experience working with students with special needs was zero years or no experience (8%), and the most experience was 15 years (8%). The mean number of years of experience was 4.7 years. The inclusion criteria for the study was that participants needed to be working or had worked directly with a student with a disability, therefore the respondent with zero years of experience could be a teacher who was just starting to work with a student with a disability at the time of the questionnaire.

**Question five.** The purpose behind Question five was to determine the experience staff members had working with students with MID, as this is the exceptionality addressed in the research question. Table 5 presents the years of experience reported, the number of respondents who selected that amount of time, and the percentage of total responses that belonged to that group. One survey respondent did not answer this question and was not included in the percentage of total responses. Most staff (92%) had previous experience working with students with MID, with only one staff member (8%) never having worked with students with this disability. The mean number of years of experience was 4.8 years. This number was slightly higher than the total years of experience working in any area of special education that was reported for the previous question; however, the one non-response likely accounted for this difference.

**Question six.** Question six examined the qualifications and/or experience in special education that staff members possessed. As the purpose of this question was to determine the formal education staff members had in regard to working with students with special needs, Question six could have been improved by asking for qualifications only, rather than qualifications and/or experience. Furthermore, experience in special education had previously been addressed in Question four, so it was not necessary to ask this again. This redundant item could have been avoided by piloting the questionnaire (Cohen, Manion, & Morrison, 2007), however, with the already small participant pool, there were not enough staff members to administer two questionnaires on the same topic. Nonetheless, this potential miscommunication did not appear to affect the final results of the question, as the response of “experience in classroom” was likely interpreted as “no formal qualifications” by respondents.

In Table 5, the responses to this question are organized based on the highest level of special education qualifications respondents had acquired, and includes the number of respondents, and the percentage of respondents that identified each qualification.

The results show that 38% of respondents had no formal special education training beyond the brief training provided in pre-service education programs. Some staff members (23%) reported having hands-on experience in their classroom working with students with special needs, with one teacher (8%) taking a one-week training course focusing on a specific disability. About one-third of staff members (31%) had taken Additional Qualification courses in special education, such as Special Education Part 1 and Special Education Part 2, which are for-credit courses offered by certain Ontario post-secondary educational institutions. Although 38% of respondents had no formal special education beyond their pre-service education program, 92% of respondents had experience working with students with special needs and the same proportion had experience working with students with MID. Given that most respondents had worked directly with students with MID and also had previous experience teaching online, the respondents were considered to be sufficiently informed about the educational needs of these students and how their needs may be met online; therefore, the design recommendations contained in the next section of the questionnaire were considered to be valid.

**Question seven.** The purpose behind Question seven was to determine the experience and qualifications staff members had in course design. In the preliminary questionnaire, teachers were asked to provide recommendations of elements of course design that could meet the needs of students with MID at KiHS. Therefore, it was



important not only to understand the background knowledge of teachers in instructing online and working with students with special needs, but also their background knowledge in course development, both on- and off-line. Table 5 shows the experience or qualifications in course design that were reported, the number of respondents who reported each experience or qualification, and the percentage of total responses in each group. One survey respondent did not respond to this question and was not included in the total number of responses. Most respondents (75%) reported that all of their experience and qualifications originated from developing courses at KiHS. Based on these findings, the design elements recommended by respondents for courses at KiHS were considered valid.

#### **Questions Eight to Eleven: Course Design Questions**

Questions eight to 11 focused on course design for students with MID or similar needs. The first three questions, Questions eight through 10, followed the same “Stop, Continue, and Start” theme, which, as previously discussed, is a format used for program improvement at KiHS. The last question in this section, Question 11, asked respondents to identify the course that would most benefit from being revised to better suit the needs of students with intellectual disabilities. A detailed description of each of these questions, along with their results, is found in the following section.

**Question eight.** The purpose behind Question eight was to determine which features in the design of courses at KiHS were considered to be impeding the success of students with MID. Because the theme of “Stop, Continue, and Start” was used to organize the survey questions, the theme continued in the coding process, with the use of the parent code “Stop” for analysis of the responses for this question. Recommendations

for features of course design to discontinue using were organized under one of the five components of course design: teaching methods, assessment, content, context, and goals (Ellis, Light, & Pryde, 1999). All 13 respondents responded to this question, with many providing multiple suggestions (Figure 4).

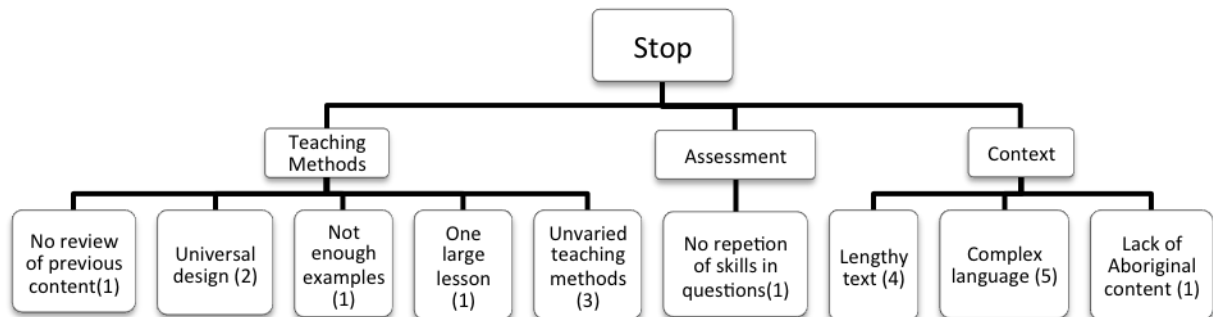


Figure 4. Respondents' comments on features to stop being used in the design of courses.

Only three of the five components of course design were identified by respondents, and these were teaching methods, assessment, and context. The results show that the majority of respondents were concerned about contextual issues, for example, how the course fit the cultural and academic needs of students with MID (10 comments, representing 53% of coded responses). The amount of text was seen as too lengthy and complex for the specific student group this study, as students at KIHS may have English as their second language and, as reviewed in Chapter III, individuals with MID can have difficulties with receptive language, in other words the ability to understand language that is read or heard. One respondent felt that the courses lacked Aboriginal content. Next to the contextual-related issues, respondents were most concerned about the teaching methods utilized in courses at KiHS (eight comments, representing 42% of coded responses). Three respondents felt that lessons did not have

diversity in the teaching methods and that they should incorporate more variety in materials and methods used to convey and supplement content, such as the use of videos, hands-on lessons, and interactive components. While universal design is considered beneficial for students with intellectual disabilities (Chalghoumi, 2012; Wehmeyer, Tassé, Davies, & Stock, 2012), some staff members felt that universal design should be avoided at KiHS (two comments). These respondents believed that one master course could not meet the needs of all learners and trying to modify it for specific learners was also not a workable solution.

Only three of the five components of course design were discussed by respondents, and these were teaching methods, assessment, and context. The results show that the majority of respondents were concerned about contextual issues, for example, how the course fit the cultural and academic needs of students with MID (53% of coded responses). The text was seen as too lengthy and complex for the specific student group this study, as students at KiHS may have.

Even though several respondents did not possess much formal education in special education (Table 5), there may be some legitimacy to their concern about universal design. According to Burstahler (2012), “employing universal design principles does not eliminate the need for specific accommodations for students with disabilities” (para. 11). Universal design provides full access to course content for most students (Burstahler, 2012), but may not be sufficient to address the problem this research study was addressing – that not every student with MID was having their needs met in online courses at KiHS, including the provision of accommodations as directed on IEPs.

Other design features that respondents recommended should be avoided or “stopped” included large lessons with too many components (one comment), too few examples of the skills/concepts being taught (one comment), and lack of a review of previously-taught content at the beginning of lessons (one comment). Only one respondent discussed assessment, mentioning that certain courses, such as mathematics, required significant amounts of practice in order for students to grasp the knowledge, and that having only one or two activities with limited practice was not sufficient for students.

**Question nine.** Question nine was coded under the “Continue” parent code and examined the features in the design of courses at KIHS that staff members felt should remain in place as they removed barriers or facilitated learning for students with MID. Figure 5 below shows the responses from the 13 respondents who answered this question and the three areas of course design that were addressed.

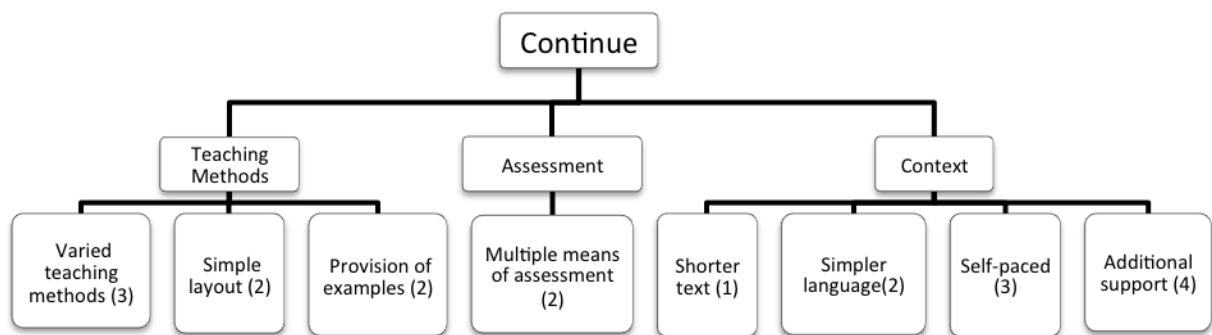


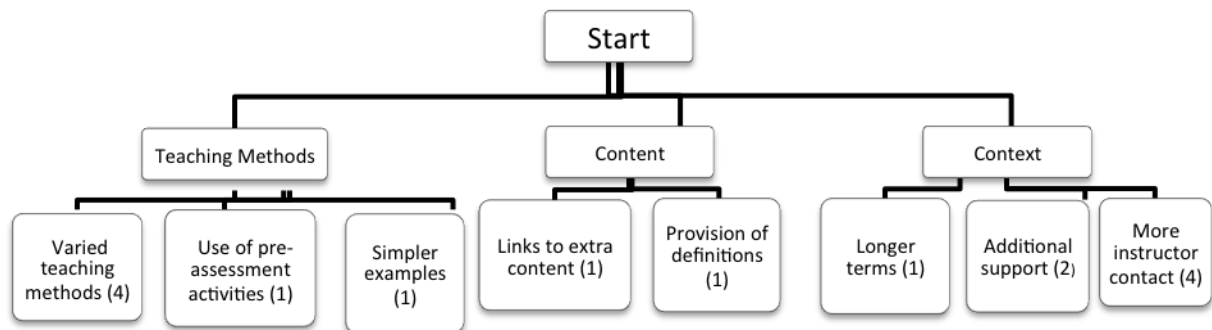
Figure 5. Respondents’ comments on the design features to continue using in courses.

Similar to the results from the previous question, the majority of comments from respondents to Question 9 were about contextual issues or factors, such as the culture and interests of students that may influence the course design (10 comments, representing 53% of coded responses). In this area of course design, having a special education

teacher, classroom assistance, and assistive technology were seen as supports that facilitated learning and assisted students (four comments, representing 19% of coded responses). According to five respondents, having a self-paced course, and using simple language and shorter lengths of text, were features to continue using in online courses at KiHS. Again, teaching methods were the second most often mentioned area of course design (seven comments, representing 37% of coded responses), with respondents recommending the continued use of varied teaching methods (three comments, representing 16% of coded responses), the provision of multiple examples in lessons (two comments, representing 11% of coded responses), and the use of consistent and simple course templates (two comments, representing 11% of coded responses).

With regard to the use of templates, respondents were referring to the fact that courses at KiHS used the same format for all courses, with each subject area having a different colour scheme. For example, one respondent remarked, “Our course layout READ/THINK/DO is very structured. Students know what to expect, and while content in the activities [may] change, the format does not.” Some of the teaching methods that respondents felt worked for students with MID and that should continue in courses at KiHS were the use of videos, diagrams, graphics, and audio clips. Lastly, two comments were made about the provision of alternative forms of assessment for students being a valuable design feature to retain. For instance, one respondent remarked on the options in courses to submit work using a visual representation rather than text only, and another mentioned that the capacity for students to be able to create something for assessment was a beneficial accommodation already being provided directly in courses.

**Question ten.** For the “Start” component of the questionnaire, Question 10 asked respondents to list the design features that they thought should begin to be incorporated into courses at KiHS in order to facilitate learning and assist students with MID in achieving success. Like the previous two questions, this question helped in determining the set of course design features that would be used in the revised course. All 13 respondents responded to this question; however, only 11 had suggestions of design features to begin using in KiHS online courses. Figure 6 below illustrates the three areas of course design that were mentioned by respondents; these were teaching methods, content, and context, with teaching methods being the most frequently discussed component (6 comments, representing 67% of coded responses).



*Figure 6.* Respondents' comments about design features that should start being used in courses at KiHS.

Although some respondents previously indicated their satisfaction with the varied instructional methods in Question 9 (three respondents), 27% of respondents to Question 10 felt that courses at KiHS should start to include additional non-textual components. This finding aligns with the recommendation found in the review of literature encouraging teachers of Aboriginal students to make online courses less text-based

(Philpott, Sharpe, & Neville, 2009). Other suggestions for this question included increased use of visuals, graphic organizers, live web lessons, and interactive tools.

Contextual considerations included longer terms (one comment), additional support through assistive technology (two comments), and increased instructor contact (four comments). Some respondents felt that the eight-week term was too short for students with MID to complete all of the assignments in a course and the term should be extended to accommodate students with MID. Even though students can take additional time to complete a course if required, new courses begin every eight weeks, potentially putting students behind before they even start the new term. Prior to the 2012/2013 school year, terms at KiHS were nine to 10 weeks in length, but were changed to align with the schedules of provincial secondary schools in Northwestern Ontario. As the new schedule could not be changed, students were able to request an extension for the course in order to complete assignments at their own pace.

While two respondents felt that assistive technology should be used more frequently in lessons, another felt that some courses already adequately utilized assistive technology. It appeared that the use of assistive technology was ultimately dependent on two factors: the classroom mentors' efforts to learn and to use the technology, and the instructors' motivation to design courses based on students' needs. The two respondents proposing increased use of assistive technology did not provide much explanation about the types of assistive technology they would like to see integrated into the design of courses. The only detailed suggestion was for the inclusion of "a feature where the course could be read to the student" (Respondent #2, 2012) at their own pace, even though courses at KiHS already have this feature. This lack of knowledge of assistive

technology already available could indicate a need for further professional development for staff members, particularly those new to the school.

Respondents also wanted to see more instructor contact with students (four respondents). The suggested means of communications were video conferencing, telephone calls, web conferencing, and weekly check-ins. Having simpler examples of skills and concepts to be learned, and the use of pre-assessment activities were also recommended under the area of teaching methods to be added to course design.

When considering the content in the design of courses, one respondent proposed having a weekly list of definitions, and another suggested providing links to extra content within the lesson. A summary of the suggestions resulting from Question 8 to 10 is found below, using the same parent codes used for analysis.

Table 6

*Responses from the Preliminary Questionnaire*

Stop using	Continue using	Start using
<ul style="list-style-type: none"> <li>• lengthy texts;</li> <li>• complex language;</li> <li>• limited Aboriginal content;</li> <li>• limited repetition of skills in assignment for practice;</li> <li>• unvaried teaching methods;</li> <li>• large lessons;</li> <li>• limited examples of the skills/concept being taught;</li> <li>• principles of universal design;</li> <li>• limited review of previous content.</li> </ul>	<ul style="list-style-type: none"> <li>• a variety of teaching methods;</li> <li>• simple layouts;</li> <li>• multiple examples for concept/skill being taught;</li> <li>• multiple means of assessment;</li> <li>• shorter lengths of text;</li> <li>• simple language;</li> <li>• self-paced courses;</li> <li>• additional support (i.e., classroom assistant, special education teacher).</li> </ul>	<ul style="list-style-type: none"> <li>• a larger variety of teaching methods (e.g., more videos, graphics, audio clips);</li> <li>• pre-assessment activities;</li> <li>• simpler examples;</li> <li>• more contact with students;</li> <li>• links to extra content/support;</li> <li>• extended terms;</li> <li>• assistive technology.</li> </ul>



**Question eleven.** Lastly, Question 11 asked respondents to choose which course at KiHS they felt would most benefit from being revised in order to better suit the needs of students with intellectual disabilities. Due to the principles of the action research methodology being used in this study, it was imperative to involve the instructors and mentors in the decision of which course to revise. Table 7 below shows the courses chosen by respondents, the number of respondents who selected each course, and the percentage of total respondents who chose each.

Table 7

*Course Most Needing to be Revised*

Course	# of Respondents	Percent
Grade Nine Applied Science (SNC1P)	3	25%
Grade Nine Science, Academic (SNC1D)	3	25%
Grade Nine Learning Strategies, Open (GLS1O)	2	17%
Grade Nine Exploring Family Studies, Open (HIF1O)	1	8%
Grade 11 Raising Healthy Children, Open (HPC3O)	1	8%
Grade Nine Healthy Active Living, Open (PPL1O)	2	17%
Grade Nine Math, Applied (MAT1P)	1	8%
Grade Nine Math, Academic (MAT1D)	1	8%
Grade Nine Math, Locally Developed (MAT1L)	1	8%
Grade Eleven Mathematics for Work and Everyday Life, Essential(MEL3E)	1	8%
English	1	8%
Science	2	17%
All courses	2	17%

Some respondents selected more than one course to be revised; therefore, the values in Table 7 do not sum to 100%. As one respondent indicated “no comment at this time,” percentages were based on the number of individuals who listed a course. Most respondents felt that science courses needed to be revised, with 25% choosing Grade 9 applied science, 25% choosing Grade 9 academic science, and 17% choosing the general area of science subjects. Several subject areas and/or courses were placed equally as the second choice, with Learning Strategies (GLS1O), Healthy Active Living (PPL1O),

English, and math each being selected by two respondents. Some respondents (17%) felt that all courses could benefit from being revised for students with special needs.

Results showed that science was the first subject choice of respondents. However, as the Grade 9 science courses were taught in the first term and the majority of students with MID had already earned credit for this subject area, it was not considered practical to offer a Grade 9 course in science in term three, the time for the implementation of the revised course as part of the thesis research study. Therefore a second-place course, Grade 9 Locally Developed Math (MAT1L), was ultimately chosen by the researcher and administration to be revised. Although this course was not the first choice of respondents, it was the most preferred course of those offered by KiHS in term three and for which students did not already possess a credit. In addition, 17% of respondents indicated that all courses could benefit from being revised, also contributing to the selection of the Grade 9 Math course as a suitable choice for revision.

Another factor that contributed to the choice of Math as an appropriate subject within to revise a course was that the mathematics curriculum had not be revised since 2005; therefore, none of the math courses were part of the Aboriginal Education Strategy that had incorporated Aboriginal expectations and teacher prompts for adding Aboriginal culture into the curriculum (Ontario Ministry of Education, 2005b). Consequently, the revision of a math course could help to increase Aboriginal content and result in Aboriginal culture being incorporated directly into the Ontario curriculum.

Respondents choose a variety of math courses to be revised, with each course being selected by the same percentage of respondents. Therefore, it was necessary for the researcher to select a Grade 9 math course from one of the following streams: locally

developed, applied, or academic. Locally developed compulsory courses are intended for those students who have gaps in their foundation of knowledge of the curriculum and who require flexibility and support in order to meet the compulsory credit requirements in English, mathematics, and science for an OSSC or OSSD (Ontario Ministry of Education, 2004a). As students with MID often have noticeable gaps in mathematical skills (Ontario Ministry of Education, 2002; Weber & Bennett, 2004), the locally developed level was considered to be the most appropriate Grade 9 Math course for the students with MID at KiHS.

### **Summary**

The results from the review of literature showed that the areas of course design with the most design elements to consider were context and instructional methods. Because this study worked with a specific culture and disability, it is not surprising that contextual and instructional considerations were the most frequently mentioned design features in the literature reviewed.

The results from the preliminary questionnaire indicated that respondents (e.g., instructors and mentors at KiHS who worked at KiHS and had experience teaching online courses and working with students with MID) had experience in the field of education, with some specialized knowledge in the areas of online education and special education. For instance, the respondents had worked at KiHS for an average of 2.7 years, they had an average of five years of teaching experience and an average of 3.4 years of online teaching experience. Most (92%) of the respondents reported previous experience working with students with special needs, and 31% had formal certification in special education.

In addition, the results of the preliminary questionnaire provided numerous suggestions for course design features to be stopped, continued, or initiated. The areas of course design identified by respondents were content, assessment, and teaching methods. Issues pertaining to course goals were not mentioned in the responses. The responses from the preliminary questionnaire for each of the areas are found in Table 8 below.

Table 8

*Responses from the Preliminary Questionnaire*

Stop using	Continue using	Start using
<ul style="list-style-type: none"> <li>• lengthy texts;</li> <li>• complex language;</li> <li>• limited Aboriginal content;</li> <li>• limited repetition of skills in assignment for practice;</li> <li>• unvaried teaching methods;</li> <li>• large lessons;</li> <li>• limited examples of skills/concept being taught;</li> <li>• principles of universal design;</li> <li>• limited review of previous content.</li> </ul>	<ul style="list-style-type: none"> <li>• a variety of teaching methods;</li> <li>• simple layouts;</li> <li>• multiple examples for concept/skill being taught;</li> <li>• multiple means of assessment;</li> <li>• shorter lengths of text;</li> <li>• simple language;</li> <li>• self-paced courses;</li> <li>• additional support (e.g., classroom assistant, special education teacher).</li> </ul>	<ul style="list-style-type: none"> <li>• a larger variety of teaching methods (e.g., more videos, graphics, audio clips);</li> <li>• pre-assessment activities;</li> <li>• simpler examples;</li> <li>• more contact with students;</li> <li>• links to extra content/support;</li> <li>• extended terms;</li> <li>• assistive technology.</li> </ul>

Lastly, the course that was chosen to be revised was Grade 9 Locally Developed Math (MAT1L). Although this course was not the respondents' first choice of courses at KiHS to be revised, the suggestions from the preliminary questionnaire were still valuable as the recommendations were made for courses in general at KiHS.

Table 9

*Recommendations from Literature Review and Preliminary Questionnaire*

Component of Design	Recommendations
Context	<ul style="list-style-type: none"> <li>• incorporate culture into instruction and content;</li> <li>• integrate the Western styles of education with traditional ways (holistic education);</li> <li>• offer flexibility in expectations (i.e., daily expectations, learning styles) and schedules/pace of coursework;</li> <li>• establish strong student-teacher relationships;</li> <li>• engage learners in virtual dialogue with other teachers and learners;</li> <li>• be conscious of the importance of family/community;</li> <li>• provide opportunities for the student to work with others;</li> <li>• link learner support-success services online;</li> <li>• strengthen self-esteem and identity;</li> <li>• be conscious of bandwidth-restricted environments;</li> <li>• be conscious of accessibility standards;</li> <li>• use clear and simple language at level appropriate for students;</li> <li>• be conscious of accessibility standards.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• match content to the ability levels of the learners;</li> <li>• provide links to extra content;</li> <li>• link content to real-life experiences.</li> </ul>
Teaching Methods	<ul style="list-style-type: none"> <li>• use a variety of instructional methods;</li> <li>• provide opportunity for independent and interactive learning;</li> <li>• provide courses that are less text-based;</li> <li>• provide graphical representation of concepts, such as the use of diagrams or mind maps;</li> <li>• offer alternatives to written expression, such as audio or video recordings;</li> <li>• when using audio, speak clearly and at level and speed appropriate for students;</li> <li>• provide real-time text captioning for all audio/video components;</li> <li>• provide a text equivalent for all non-text elements;</li> <li>• sequence the steps involved in learning a skill or concept;</li> <li>• scaffold learning;</li> <li>• chunk information into manageable parts;</li> <li>• integrate hands-on learning;</li> <li>• use manipulatives;</li> <li>• use multiple examples;</li> <li>• use concrete examples;</li> <li>• teach the same concept or skill in many situations;</li> <li>• provide extended and numerous opportunities to practice skills and learn material until assimilated by learners;</li> <li>• use drill and practice;</li> <li>• introduce key concepts and vocabulary at the beginning of a new</li> </ul>

	<p>lesson or unit;</p> <ul style="list-style-type: none"> <li>• highlight key words;</li> <li>• bridge learning of content to skills;</li> <li>• allow for materials to be enlarged;</li> <li>• present the main points of a topic first, followed by less important information;</li> <li>• avoid threaded discussions;</li> <li>• review previously learned material;</li> <li>• develop consistent template/design/style;</li> <li>• use simple layouts;</li> <li>• pay attention to structure in instruction;</li> <li>• provide consistent navigation across the site;</li> <li>• use well organized and uncluttered web pages;</li> <li>• put less information on a page;</li> <li>• use page titles and headings;</li> <li>• avoid using unnecessary graphics or pop-ups;</li> <li>• limit use of external links;</li> <li>• if using external links, ensure that level is appropriate for learners.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• use multiple means of assessment;</li> <li>• offer alternative forms of assessment;</li> <li>• provide frequent assessment/feedback;</li> <li>• give clear, specific written directions;</li> <li>• provide practice questions;</li> <li>• provide multiple opportunities to demonstrate learning;</li> <li>• use frequent short assessments rather than one long assessment.</li> </ul>

Table 9 above summarizes and combines results from the analysis of the review of literature (Table 4) with the results from the preliminary questionnaire (Table 8) representing the total set of design considerations used in the revision of the Grade 9 Math course, MAT1L. A discussion of the implementation of the intervention, including how this set of design considerations was used to inform the revision of the course, can be found in Chapter VI.

## Chapter VI: Implementing the Intervention

Due to staff concerns that students with MID at KiHS were not having all of their educational needs met in online courses, the research study attempted to create a set of design considerations that could address these concerns. The course that was chosen to be revised with these elements integrated into the design was the grade nine locally developed math course. This course was viewed by staff and administration at KiHS as not only a course that needed to be revised, but also a subject that could benefit students with MID. The importance of math in everyday life is obvious for those students wanting to live independently. For example, math skills are necessary for personal life-management, such as paying for groceries and budgeting, and employment skills, such as managing time. When planning the intervention, the results from the review of literature and the preliminary questionnaire were used to create a set of design considerations that would better meet the needs of Aboriginal learners with MID at KiHS. These elements were then used to implement the intervention, the revised MAT1L. Screenshots showing the revised course pages before and after the revision can be found in this chapter and also appear in Appendix G.

There were several components of the MAT1L course that did not change during the revision process. In order to meet the requirements of KiHS, the format of the course did not change. The number of weeks (eight) in the revised course remained the same, as well as the number of assignments (28), and the numbering system used. To maintain consistency in content for class discussions and group work, the number (six) and names of units were unaltered. Lastly, the types of assessment and the grade value attached to each were not changed in the revised course. Keeping with the requirements of the

Ontario Ministry of Education, formative assessment accounted for 70% of the final grade, and summative assessment accounted for 30%. The summative assessment included a culminating activity and exam, both of which kept the same grade value (15% each) as the original course.

This chapter will begin by discussing how the set of design considerations (Table 9) developed from the literature review and preliminary questionnaire informed the design of the revised MAT1L. This will be followed with a discussion of changes made to the design while students were taking the course, as well as a discussion of the interactions of students and teachers with the revised course.

### **The Preliminary Course Revision Process**

The set of course design elements (Table 9) developed from the literature review and preliminary questionnaire yielded suggestions relating to five of the six components of course design: context; content; teaching methods; and assessment (Ellis, Light, & Pryde, 1999). Results involving the component of goals, or learning outcomes, were not produced, however the learning outcomes used in this study were already predetermined as a requirement for offering an Ontario Ministry of Education approved credit. The suggestions found in each of these areas of course design, along with how they were incorporated in the design of MAT1L, are discussed below.

Similar to all courses at KiHS, the revised MAT1L course contained 28 lessons, one culminating activity, and one exam. Altogether, the course comprised of 110 instructional hours across a period of eight weeks. The organization of these activities is shown in Table 10.



Table 10

*Organization of Activities*

Week	Activities
Week 1	Introduction/Plagiarism 1.1: Life With Numbers 2.1: Measurement 3.1: Accuracy in Measurement 4.1: Perimeter Online Breeze Review Session #1
Week 2	5.1: Weekly Review 6.1: Area 7.1: Area of Triangles 8.1: Volume Online Breeze Review Session #2
Week 3	9.1: Volume of other Shapes 10.1: Weekly Review 11.1: Data 12.1: Looking at Data Online Breeze Review Session #3
Week 4	13.1: Using Data 14.1: Graphing Data 15.1: More Graphing Online Breeze Review Session #4 16.1: Midterm Review
Week 5	17.1: Fraction Action! 18.1: Using Models to Work with Fractions 19.1: Beyond Manipulatives Online Breeze Review Session #5 20.1: Weekly Review
Week 6	21.1: Number Relationships 22.1: Ratios 23.1: More Proportions 24.1: Weekly Review Online Breeze Review Session #6
Week 7	25.1: Percent and Money 26.1: Tax and Discounts 27.1: Ordering 28.1: Final Review Online Breeze Review Session #7
Week 8	Culminating Activity Final Exam

**Context.** The majority of the recommendations suggested by respondents on the preliminary questionnaire pertained to contextual issues. There are many contextual

issues that influence the design of a course, and instructors are encouraged to think about who they will be teaching, how the course will fit within their studies, and about the facilities and resources available to support them (Ellis, 2008). Keeler and Horney (2007) recommended identifying the target audience for a course and designing accordingly.

As the study investigated the needs of a very specific group of students, it is not surprising that contextual issues were frequently mentioned. Many of these recommendations from the preliminary questionnaire and literature review, extends beyond the boundaries of *context*, as the components of the course design model are interrelated, however, for the purpose of organization, each are categorized under the area that it fits best.

***Incorporate culture into instruction and content.*** One frequently mentioned recommendation in both the literature review and questionnaire was incorporating culture into instruction and content. Staff felt that incorporating Aboriginal content was important in meeting the needs of students with MID at KiHS, and the analysis of the literature review supported this recommendation, as having curriculum and teaching strategies that reflect Aboriginal culture were reported as two of the main factors that contribute to academic success (Ontario Ministry of Education, 2007). Therefore, Aboriginal resources and content were provided in the revised course as much as possible; however, limited resources containing Aboriginal content were located. For example, there were no interactive learning objects found in the Ontario Educational Resource Bank (OERB) for math that contained Aboriginal content or images. There were also no MATIL resources that could be located outside of the resource bank that

contained Aboriginal content or images. Therefore, when possible, terms and content within the course were modified to make them more culturally-appropriate. For example, to make content more relevant to the lives of students, wolves were compared to moose when learning about ratios, and a prominent local store was named when discussing discounts.

*Use clear and simple language at a level appropriate for students.* The design consideration to use clear and simple language originated from both the review of literature and preliminary questionnaire. When possible, language was simplified in the revised course to accommodate learners whose first language may not have been English and those learners with MID that may have difficulty with receptive language skills (Ontario Ministry of Education, 2002). Readability was measured using the Flesch Reading Ease<sup>®</sup> and the Flesch-Kindcaid Grade Level<sup>®</sup> to ensure that language in the revised course was simplified. The Flesch Reading Ease<sup>®</sup> measures the readability of text on a 100-point scale, with a higher score indicating text that is easier to understand. The Flesch-Kindcaid Grade Level<sup>®</sup> test produces a U.S. grade-level score using the average sentence length and the average number of syllables per word in a document. A selection of activities from each week and their readability levels can be found in the table below.

Table 11

*Readability of Activities: A Sample*

Activity	Flesh Reading Ease <sup>®</sup>	Flesch-Kincaid Grade Level <sup>®</sup>
Life with Numbers	Original – 72.5	Original – 5.6
	Revised – 76.5	Revised – 5.1
Volume	Original – 76.1	Original – 6.2
	Revised – 78.0	Revised – 5.6
Volume of Other Shapes	Original – 75.1	Original – 7.0
	Revised – 74.6	Revised – 6.8
Graphing Data	Original – 66.8	Original – 7.2
	Revised – 71.2	Revised – 6.8
Using Models to Work with Fractions	Original – 72.0	Original – 6.4
	Revised – 86.0	Revised – 3.8
Proportions	Original – 70.2	Original – 7.2
	Revised – 73.4	Revised – 6.2
Tax and Discounts	Original – 68.5	Original – 6.9
	Revised – 73.9	Revised – 5.8
Culminating Activity	Original – 76.1	Original – 5.5
	Revised – 80.2	Revised – 5.2

A glossary was also created to define difficult words and mathematical terms, and links to these definitions were provided in lessons. Figure 7 provides an example of an entry in this glossary.



Figure 7. Glossary added into revised course to provide additional content/support to students. Copyright 2013 by Keewaytinook Internet High School.

*Integrate the Western styles of education with traditional ways.* The set of design features developed from this study included integration of traditional ways of education with the Western style of education. An Aboriginal or traditional perspective on learning engages the entire individual and the community and includes learning by example and experience (Canadian Council on Learning, 2007; The Crossing Boundaries National Council, 2006). Integration of traditional ways of education was already well-established in the education environment at KiHS, so few changes were made in this area of context. For example, KiHS offers co-operative education courses in a variety of subject areas to encourage students to learn by example and experience. In addition, courses have assignments that require students to connect with their community outside of the online environment. Elders and other community members are also invited into the classroom to participate in ceremonies and celebrations, and when applicable, to share their knowledge through demonstration and story-telling.

*Offer flexibility in expectations and acknowledge the importance of family and community.* Similar to the integration of traditional ways of education, offering flexibility in expectations and schedules was already present in the design of courses at KiHS. Therefore, no changes were made to MAT1L to incorporate this design consideration. For example, similar to other courses at KiHS, the revised math course remained self-paced within an eight-week schedule, with students being able to obtain an extension if required, in order to accommodate the need for a flexible and self-paced schedule that Aboriginal students often need (Crossing Boundaries National Council, 2005; Goulet, 2001; Swanson, 2003). Because KiHS acknowledges the importance of family, community, and culture, students were already given flexibility in attendance to

participate in hunting weeks, feasts, and other community events. Students could also request course extensions for a valid reason, such as illness or Internet connectivity issues. Although the “Tabs Course Format” plug-in in MoodleFN organized lessons by week, all students at KiHS were provided flexibility regarding when they completed assignments and could submit assignments at any time from a previous week.

***Establish strong student-teacher relationships.*** The literature on Aboriginal education advocates building strong teacher/student relationships in order to increase academic success of students (Goulet, 2001; Ontario Ministry of Education, 2007). Correspondingly, the questionnaire results showed that staff at KiHS also felt that this relationship was important and requested that communication be increased between instructors and students. The recommendation to establish strong student-teacher relationships was included in the set of design considerations, and several features were added in the design of the revised course. Weekly video presentations by the teacher were included to provide an overview of the assignments and goals for the week, and to provide an opportunity for the teacher to connect with students. The instructor also held weekly synchronous meetings using Adobe<sup>®</sup> Connect<sup>™</sup>, a web-conferencing platform, where students could interact with each other and the teacher, through text, audio, and video conferencing. A chat box on the homepage of the course was also inserted for students to discuss the course material with their instructor. Figure 8 below illustrates how the course homepage was revised to increase teacher support and contact through the use of video announcements, web conferencing sessions, and a chat box.

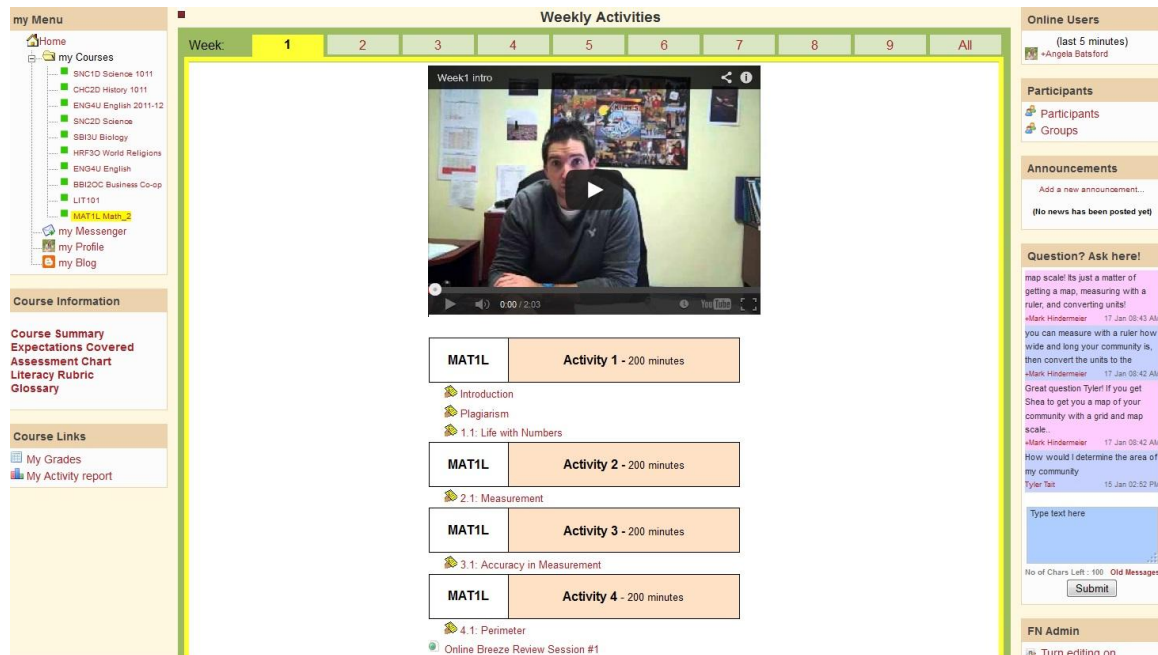


Figure 8. Revised course homepage in revised course showing increased teacher support and contact through the use of video announcements, web conferencing sessions, and a Q&A chat box.

***Engage learners in virtual dialogue.*** Numerous studies or reports encourage teachers to integrate human interaction into classroom activities (Hilberg & Tharp, 2002; Swanson, 2003). Therefore, this recommendation was added to the set of design considerations, and a couple of revisions were made to the MAT1L course to engage learners in virtual dialogue. As discussed previously, students could interact with their teacher and other learners through weekly synchronous meetings. The messaging feature in Moodle, which allows users to send instant messages to each other, was disabled across all courses by administration for productivity reasons, so students were unable to use this feature to communicate with others enrolled in the course. To compensate for the removal of the messaging feature and the corresponding reduction in interaction opportunities, a chat box was inserted on the course homepage, allowing students to write

messages that were visible to everyone in the course. Students were encouraged to use this chat box to ask questions about course content, and several students took advantage of this feature. However, the chat box did not compensate for the reduction in student-student interaction, but may have promoted an increase in student-instructor interaction. The chat box was selected over a Moodle forum for student questions because it occurred in real time, whereas the forum had a 30 minute delay before posts were recorded. In addition, while a chat box was static on the page, the forum would not be visible in each week, because of the FN plug-in that creates weekly tabs.

***Provide an opportunity for students to work with others.*** Working collaboratively with others is suggested in the literature for meeting the educational needs of both students with MID (Ontario Ministry of Education) and students of Aboriginal descent (Swanson, 2003). To implement the design consideration of providing students with an opportunity to work with others, a number of assignments allowed students to work in a group if they desired. For example, in a lesson reviewing measurement and fractions, students can choose to work with a partner to build a model of an aquarium. In another lesson, students can work with a partner to measure objects around the classroom.

***Link learner support-success services online.*** Students at KiHS already receive many of the disability-specific supports that Moisey and Hughes (2008) advocated, such as progress monitoring and educational counseling, but staff members felt that additional support could be provided through the use of links to online resources. To meet this design consideration, several new links were added, such as links to definitions of mathematical terms used in lessons, and a link to the glossary on the course homepage.



A link to the KiHS numeracy course, which covers basic mathematical skills and concepts, was also provided on the homepage. In addition, survey respondents suggested that support for students should continue to be provided by classroom assistants and special education staff. In the revision of the math course, support was further strengthened through the placement of a chat block located on the homepage of the course and through weekly web conferences. Recordings of the web-conferencing sessions were embedded directly within the course for those students who were unable to attend the synchronous meetings. These sessions included additional instruction on lessons and an opportunity for informal discussions. Students were able to communicate with the instructor through audio or text, thus allowing students to select the mode that they were more comfortable using.

*Strengthen self-esteem and identity.* The activities in the course were organized according to difficulty level with easier activities presented first in order to build students' self-esteem and confidence as recommended by Hilberg and Tharp (2002), Fairies (2009), Swanson (2003), Toulouse (2008), and Weber and Bennett (2004). An educational environment that honours the culture of Aboriginals also helps strengthen students' self-esteem and identify (Toulouse, 2006), thus, as discussed earlier, Aboriginal content was added when possible.

*Be conscious of bandwidth-restricted environments.* Another contextual factor from the set of design considerations was the bandwidth available to access the learning materials. Given that KiHS is situated in a bandwidth-restricted environment, the use of interactive materials and instructional videos in the revised course was a concern in the research study. No other means of supplying the interactive materials were explored in

the study as one of the constraints for course development at KiHS is to provide all course content within the online environment. Sending videos, textbooks, or hands-on materials to students via mail was discouraged because of the remoteness of communities, which could delay mail delivery and increase the cost of the program. In consideration of bandwidth, the use of interactive materials and instructional videos was limited to two per lesson and less than five minutes in length each. In addition to reducing the demands on bandwidth, videos of less than six minutes in length can optimize learning engagement (Guo, Kim, & Rubin, 2014). Because the interactive materials used in this study were presented in Flash format, which compresses the video and provides optional audio, these learning objects were considered suitable for areas with restricted bandwidth. Students were also able to save time by loading interactive materials and videos while they read other components of the lesson.

*Be conscious of accessibility standards.* As also suggested in the literature (Burstahler, 2012), one survey respondent felt that a universally designed course could not meet the needs of all students. While the purpose of the research study was not to design a course that could meet the needs of all students at KiHS, but only those with MID, the set of design considerations included several universal design principles found in the review of the literature. For instance, multiple means of representation were used for teaching mathematical concepts, the course interface was simplified, and an option for audio was included in interactive resources. Many of these principles were also located in the accessibility standards reviewed as part of the set of design features developed from this study. Some of the accessibility standards used in the revision included preserving consistency in layout, font, and colour, including descriptive embedded text

for images, and organizing content in a way that it was read by screen readers in a logical order. Providing a text equivalent for all non-text elements is a principle of online universal design (Crow, 2008), as well as an accessibility standard (IEEE, 2010).

Considering this recommendation, text captioning was provided as an option for all interactive lessons, learning objects, and videos in the revised course, but was not possible during synchronous web conferences.

**Content.** As one of the purposes of the study was to investigate course design features, the course curriculum remained unaltered. However, how the curriculum was presented to students was influenced by the set of design considerations (Table 9) developed from the review of literature and preliminary questionnaire.

***Link content to real-life experiences.*** The recommendation to link content to real-life experiences was included in the set of design considerations as students with MID can benefit from having content that is applicable to their lives (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002). A large amount of content in the course was already linked to real-life experiences, so no major revisions were necessary for this area. Any new resources or content added to the course was selected based on relevancy to students' lives.

***Match content to the ability levels of the learners.*** In addition to content being linked to real-life experiences, it should also be matched to the ability levels of the students (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002). In the revised course, some of the lessons were simplified and redundant content was removed to match the ability levels of students enrolled in the course, while still meeting the curriculum requirements of the Ministry of

Education. This revision provided the space in the course for additional review of content, one of the features added into the new design.

***Provide links to extra content.*** In the preliminary questionnaire, it was suggested that lessons provide links to extra content to meet the needs of students with MID. In response to this design consideration, the revised course included a link to the numeracy course, which contained lessons reviewing math skills necessary for Grade 9.

***Teaching methods.*** The majority of recommendations in the set of course design features were categorized under the component *teaching methods* in the course design. All of the recommendations for instructional methods listed in Table 12 were applied in the revision of the math course; a discussion of how they were utilized is provided below.

***Use a variety of instructional methods.*** One of the most frequently mentioned recommendation from the review of literature was the use of a variety of instructional practices. Survey respondents felt that the variety of teaching methods already used in KiHS courses was adequate, while other respondents wanted to see more instruction utilizing audio and/or video components. Accordingly, the revised course incorporated various videos (Figure 9), including learning objects from the OERB, and videos created with Camtasia Studio™, screen recording and video editing software that allows individuals to record on-screen activity, add interactive elements, edit videos, and share videos on a variety of devices (TechSmith, 2013). While the set of design features included adding Aboriginal content, there were no examples of videos or other learning objects depicting Aboriginal people in the OERB bank. With the constraints of the timelines for the development of the intervention and the implementation of the study, as

well as financial constraints, it was not possible to create videos or learning objects incorporating Aboriginal people for the revised course.

**Rates**

24.1

**Rates Vs. Ratios**

**Practice**

Let's do a short practice exercise that helps us compare rates vs. ratios.

**Find the Ratio and Rate**

Remember to Find the Ratio and Rate

In this activity you will be shown several different examples of either a ratio or a rate. You will decide whether the example is a ratio or a rate, then use your answer to drag the example to the correct box.

**Examples**

**Example 1** - The Northern Store sells bottled water for \$1.75 each. It also sells cases of 24 bottles of water for \$40.00. Which price is a better deal? Compare the price per

Figure 9. Lesson on rates and ratios in the revised course utilizing a variety of instructional methods, offering alternatives to written expression, and providing an extended opportunity to practice skills.

**Use drill and practice.** Drill and practice was one of the instructional strategies included in the set of design considerations to address the difficulties many students with MID have with memory (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002; Weber & Bennett, 2004). Drill

and practice exercises were added to the revised course to meet the needs of students with MID, while also increasing the variety of instructional practices in MAT1L.

***Provide opportunity for independent and interactive learning.*** As discussed earlier, some literature on Aboriginal education suggested using group activities to meet the social needs of the culture (Hilberg & Tharp, 2002; Swanson, 2003); however, other literature advocated the use of independent activities in online education (The Crossing Boundaries National Council, 2005). Therefore, a mix of activities was employed in the revision of the course, including optional group activities, independent work, and interactive online lessons.

***Provide courses that are less text-based.*** Both the review of literature and preliminary questionnaire recommended the use of lessons that are less text-based. A variety of instructional methods were also used to meet this design consideration, such as the use of instructional videos and the addition of interactive learning materials. The videos were teacher-developed or originated from YouTube. The majority of the interactive lessons and games were found in the Ontario Educational Resource Bank (OERB), a repository of learning objects that are directly linked to the Ontario elementary and secondary curriculum and appropriate for both the public and Catholic school systems (Ontario Ministry of Education, n.d.). The learning objects are re-usable, self-contained educational resources that are usually digital and web-based, and include units, lesson plans, activities, maps, and interactive learning resources (British Columbia Ministry of Education, 2013). Previously, the OERB was only for use by provincially-funded school boards, school authorities, and demonstration schools. However, under a year-long pilot project, KiHS was granted use of the learning object repository. The

researcher used a variety of resources from the resource bank, ranging in grade levels from elementary to secondary school, in view of the fact that the locally developed math curriculum contains many broad expectations, allowing the content to be easily tailored to the ability level of students. For example, one of the expectations is “solve problems involving money, drawn from everyday situations”, which provides flexibility for the teacher in terms of content and grade level. The instructional resources from the OERB bank were chosen based on topics that the researcher thought were valuable to their lives, rather than on the explicit grade level listed.

***Offer alternatives to written expression.*** To provide alternatives to written discussion, as suggested in the set of design considerations, web-conferencing was used for discussions, and students had to choice to interact with others using text, audio, or video. With the inclusion of video-conferencing, along with instructional videos, interactive lessons, graphical representations, and learning objects, the course shifted from being predominately text-based to a form that included multiple means of expression.

***Provide graphical representations of concepts.*** Providing graphical representations of concepts was recommended in both the review of literature and preliminary questionnaire. The revised course utilized a variety of graphical representations, including mind maps, graphs, diagrams, fraction circles, and number lines. For example, a diagram was utilized in the revised course to help students distinguish between area and perimeter.

***Provide real-time text captioning for all audio/video components.*** Another recommendation from the set of design features was to provide text captioning for all

audio and video components. In the revised course, real-time text captioning was inserted in all researcher-created videos and videos originating from YouTube. The learning objects originating from the OERB bank already included an option for text-captioning, so when these audio/video components were added into the revised course, no additional actions were necessary.

***Provide a text equivalent for all non-text elements.*** Including a text equivalent for all non-text elements is an accessibility standard (IEEE, 2010), as well as a principle of online universal design (Crow, 2008). Therefore, in addition to audio and video components, a text equivalent was provided for all graphics used in the revised course.

***When using audio, speak clearly and at a level and speed appropriate for students.*** For students with MID, it is recommended that teachers speak at a level and speed that meets the needs of their students (British Columbia Ministry of Education, n.d.). In consideration of this recommendation, the teacher and researcher were conscious of the speed, clarity, and level of their communication in the weekly announcements, web-conferencing, and instructional videos.

***Integrate hands-on activities and use concrete materials/use manipulatives.*** Other recommendations from the set of design considerations included using hands-on activities, concrete materials, and manipulatives when working with students with MID (More, 1999; Ontario Ministry of Education, 2002). Although KiHS is an online school, some hands-on activities were incorporated into the course, such as measuring the length of objects and building boxes to measure volume. Manipulatives and concrete materials, such as money kits and graphing supplies, were also available for students who wished to practice concepts offline. As not all the students may be studying in the learning centre



classroom where these supplies were readily available, the time and cost of shipping to remote Northern communities would make sending the supplies prohibitive. Instead, the hands-on activities used items, such as rulers or tape measures that were easily accessible to the students in the classroom and at home. In addition, interactive online resources were used to simulate hands-on activities, for example, an interactive game, which allowed students to manipulate fractions, was embedded into a lesson to provide an opportunity to practice division of fractions. A pie graphic with pieces that students could drag and drop illustrated how a pizza could be equally distributed among a group of people.

***Introduce key concepts and vocabulary at the beginning of lessons.*** When working with students with cognitive disabilities, it is recommended that key concepts and vocabulary are introduced at the beginning of new lessons or units (College Committee on Disability Issues, 2006). In response to these design considerations, key concepts and vocabulary were introduced at the beginning of lessons and also referenced in the Glossary Activity Module found at the static sidebar of the course.

***Highlight key words.*** A design element originating from the review of literature was to highlight key words for students with MID (Ontario Ministry of Education, 2002). In the revised course, highlighting was used to bring further attention to key terms and to indicate words that were linked in the glossary.

***Bridge learning of content to skills.*** When working with Aboriginal students in e-learning programs, it is suggested that instructors bridge learning of content to skills (The Cross Boundaries National Council, 2006). This design element was incorporated

into the revised course through the use of activities that were interactive, meaningful to students, and that made use of manipulatives when available.

***Sequence the steps involved in learning a skill or concept.*** The review of literature on educational strategies for MID suggest sequencing the steps for learning a new skill or concepts (Ontario Ministry of Education, 2002). To incorporate the design consideration, when new skills were being introduced in MAT1L, the steps were sequenced to facilitate assimilation for students. For example, when learning about how to calculate tax on a multi-item purchase, the steps were sequenced to show the logical order of calculations required to arrive at the final purchase amount.

***Scaffold learning.*** Scaffolding is used in universal design to help learners increase executive capacity and transform information into useable knowledge (Centre for Applied Special Technology, 2011). Modeling, providing multiple examples with decreasing amount of support, and online interactive tutorials were used to implement this design consideration in the revised MAT1L course.

***Teach the same concept or skill in many situations, use multiple examples, and provide extended and numerous opportunities to practice skills.*** Survey respondents felt that students would benefit from having several straightforward examples accompanying the content in a lesson, as well as from having several opportunities to practice the skills. In the literature review, the Ontario Ministry of Education (2002) and Weber and Bennett (2004) also advised teaching the same skill in multiple situations and giving students numerous opportunities to practice. In response to these recommendations, the revised course incorporated extra examples into lessons and previous examples were simplified when required. In addition, concepts were taught in multiple situations, and students

were given additional opportunities to practice these skills through the integration of interactive games and practice quizzes.

***Pay attention to structure in instruction.*** In order to accommodate many of the teaching strategies from the set of design considerations, changes were made to the master template of the course. Although a template is used for all courses in KiHS in order to maintain consistency within and across lessons, permission was given by the KiHS administration to alter the course template for the revised course used in this study. As students with MID can benefit from having structured routines, instruction, and learning environments (Weber & Bennett, 2004), a template can also serve to provide students with a standardized routine for completing lessons. The changes to the template will be discussed in further detail below.

In order to meet administrative requirements for newly developed courses, the revised template included an additional section that listed curriculum expectations for each activity. This section was inserted at the beginning of the template, as illustrated in Figure 11.

***Review previously learned material.*** Individuals with MID can experience difficulty with retention of knowledge (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002; Weber & Bennett, 2004), and having a structured review can assist in this retention of knowledge (More, 1999). Therefore, another section was added to the template to provide a consistent place to review the content presented in the activity (Figure 11). This recommendation was supported by the results of the questionnaire, where teachers at KiHS felt that these students would benefit from additional review of content. Taking this information into

consideration, revisions were made to the locally developed math course to include both weekly and unit-level review activities that students could use for feedback on their progress. In addition, each lesson provided a brief review of the content covered in the unit up to that point, as shown in the example found in Figure 10 below.

**Review**

So far, you have looked at measuring the lengths of things using rulers. By measuring the lengths of edges you are able to determine the *perimeter* of things like a room and the *area* of things like the area of a floor or a desk top. In this activity you look at the last kind of measurement of this course: **volume**. Before we look at volume, let's review.

**Perimeter**

**Perimeter** is the distance around a shape.

**Perimeter = the total length of all sides**

**Area**

**Area** is the amount of space inside a flat (2-dimensional) shape.

**Area of a rectangle =  $b \times h$**

**Area of a triangle =  $\frac{1}{2} b \times h$**

Figure 10. Example of content being reviewed in revised course. Copyright 2013 by Keewatinook Internet High School. Included with permission from Principal, KiHS: available on request.

Activities of similar topics were organized into units, and as individual units progressed, this section for review increased in the number of topics covered, but decreased in the

depth of detail explained. At the beginning of each unit, the content from the previous unit was removed to accommodate the new material.

*Use simple layouts.* Both the review of literature and preliminary questionnaire recommended using simple layouts in the design of courses for students with MID. To incorporate this design consideration, the master template for MAT1L was further modified. One of the sections in the course template, “Think about This,” which was used in KiHS courses to provide additional instructional material, was removed and all content from this section and the section “Read This,” was amalgamated into “Read This.” The revision simplified the course structure by having only one section, instead of two, for course content.

*Avoid using unnecessary graphics or pop-ups.* The last change to the course template was the removal of one of the columns that was used to display the majority of graphics. Unnecessary graphics can be distracting for students with exceptionalities, such as the students in this study (Brown, 2010; Keeler & Horney, 2007). Instead, graphics were wrapped into the corresponding text to establish a relationship between the two elements, and unnecessary graphics were removed. The revisions to the template are illustrated in the figure below.

ACCOMMODATING STUDENTS WITH MID

MAT1L - MEASUREMENT	MAT1L	2A-1: Measurement
What You Will Learn	Part A	Read This
Review This	Part B	Think About This
Read This	Part C	Do This
Do This	Evaluation	This is How You'll Be Marked
This is How You'll Be Marked		

Figure 11. The revised (left) and original template (right) for MAT1L. Copyright 2013 Keewaytinook Internet High School.

***Provide consistent navigation across the site.*** For students with intellectual disability, consistency in the online learning environment also includes the navigation within the web site (Rowland, 2004). This design consideration was acknowledged in the revision of the math course; however, no major changes were required because MoodleFN already had consistent navigation.

***Put less information on a page.*** To cover multiple topics, some online courses at KiHS use one large lesson and others use several smaller lessons. Survey respondents felt that long lessons should not be used in courses for students with MID. A similar recommendation in the review of the literature reinforced this suggestion with findings that students with MID benefit from having less information on a page (More, 1999). In the course revision, lengthy lessons were replaced with several smaller lessons, extraneous content was removed, and extensive text was replaced by video presentations.

***Chunk information into manageable parts.*** Students with MID also benefit from having information broken down into smaller chunks (Ministry of Education, 2002). The use of a template that divided lessons into several components remained in use during the revision of the course. To assist in chunking similar information, assignments were divided into five parts: “what you will learn”, “review this”, “read this”, “do this”, and “this is how you will be marked.” Instruction and assessment were organized into manageable parts using titles and headings.

***Use page titles and headings.*** Using appropriate headings to organize text into smaller sections can assist individuals, such as those with MID, who may struggle with receptive language and processing (Brown, 2010). The use of appropriate titles and headings can also increase web accessibility for learners (Crow, 2006). Therefore, in

addition to using titles and headings to organize lessons and chunk information, headings and titles were utilized to increase web accessibility in the revised course.

*Develop consistent template, design, and style.* Brown (2010) identified having the layout of content organized and consistent across all pages as an important feature in supporting students with cognitive disabilities in online learning. Thus, across all MAT1L lessons, the style, size, and colour of text were kept uniform and the colour of the template was also kept consistent within the course and with other math courses at KiHS. For example, black 12-point Arial typeface was used for all body text in lessons, and bolded, blue 14-point Arial typeface was used for subheadings. The template, like other math courses, used red boxes with white 14-point Arial typeface to organize and separate the different components (This is What You Will Learn, Review, Read This, Do This, This is How You Will be Marked) of each lesson.

*Use well organized and uncluttered web pages.* Having uncluttered web pages is another valuable design consideration for students with cognitive impairments (Crow, 2006). Unnecessary content and graphics were removed from lessons in the original math course to create more organized and less distracting web pages. The template, together with headings and titles, assisted in the organization of web pages.

*Allow for materials to be enlarged.* Allowing for material to be enlarged was another recommendation included in the set of design considerations resulting from the review of literature and preliminary questionnaire. The text in the original course was a 12-point typeface, which is the standard text size for lessons at KiHS. The text size remained the same in the revised course since the Internet browsers (Google Chrome,



Internet Explorer, and Mozilla Firefox) that are used at KiHS allow the user to enlarge or reduce the view of a webpage, including text and images.

***Avoid threaded discussion.*** Given that threaded discussions require the use of both receptive and expressive language skills, and students with MID may experience difficulties in both of these areas, it is recommended that they not be included in the design of a course (Brown, 2010; Weber & Bennett, 2004). This design element was considered in the revision of MAT1L, and forums with threaded discussions were not used.

***Limit use of external links and ensure that the level of external sites are appropriate for learners.*** Links to external websites within a course can create confusion for students with cognitive disabilities, especially when websites are not designed for these students (Brown, 2010). In addition, a study completed by Fichten et al. (2009) found that the most common problem reported by students with disabilities was inaccessibility of websites. Brown (2010) suggested that teachers can reduce student frustration by limiting the number of external websites used; choosing sites that match the students' reading level; and preparing a list of questions that the students will answer when visiting the website. Because of the difficulty locating websites that were appropriate to the reading and comprehension level of students, as well as websites that were free of distracting material, such as advertisements, external links were removed in the revised course (See Appendix G). Nearly all of the websites that were linked in the original course included pop-up advertisements, banner advertisements, unnecessary graphics, and other forms of extraneous information, which can be distracting for students with exceptionalities, such as MID (Brown, 2010; Keeler & Horney, 2007). To

compensate for the removal of these external links, the material was incorporated within the lessons through the use of embedded videos and interactive activities, and/or written content.

**Assessment.** In comparison to the changes made in the teaching methods for the revised course, few modifications were made to the assessment in activities. Similar to the original course, the formative assessment in the revised course accounted for 70% of the final grade, and the summative assessment was worth 30%.

***Use multiple means of assessment.*** The results from the preliminary questionnaire and the review of literature demonstrated the value of having multiple means of assessments for students with MID (More, 1999; Ontario Ministry of Education, 2002). Accordingly, assessment strategies remained varied in the math course with some of the assessment tools including self-grading quizzes, rubrics, self-assessment activities, culminating activities, exams, and worksheets.

***Provide practice questions.*** Both the review of literature and preliminary questionnaire yielded the design consideration to provide practice questions. Learning objects, such as online quizzes and games, were introduced to provide opportunities for practice and self-evaluation. Before the revision of MAT1L, there was little or no opportunity for students to practice the skills being taught before the formal assessment. In the new design, interactive games and quizzes from the OERB were used to provide practice before assessment.

***Provide multiple opportunities to demonstrate learning.*** Students with MID can benefit from having multiple opportunities to demonstrate what they are learning (Ontario Ministry of Education, 2002). As mentioned earlier, learning objects from the

OERB were inserted into revised math lessons. The learning objects provided students with an opportunity to demonstrate learning and supplied another means of offering feedback to students. In addition, all expectations were covered more than once in the revised course, therefore, students had multiple occasions to demonstrate that they had met expectations for MAT1L.

***Provide frequent assessment and use frequent short assessments rather than one long assessment.*** Short assessments occurred in most activities in the course, providing frequent formative feedback to students, as suggested in the literature (Butler, Miller, Lee, & Pierce, 2001; Metro Consortium for Students with Mild Intellectual Disabilities, 2002). Since assessment occurred frequently, students were also provided multiple opportunities to demonstrate their learning.

***Offer alternative forms of assessment.*** As recommended in the set of design considerations, students in the revised course were able to submit assignments in alternative formats, with permission from the course instructor, even if the option was not explicitly provided. For example, students were able to complete oral reports instead of written submissions for assignments.

***Give clear, specific written directions.*** The final revision in the MAT1L course was simplifying the instructions for the assessment activities. Complicated directions were revised to be clear and precise, in order to compensate for the difficulty that students with MID may have following directions and understanding abstract, figurative, or complicated language (Ontario Ministry of Education, 2002).

### **Ongoing Course Revision Process**

Similar to all courses at KiHS, mentors were encouraged to provide feedback to the instructor about any changes that were required or recommended during delivery of the course. In this research study, feedback was also provided to the researcher. This open development of work throughout the research process is an essential component of participatory action research (MacDonald, 2012). Several changes, which are described below, were made to MAT1L after the initial revision based on this formative feedback.

In response to feedback received from a study participant after the course had begun, and with permission of the KiHS administration, the researcher simplified the wording of the course expectations in the remainder of the activities. The participant felt that some of the wording used in the Ontario curriculum documents was too difficult for students to understand and that the language used in the expectations could be simplified while retaining the meaning.

As part of the cyclical process of evaluating and revising the intervention to meet the needs of students with MID, additional videos were inserted into MAT1L. Two extra videos were inserted into week five in response to a mentor on February 5, 2013 requesting that some of the content for that week be explained through audio or video to reduce the reading load of his or her students. Although the mentor had initiated the use of screen-reading software to reduce the reading load, in consultation with the special education teacher/course instructor it was decided that some of the content would be better delivered in an alternative way, such as video. The instructor provided suggestions of video clips that would best explain the content. In addition, a video created by the researcher using Camtasia was inserted into week seven to replace written examples of

proportions. On February 19, 2013, a mentor communicated to the researcher that proportions could be more easily understood by students if they were able to see how someone worked through the problem using the steps outlined in the lessons, rather than through text explaining the process.

No other changes were made to the design of the course beyond simplifying the course expectations and inserting additional videos. These revisions, along with the preliminary revisions, contributed to the design of MAT1L that teachers evaluated in the second questionnaire and follow-up interview.

### **Interactions with the Course**

The revised MAT1L course was offered in semester three, which ran from January 7, 2013 to March 8, 2013. Nine students, who were formally identified as having MID, or as having similar needs, were enrolled. Based on the geographical location of these students, seven mentors, along with the course instructor, interacted with the course.

Prior to the course being offered, course mentors were aware that there would be two versions of the math course. Students with MID, or similar needs, who were enrolled in MAT1L were informed that the course was revised to include accommodations and other design features that may benefit them, and were given the choice of which version of MAT1L that they would like to take. All of these students chose to take the revised course.

The mentors' interaction with the students, course instructor, and interim special education teacher remained fairly similar to that of the original course. The mentors were available to help students in the situated learning centre when required. The noticeable

difference in the revised course was that mentors did not have to provide the list of instructional or assessment accommodations to each student as prescribed on their IEP. By not having to modify lessons to incorporate accommodations, mentors had increased time available for other responsibilities and the students with MID therefore spent less time working side-by-side with mentors on assignments, thus making them less obviously singled out for special attention. Mentors continued to communicate regularly with the special education teacher and course instructor regarding students' progress. In common with other courses at KiHS, mentors were encouraged to provide feedback about the course; however, because the researcher was responsible for development of the revised course, feedback was given to researcher rather than the course instructor.

The teacher's interaction with the students increased with the revised course. Typically at KiHS, teachers will communicate with students through feedback in lessons, course news, and occasionally through email. Since one of the recommendations from the list of design elements was to establish strong student-teacher relationships, the teacher revised the course to include video announcements, web conferencing software, and a chat box.

Students' interactions with the math course changed in some ways, but remained consistent in others. Students no longer had to follow a list of accommodations for each activity, thus allowing them to complete an activity unaltered. The revisions to the math course allowed students to experience an online course as a student without accommodations at KiHS. Although students' lessons may appear different than others enrolled in MAT1L, those students in the revised course were part of the larger MAT1L class. For example, all students taking MAT1L, whether in the revised course or original

course, participated in the same synchronous meetings, received the same weekly announcements, and were able to work together for group assignments. Instructional time (110 hours) remained unaltered in the revised course; therefore students in this study were not required to spend additional time on lessons.

The interim special education teacher was also the course instructor for MAT1L. The contact between the special education teacher with students and mentors remained similar to that of the past. For example, the special education teacher communicated regularly with mentors about students with IEPs. The workload of the special education teacher was reduced as there was no longer a need to create a list of accommodations for each lesson in the course. The instructor, like the mentors, was encouraged to provide feedback about the course. Frequent communication between the course instructor/special education teacher and the researcher occurred throughout the delivery of MAT1L in order to continually improve the design. These suggestions were based on communication from mentors who were observing students working in the course, or experiences communicated to the mentor by the students enrolled in the course.

This chapter discussed how the set of design features developed from the review of literature and preliminary questionnaire were used to revise MAT1L, what revisions were made during delivery of the course based on feedback from study participants, and how all of these revisions affected teachers' and students' interactions with the course. The next chapter will communicate and discuss the findings from evaluating the outcome, the revised course. The chapter will include results from the second questionnaire, as well as the follow-up interviews.

## Chapter VII: Evaluating the Outcome

This chapter will present and discuss the results from the research study that addressed the problem of students with mild intellectual disability at KiHS not having all of their needs being met in online courses. The last stage in the action research cycle for this study was evaluating the outcome. In this stage, a questionnaire and follow-up interviews were used to determine the success of the intervention

The revised course, MAT1L, was offered to students during term three from January 7, 2013 to March 8, 2013. The course was revised by the researcher, incorporating the design suggestions gathered from the stage of planning the intervention, previously discussed in Chapter V. A list of these design features can be found in Table 9. Each lesson of the original course was reviewed and any necessary changes were made to meet the design suggestions. Screenshots showing the revised course pages before and after the revision can be found in Chapter VI and also appear in Appendix G.

Nine students were enrolled at the beginning of the term; four were active at the mid-way point in the course, and three of these students (33%) received the credit for the course. Of the five students who did not make it to the mid-way point, one student had to leave the community, another student started a full-time job, one was withdrawn to focus on another course, and the two others did not attend KiHS during the term. Considering only those who were active mid-way in the course, the percentage of students earning the credit would rise to 75%. Although the number of students in this dissertation study was small, the number of students with an IEP who enroll in MAT1L is consistent with previous years. The table below shows the enrollment in MAT1L for students with IEPs, and the percentage of students who received a credit. The statistics show, in comparison



to the numbers described above, an improvement in the number of students with exceptionalities earning a credit in MAT1L.

Table 12

*Course Completion Rate for Students with IEPs in MAT1L*

Year	# of Students Enrolled	# Students Active Mid-Point	# of Students who Received the Credit	% of Active Students who Received the Credit
2009/2010	7	6	1	17%
2010/2011	9	8	2	25%
2011/2012	6	2	1	50%

Perceptions of teachers of the success of the revised math course in meeting needs of students with mild intellectual disability, or those with similar needs, were assessed using a questionnaire and follow-up interviews. The questionnaire was distributed to all teachers who consented to participate in the research study and had also worked with the revised course as an instructor or mentor. A follow-up interview was used to acquire further details on the perceived success of the intervention. Both the questionnaire and follow-up interviews invited suggestions for improvement for the math course and subsequent courses that might be developed at KiHS for students with special needs.

This chapter will begin by presenting the findings from the secondary questionnaire and interview, which took place after the revised course was offered and the term complete. The findings are organized by the method used for data collection, beginning with the results from the questionnaire, followed by the results from the interviews. A discussion of the results will follow, along with a summary of the findings.

## **Participants**

Course instructors and mentors who worked with students in the revised math course were asked to participate at this stage of the research study. All of the seven staff members who worked with students on the revised math course completed a post-intervention questionnaire (see Appendix B) measuring their perception of the success of the intervention. This high response rate (100%) on the second questionnaire was higher than normal and better than expected for a questionnaire (Cohen, Manion, & Morrison, 2007). Participants selected for follow-up interviews were those who volunteered to do so on the post-intervention questionnaire. Three staff members volunteered, but only two participants (29%) were interviewed, as the third person declined to participate because of time constraints. Although the interviews were not as successful as expected, they did elicit additional elaboration on the topics covered in the questionnaire evaluating the intervention.

## **Results from Evaluating the Intervention**

### **Secondary Questionnaire**

The questionnaire evaluating the outcomes of the intervention comprised 10 questions. The first nine questions asked respondents to respond to statements using a 4-point Likert scale. The last question was open-ended and permitted respondents to write a comment of any length. The questionnaire was distributed on March 11, 2013, with three follow-up reminders being sent on April 1, April 8, and April 15, 2013, as discussed in Chapter IV. Responses to each of the questions on the questionnaire are explored in more detail below.

**Question one.** The purpose of the first question was to determine if respondents felt that the curriculum expectations were fully covered in the revised math course. This question covered the area of *goals* in course design (Ellis, Light, & Pryde, 1999). Although curriculum expectations were not developed by the researcher in this study, they are the expectations that teachers must incorporate into any course that is developed or instructed in an accredited secondary school. Therefore, it was important that the content in the revised course still met the expectations or goals required to grant a course credit to students.

The majority of respondents (86%) felt that the curriculum expectations were fully covered in the revised course (Table 13). Only one respondent (14%) disagreed that the course included all of the expectations as required by the Ontario Ministry of Education. However, each lesson listed the expectations that were to be covered, and to meet the requirements of the Ontario Ministry of Education, each expectation was covered at least once throughout the course. Therefore, future exploration through a follow-up interview could help determine why the one respondent felt that the expectations were not covered.

Table 13

*Question One: The Curriculum Expectations Are Fully Covered*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	1	14%
Agree	5	71%
Strongly Agree	1	14%
<b>Disagree Total</b>	<b>1</b>	<b>14%</b>
<b>Agree Total</b>	<b>6</b>	<b>86%</b>

**Question two.** In the review of literature, it was recommended that navigation for students with intellectual disabilities be effortless (Cavanaugh, Repetto, Wayer and Spitler, 2013; Crow, 2006) and that universal instructional design principles include keeping the interface simple and uncomplicated (Elias, 2010). For these reasons, Question two was used to determine if the revised lesson template and course interface, including the elimination of the external links and extraneous graphics, fulfilled these suggestions for course design.

Table 14 shows that all seven respondents (100%) felt students had little difficulty navigating through the course.

Table 14

*Question Two: The Course is Easy to Navigate for Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	0	0%
Agree	6	86%
Strongly Agree	1	14%
<b>Disagree Total</b>	<b>0</b>	<b>0%</b>
<b>Agree Total</b>	<b>7</b>	<b>100%</b>

**Question three.** The purpose behind Question three was to determine if teachers perceived the content of the course to be relevant to the students in this study. This was an essential question, as curriculum that reflects their culture contributes to the success of Aboriginal learners (Faries, 2009; Ontario Ministry of Education, 2007). Furthermore, it was important to have content that reflected the student's environment, as students with MID benefit from content that is linked to real-life applications (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002). One respondent (8%) in the preliminary questionnaire from planning the intervention had

indicated that he/she would like to see more Aboriginal content in courses at KiHS.

Therefore, in the revision of MAT1L, additional Aboriginal content was included when available.

The results from this question indicated that most respondents (71%) considered the content in the revised course to be applicable to the students' lives (Table 15). Only two respondents (29%) disagreed that the content was relevant to the lives of Aboriginal students with MID. While every effort was made to include Aboriginal content, it was difficult to find math resources that were targeted to the First Nations culture of students in this study. For instance, 27% of the respondents in the preliminary questionnaire wanted to see more non-textual components used for instruction (Figure 4, p. 190), such as interactive tools; however, as mentioned in Chapter VI, there were no interactive learning objects located in the Ontario Educational Resource Bank (OERB) for math that contained Aboriginal content or images. Thus, it is not surprising that some respondents felt that not all of the content was applicable to the students with MID at KiHS.

Table 15

*Question Three: The Content of the Course is Applicable to the Lives of the Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	2	29%
Agree	5	71%
Strongly Agree	0	0%
<b>Disagree Total</b>	<b>2</b>	<b>29%</b>
<b>Agree Total</b>	<b>5</b>	<b>71%</b>

**Question four.** Question four looked at a contextual issue, and asked teachers if they agreed that the course content was presented in a way that suited the reading and comprehension level of the enrolled students. It was seen as necessary to evaluate the

readability level of the revised text as the length and the language of the text was a concern of 47% of the respondents to the preliminary questionnaire (Figure 4, p. 190). Accordingly, the post-intervention questionnaire asked respondents their opinion on the statement, “The content of the course is presented in a way that suits the reading and comprehension levels of the students.”

Table 16 below shows that the opinions were mixed, as 57% of the respondents agreed and 43% disagreed that the level of text in the redesigned course met learners’ needs. The length and reading level of the text was simplified in the new design of MAT1L (Table 11); however, the content to be covered could not be altered because of the curriculum requirements of the course. Because of this constraint, and the fact that mathematic skills are one of the most noticeable deficits in academic achievement for students with MID (Ontario Ministry of Education, 2002; Weber & Bennett, 2004), some respondents may have felt that the content, which includes mathematical terms that cannot always be simplified, was not suitable to the reading comprehension levels of students.

Table 16

*Question Four: The Content of the Course is Presented in a Way that Suits the Reading and Comprehension Levels of the Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	3	43%
Agree	4	57%
Strongly Agree	0	0%
<b>Disagree Total</b>	<b>3</b>	<b>43%</b>
<b>Agree Total</b>	<b>4</b>	<b>57%</b>

**Question five.** The purpose behind Question five was to look at the teaching methods used in the locally developed math course created for students with MID. Several respondents in the preliminary questionnaire felt that courses at KiHS should include a range of instructional techniques for these students (Figure 6, p. 194). The Ontario Ministry of Education (2002) also recommends using a variety of instructional methods to meet the learning needs of students with MID. Therefore, respondents in the follow-up questionnaire were asked whether or not they agreed that the content was presented in multiple ways in the revised course. In the new design, videos, interactive lessons, and interactive games were added to the repertoire of instructional methods.

Table 17 shows that all respondents (100%) were of the opinion that “the content is presented in multiple ways,” with 14% strongly agreeing to this statement.

Table 17

*Question Five: The Content is Presented in Multiple Ways*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	0	0%
Agree	6	86%
Strongly Agree	1	14%
<b>Disagree Total</b>	<b>0</b>	<b>0%</b>
<b>Agree Total</b>	<b>7</b>	<b>100%</b>

**Question six.** The area of teaching methods in course design was further examined in Question six, given that having a variety of teaching methods is not effective if they are not appropriate for the learners. Considering the specific needs of students with MID, questionnaire respondents were asked about whether or not they felt that the teaching methods matched these needs.

As 27% of the respondents in the preliminary questionnaire wanted to see more variety in the instructional techniques used (Figure 6, p. 194), new methods, such as the use of interactive games and videos, were used to teach the MAT1L curriculum. These methods were chosen based on their appropriateness to the ability level of the students with MID at KiHS. Factors, such as the level of language, difficulty level, and length of content/exercise were examined when determining the suitability of these methods. In addition, methods were chosen in consideration of restrictions on bandwidth and only interactive materials that were presented in compressed Flash format and videos of less than five minutes in length were selected. Not only did keeping the length of videos to a minimum assist in decreasing the demands on bandwidth, videos of less than six minutes in length help optimize learning engagement (Guo, Kim, & Rubin, 2014).

The majority of respondents (86%) agreed that the teaching methods used in the revised course were appropriate for the ability level of the students (Table 18). Only one respondent (14%) felt that the teaching methods did not suit the learners' capacity. This discrepancy was explored in the follow-up interviews.

Table 18

*Question Six: The Teaching Methods used in the Course are Applicable for the Ability Level of the Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	1	14%
Agree	6	86%
Strongly Agree	0	0%
<b>Disagree Total</b>	<b>1</b>	<b>14%</b>
<b>Agree Total</b>	<b>6</b>	<b>86%</b>

**Question seven.** The function of Question seven was again to look at the level of text in the course, but this time for the assessment section of lessons. The template used



in the math course separated the content being taught from the assessment, so the purpose behind this question was to ensure that the level of text continued to suit the learners' abilities throughout each activity.

Table 18 shows that while a greater number of teachers (57%) agreed that the instructions were written at an appropriate level, several teachers (43%) felt that the instructions did not match the reading and comprehension level of the students. Similar to the results of Question 4, respondents may have felt that the content itself was what made the readability of the language unsuitable to the learners. The subject of mathematics contains terms and language that cannot be changed without losing the meaning. For example, the term *denominator* used in the MAT1L curriculum is a term that cannot be simplified and that is not commonly used in students' lives.

Table 19

*Question Seven: The Instructions for the Activities are Presented in a Way that Suits the Reading and Comprehension Levels of the Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	3	43%
Agree	4	57%
Strongly Agree	0	0%
<b>Disagree Total</b>	<b>3</b>	<b>43%</b>
<b>Agree Total</b>	<b>4</b>	<b>57%</b>

**Question eight.** Question eight asked respondents for their opinions of the assessment strategies used in the revised course. While staff members had already expressed satisfaction with the assessment strategies utilized in courses at KiHS in the preliminary questionnaire, this question on the post-intervention questionnaire ensured that the quality was upheld in the revised course. Some of the recommended assessment strategies that were maintained in the design were the use of alternative forms of

assessment, simplified wording, and highlighted key words (Ontario Ministry of Education, 2002). Table 20 shows that all respondents (100%) agreed that the assessment practices utilized in the new course matched the abilities of the students.

Table 20

*Question Eight: The Type of Assessment Used Suits the Abilities of the Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	0	0%
Agree	7	100%
Strongly Agree	0	0%
<b>Disagree Total</b>	<b>0</b>	<b>0%</b>
<b>Agree Total</b>	<b>7</b>	<b>100%</b>

**Question nine.** The purpose behind Question nine was to determine the overall satisfaction of teachers with the changes made to the locally developed math course. As identified earlier in Chapter One teachers and mentors had previously identified as a concern the fact that students with MID at KiHS were not receiving, in their online courses, all accommodations prescribed in their IEPs. It was therefore important to elicit the perceptions of teachers and mentors regarding the effectiveness of the design elements implemented in the revised course in accommodating the needs of these students. Altogether respondents concurred that design elements effectively met the needs of students with MID, with 86% agreeing, and 14% strongly agreeing to the statement (Table 21).

Table 21

*Question Nine: Overall, I was Satisfied with the Changes That Were Made to the Course to Accommodate These Students*

<b>Magnitude Code</b>	<b>Total</b>	<b>Percent</b>
Strongly Disagree	0	0%
Disagree	0	0%
Agree	6	86%
Strongly Agree	1	14%
<b>Disagree Total</b>	<b>0</b>	<b>0%</b>
<b>Agree Total</b>	<b>7</b>	<b>100%</b>

**Question ten.** The function of Question 10 was to collect ideas for improving the design of the revised math course for students with MID. The question was “what other suggestions do you have to further improve the course or make it more appropriate to the needs of the students?” It was open-ended to encourage respondents to provide detailed feedback on the revised math course.

Only three respondents (43%) responded to this question with suggestions for improvement. Recommendations included the following:

- designing activities to incorporate the use of manipulatives (66% of coded responses);
- spending a week on Canadian money (33% of coded responses); and
- simplifying wording (shorter text and language) even further so that students could easily contextualize the content (33% of coded responses).

In addition to providing suggestions, respondents also offered positive feedback about the course. For example, one staff member wrote, “Overall, this course was a great experience for the student throughout and he enjoyed it and the success he experienced,” and another commented “Overall, I like the new layout and you breaking down the steps.”

## **Interviews**

The interviews occurred after the administration of the second questionnaire and took place between April 16 and April 30, 2013.

The questions used in the interview were open-ended and were used as a guide for the interview. The semi-structured format allowed for the researcher and respondents to share and learn throughout the interview in the reciprocal manner that characterizes participatory action research (MacDonald, 2012). The interviews consisted of a preamble describing the purpose of the interview, along with five questions concerning the revision of the MATIL course.

Three questionnaire respondents (43%) agreed to a follow-up interview, but only two interviews occurred. Both were face-to-face interviews, with the audio recorded. Because participants could discuss each of the areas in as much depth as they desired, the two interviews were vastly different in length. The first interview was six minutes, and the second was 43 minutes in duration.

Following the interviews, the recordings were transcribed, summarized, and sent to participants to see if the transcription was correct and the summary adequately captured what they wanted to say. During this member-checking process, neither participant changed their responses from the interview. After transcribing and member-checking, the responses from the interviews were analyzed.

Analysis occurred by coding the data using NVivo™. The data from the interviews were coded into the predetermined themes of “Stop,” “Start,” and “Continue”. Under these parent codes, the child nodes of “Goals,” “Context,” “Content,” “Teaching

Methods,” and “Assessment” were used to further analyze the data. Using detailed coding, nodes were then created under each one of these areas of design.

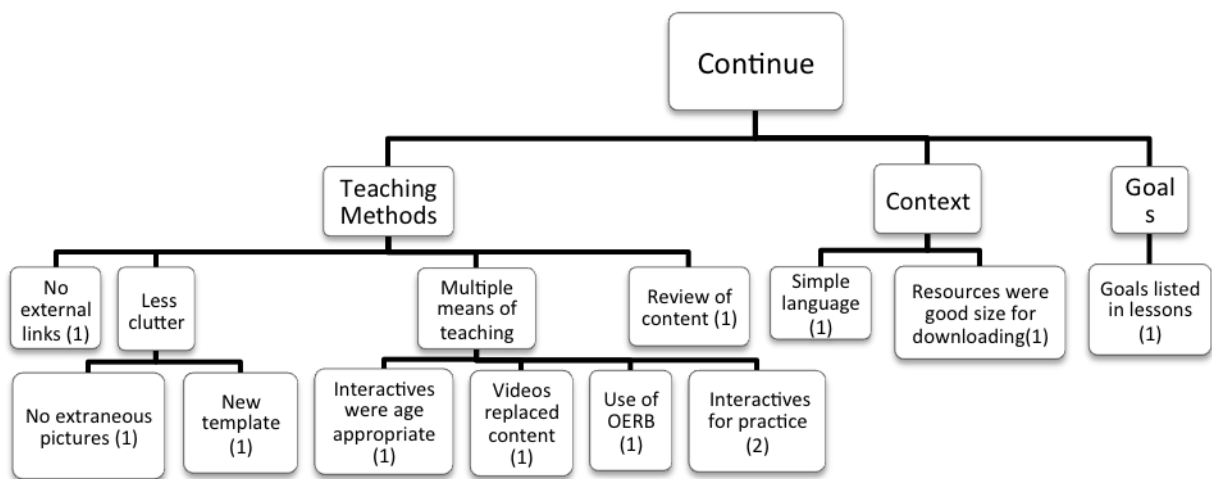
Detailed descriptions of interview questions, along with the results, are discussed in the following section.

**Question one.** The preliminary questionnaire in this study, distributed before the intervention, asked participants about their experience in teaching in general, teaching online, and teaching students with special needs. The first question of the interview further examined the background knowledge of participants by asking about their previous experience teaching the locally developed math course. This information was used to establish the validity of the responses. From both of these sources, it was determined that the participants in the follow-up interview had experience in all of the areas being examined in the study.

**Question two.** Question two asked for participants’ perception on how well they thought that the design of the course met the needs of Aboriginal students with MID or those with similar needs. Although the question was previously asked in the post-intervention questionnaire, additional depth was sought in responses for this interview question. Similar to the post-intervention questionnaire, both interviewees felt that students’ needs were met in the revised course. Additional details about why they felt that the course met students’ needs are discussed in Question three.

**Question three.** The aspects of course design that worked and did not work were the focus of Question three. Neither of the teachers interviewed had negative feedback about any features of the course design. Instead, they voiced their opinions in the form of suggestions for the future and provided feedback on what features they felt were

successful in the revised course. Figure 5, under the heading “Continue” lists the features that respondents felt worked in the course. Design features are organized under one of the five components of course design (Ellis, Light, & Pryde, 1999). Teaching methods, context, and goals were three areas of course design that were coded from the interviews. The responses that were coded under each of these areas are shown in Figure 12 below, and described in the section that follows.



*Figure 12.* Course design features that respondents would like continued in further development of the course.

When discussing teaching methods used in the intervention, the interviewees had several positive comments. Design elements that they felt should be maintained in future courses for students with MID included the use of videos and interactive materials (five responses coded), uncluttered lessons (two responses coded), continual review of content (one response coded), and self-contained lessons (one response coded). During the interview, participants focused on the use of videos and the interactive resources from the OERB, a resource bank of learning materials for use in Ontario provincial schools.

Interactive resources, mostly originating from the OERB, were used in the majority of the 28 lessons in the revised course. Videos found on YouTube or created by the researcher were also used frequently in lessons. Specific course design features that participants felt were successful included the following:

- The use of interactive resources, specifically from the OERB (one response coded);
- The use of interactive resources that were age-appropriate (one response coded);
- The use of interactive learning objects to practice concepts (two responses coded); and
- The use of videos to replace lengthy text in lessons (one response coded).

The purpose of the follow-up interviews was to allow respondents to elaborate on their opinions of the course design, such as the disagreement found in the second questionnaire over the level of the instructional methods used; however, neither of the interview participants expressed dissatisfaction with the level of the instructional methods in the revised course.

The other two areas of course design, context and goals, were only briefly discussed by the interviewees. Features in these areas that teachers felt were successful in the revised courses were simplified language (one response coded), use of resources that did not require much time to download (one response coded), and goals listed for each lesson (one response coded).

**Question four.** The purpose of Question four was to get an overall opinion on the success of the intervention. In the end, both interviewees considered the intervention

to be a success and something that should be implemented with other courses at KiHS. For example, one interviewee expressed an interest in having the science courses revised in the following year in order to ensure that students with MID had compulsory credits that they were capable of achieving. This recommendation was consistent with the finding from the preliminary questionnaire which found that science was the subject area that respondents felt was in most need of revision to meet the needs of students with MID. The only other compulsory subject that was mentioned by respondents in the preliminary questionnaire, and was again mentioned in the interviews, was English. However, revising the English courses was seen as less of a priority, compared to other compulsory credit courses.

**Question five.** The last question asked interviewees for suggestions for further development of the math course. Figure 13 lists these suggestions under their appropriate area of course design. Again, teaching methods was the most discussed topic (60% of coded responses). Suggestions for improvement included the following:

- utilize external links in moderation to develop research skills;
- create a unit on conversions, or provide content in numeracy course and link to revised math course;
- include a unit on Canadian money rather than just a couple of lessons;
- have additional lessons that use manipulatives;
- provide printable outline of steps after each video;
- have questions for assessment piggyback off of each other; and
- increase use of multimedia for instruction (e.g., videos, slide show presentations).



Content, context, and goals were three areas of design that were briefly touched upon by the interviewees. One thought that the level of the math content could be lowered further for students with MID. While both agreed that the language was simpler in the revised course in comparison to the original math course, they felt it could still benefit from additional simplification. This suggestion aligns with the results of the post-intervention questionnaire, which showed that several respondents felt that the content and assessment instructions were not presented in a way that suited the reading and comprehension level of students (See Tables 16 and 19). With regards to the goals of the math course, one interviewee strongly felt that the expectations should not be included directly at the beginning of lessons as required by administration, but rather should be included on the homepage as an optional resource students could view. The interviewee also felt that the language used in the curriculum expectations from the Ontario Ministry of Education was too difficult and lengthy for students. Even after the researcher had modified the expectations with simpler language and shorter text, based on feedback from the intervention, the teacher sensed that the students were still getting distracted and discouraged when they saw a long list of expectations at the beginning of lessons. As an alternative, it was suggested that a simple statement or video highlighting what would be learned should be included at the beginning of each lesson.

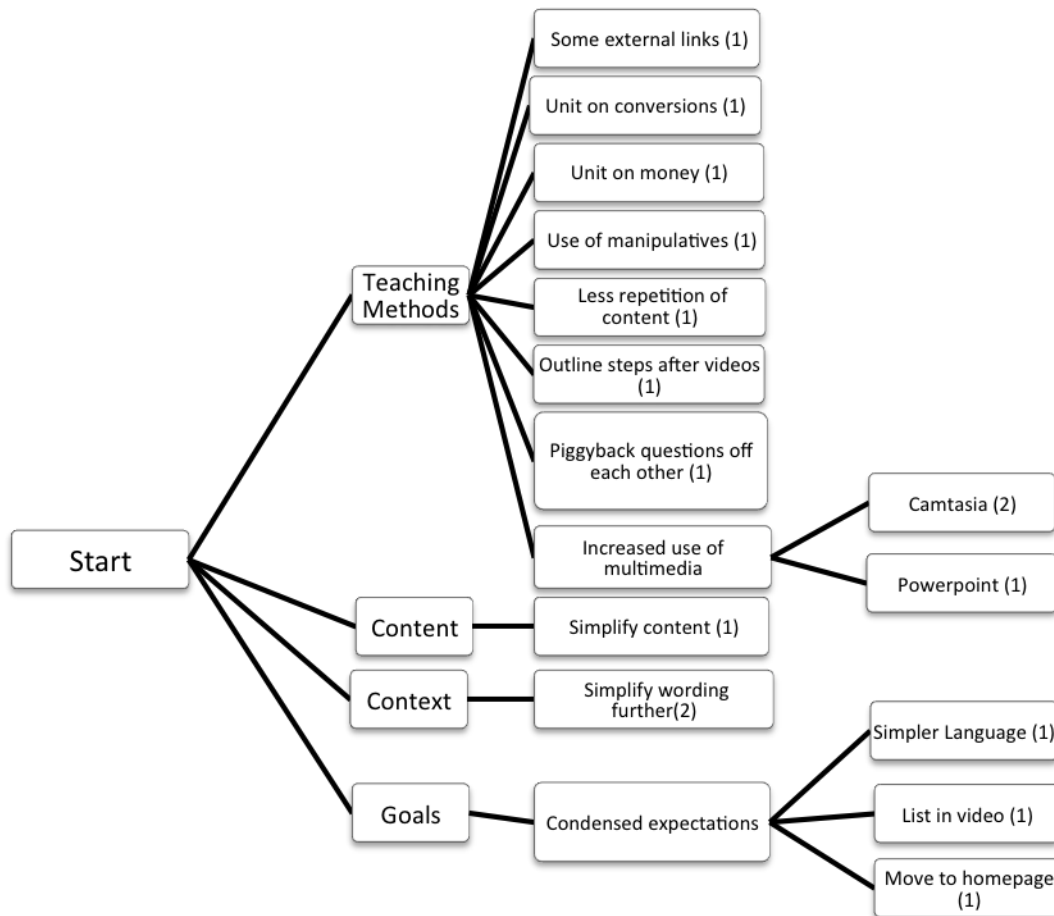


Figure 13. Course design features that interviewees felt should be included in further development of the course.

Overall, interviewees considered the intervention a success and had only positive comments and suggestions to share in the interviews. Interviewees felt that using the design principles found in this study for future courses at KiHS would be a valuable plan to meet the academic needs of students with MID.

### Summary

Both the questionnaire responses and interviews evaluating the intervention showed favourable results for the revision of the mathematics course. Overall, participants thought that the changes made to the course were positive, and that the

intervention was a success. Specifically, it was felt that the course met all of the curriculum expectations (goals), was easy to navigate, and content was taught in multiple ways. In addition, the majority of participants believed that the content, teaching methods, assessment, and instructions were applicable to students' lives and suited their reading and comprehension levels. The results from the questionnaire and interview showed that teachers liked the following features in the revised math course: the use of videos and interactive material; continual review of content; use of an uncluttered template; simplified language; and the provision of goals in each lesson. In addition, results showed that the course could be further improved in the following ways: increased use of manipulatives; use of a wider variety of multimedia for instruction; simplified language and content material; condensed list of expectations; use of some external links to develop research skills; provision of printable reference sheets to accompany instructional videos; and a greater emphasis on Canadian money.

The questionnaire responses and interviews had two areas on which there were mixed results. In Question four, respondents disagreed on whether the level of text for the content of the lessons was appropriate for students in the revised MAT1L course; 57% of respondents felt that the level of the material was appropriate, while 43% felt that it did not meet learners' needs. While the length and reading of the text was simplified in the revised course, the content of the course, including mathematical terms, could not be changed. Therefore, this constraint could account for the disagreement on the suitability of the level of content in the course. The specific areas that respondents felt were not appropriate would need further investigation to determine if they could be simplified. Question seven had similar results, with the same proportion of respondents disagreeing

about the level of text in assignments. However, this question focused on the instructions in the assignment, rather than the content in the lesson. As with the results from Question four, respondents may have felt that the subject itself was what made the readability of the instructions unsuitable to the students. The subject of mathematics contains terms and language that cannot be changed without losing their meaning. Again, this area would need further investigation to determine if all instructions require simplification, or just those in specific lessons.

In addition to the mixed results found in the questionnaire evaluating the course, there may be perceived limitations to the interview findings, as there were only two participants. However, the purpose behind the follow-up interview was to further investigate the responses from the questionnaire, rather than to explore different topics. Therefore, having only two participants was not considered to affect the credibility and usefulness of the interview responses, as similar questions were explored in the questionnaire completed by all teachers who had worked with students with MID in the revised course. Furthermore, as mentioned in the ethics description, participation in the interviews was voluntary, so questionnaire respondents were not required to complete an interview.

### **Discussion of the Results from Evaluating the Outcome**

The above results showed that analysis of the data found positive perceptions of success of the design features used in the revised course for students with MID. The remainder of this chapter will discuss these findings in more detail, beginning with the questionnaire evaluating the intervention.

## **Questionnaire**

A fairly comprehensive view was obtained of the success of the intervention from the perspective of the teachers involved as all seven teachers who worked with students taking the revised math course also completed the post-intervention questionnaire. Overall, the questionnaire respondents felt the intervention was a success and that the changes made to the course met the needs of the students with MID. Despite the fact that students with MID have a range of ability levels (British Columbia Ministry of Education, n.d.; Ontario Ministry of Education, 2002; Weber & Bennett, 2004), the intent of the intervention was to provide a course that could meet the entire scope of needs for students with MID.

Specific components of course design that were viewed as important in the pre-intervention stage were also covered in the post-intervention questionnaire, and the results are summarized below.

As a requirement of the Ontario Ministry of Education, before the revised course could be delivered and accredited for students, all expectations for MAT1L had to be covered within the course. The majority of respondents felt that this requirement had been met. The fact that one respondent dissented may have resulted because the respondent did not understand the requirement of the Ontario Ministry of Education, and therefore may indicate the need for further professional development for some staff members.

Many of the recommendations from staff and the review of literature related to the physical layout of online courses. The post-intervention questionnaire confirmed that the teachers had positive reactions to the modifications to the layout of the revised and

resulted in a course that was easy for students to navigate. As discussed in Chapter VI and shown in Table 9, the changes to the design of the course included the removal of external links, simplified template, use of the glossary, consistent use and formatting of titles and headings, and removal of extraneous content, graphics, and formatting.

All respondents felt that the intervention conveyed the content in multiple ways. This result was important because 37% of participants from the first questionnaire requested that the revised course contain additional variety in the instructional methods (Figure 6, p. 194), and existing research recommended using a variety of instructional methods for Aboriginal students with MID (More, 1999). New methods incorporated into the math course included self-assessments, virtual quizzes to provide skill practice, interactive lessons, and videos. As the single respondent who disagreed on the appropriateness of these methods was not interviewed, further investigation, to be discussed later in this chapter, could explain this perceived shortcoming and provide insight into appropriate teaching methods.

As found in the findings from the preliminary questionnaire and the review of literature, not only diverse teaching methods were considered important for the select group of students in this study, but also the inclusion of Aboriginal content. Two of the main factors that contribute to Aboriginal student success are curriculum that reflects Aboriginal cultures and perspectives, as well as teaching strategies appropriate to Aboriginal learners' needs (Ontario Ministry of Education, 2007). Aboriginal content appeared to have been successfully incorporated into the course, as the majority of respondents agreed that the content of the course was relevant to the students in the study. Although the goal was to provide Aboriginal content or content relevant to students'

lives, it was difficult to find resources that also met the need for diverse teaching methods. For instance, none of the multimedia viewed in the OERB depicted Aboriginal culture, although there were learning objects with content pertinent to students' lives. Aboriginal content was more readily found in text-only resources in the resource repository. It should also be noted that not all subject matter would be considered important to all of the students, as students from various communities took the revised course and not all individuals have the same interests. Instead, selection was based on the content that best matched the collective student culture and environment, while still providing diversity in teaching methods. As previously mentioned, the mathematics curriculum in Ontario has not been revised since 2005 and, therefore, was not part of the Aboriginal Education Strategy that incorporated Aboriginal expectations into the curriculum (Ontario Ministry of Education, 2005b). As a result, there were no course expectations with Aboriginal content, nor any teacher prompts for relating the expectations to Aboriginal culture in the MAT1L curriculum document.

In the open-ended question of the post-intervention survey asking for additional suggestions for improving the course, one teacher recommended more emphasis on Canadian money in future revisions of the course. This is an area that could be further explored in future cycles of the action research to see if there was evidence of difficulty with this topic in MAT1L.

Although the majority of respondents had positive responses for each of the areas explored in the post-intervention questionnaire, there were two areas where the teachers were not in agreement. In the first area, respondents had opposing views on whether the content was presented in a way that suited the reading and comprehension level of the

students. The language was simplified, and the amount of content to read was reduced in the revised course. The readability of activities was measured using a standard measure of readability and following tests were performed: the Flesch Reading Ease<sup>®</sup>; and the Flesch-Kincaid Grade Level<sup>®</sup>. However, this issue should be revisited in the next cycle of the action research process, before offering the course again, to ensure that the reading level of the instruction in all lessons is appropriate to the learners' needs and that content is sufficiently explained to be understandable. For instance, a professional editor could review the course for an alternative perspective and to edit the content to attain an appropriate reading level, based on a standard measure such as the readability tests noted above, as well as to ensure it is easily understood. While no literature could be found on the reading achievement levels of students with MID, reading assessments occur at KiHS as part of the educational assessment for students with exceptionalities, and were used to ensure that the reading level better matched the ability level of students. Instructional and independent reading scores of students with MID at KIHS were obtained from the assessment data found in IEPs. The reading scores varied from a grade equivalency of early grade three to early grade six using the Fountas and Pinnell Benchmark Assessment System.

The second area of disagreement pertained to the instructions for assessment. Four of the seven respondents did not agree that the instructions for assessment were appropriate for the ability levels of the students. Two of these respondents had also expressed disagreement that the course content suited the reading and comprehension level of the students. As a majority of respondents felt that the assessment instructions were too difficult for students to read or understand, and conveying content and



instructions using clear and simple language is a strategy for accommodating students with MID (College Committee on Disability Issues, 2006; British Columbia Ministry of Education, n.d., Ontario Ministry of Education, 2002), it would be worthwhile to gather further information in the next stage of the action research cycle about which lessons in particular, as well as which sections could benefit from additional revision.

Consideration should also be given to teachers' prior experience in teaching online, as the preliminary questionnaire found that 31% of respondents had only one year experience teaching online. Although most staff (92%) had experience working with students with MID, the level and depth of their experience is unclear. Findings from the post-intervention questionnaire suggest that only the content and instructions for assessment for this course would need a review, as all respondents agreed that the assessment strategies matched students' ability levels.

### **Interviews**

Although there were only two interviewees, one of Aboriginal descent, they were both considered to be sufficiently qualified to assess the success of the intervention, as both were certified teachers, had experience working with students with disabilities in the classrooms and online, and had previous experience working with the MAT1L course. The interviewees complemented each other, with one teacher having more teaching experience and the other having additional qualifications in the field of special education.

The first interviewee had the most experience teaching in Aboriginal communities and teaching online. This teacher worked directly in the classroom with two students enrolled in the revised math course and therefore was considered to have valid opinions about the success of the intervention. Despite this direct experience, the interviewee did

not possess much familiarity with online course development or knowledge of special education. This lack of background may have contributed to the short duration of the interview (six minutes) as the interviewee communicated what worked and what did not work for the students, but did not contribute much detail beyond these judgments.

The second participant held several formal qualifications in the area of special education and contributed more information to the interview. This interviewee's personal and professional interest in special education may have contributed to the depth of responses and the 43-minute duration of this interview. Each question was answered in detail, and additional information was given beyond the parameters of the five interview questions. Since possessing qualifications in the area of special education, this respondent had a great deal to say about the characteristics of MID and how the revised course addressed the needs of students with this disability. Ideas were provided about how this intervention could move forward and be integrated into the special education program in the future.

Overall, the participants provided a great amount of positive feedback about the intervention and the design features utilized. The changes in the layout of the course were particularly commended. For example, interviewees found the revised course to be less cluttered and to contain fewer distractions than the original course. Furthermore, they felt that by removing any unnecessary graphics when the left column was removed from the template, and relocating the remaining graphics into the content with text wraparound, the content became more meaningful. The other design element that was highly praised was the use of a variety of instructional materials, particularly the use of the learning objects from the OERB for instruction and practice. The teachers

interviewed said that students not only learned things from the interactive materials, but also enjoyed them. The other design elements that the teachers felt were beneficial for students included the following: breaking down the steps for a skill, continual review of content, simplified language for content and instruction, and simplified curriculum expectations at the beginning of each activity. All of these design features will be kept in the current MAT1L course for students with MID, and will be retained in future cycles of the action research as further course development occurs.

In the discussion of which subsequent courses would benefit from being revised in the future, one interviewee suggested that science courses, or other compulsory courses that were perceived as too difficult for students with MID, should be chosen, as these courses are a requirement for an OSSC or OSSD. The locally developed compulsory credit courses available for math, English, and science were preferred over academic or applied credit courses that were designed for students who could not meet the expectations of the provincial curriculum (Ontario Ministry of Education, 2004a). The interviewee felt that because English courses could easily be modified by substituting the levels of reading material, they would be a poor choice for revision. Moreover, as KiHS does not offer locally developed courses for optional courses, an alternative option would be to develop, rather than revise, courses with curriculum expectations specifically for First Nations students with intellectual disabilities in local communities. Ultimately, even if other courses were not created for students with MID, the interviewee expressed considerable interest in using some of the design features in his/her own courses for all students in general.

Along with the positive feedback, the interviewees provided a number of valuable suggestions for further course revisions in later stages of the action research cycle. For example, one interviewee was apprehensive about the removal of external links from the design. Links to external websites can cause confusion and frustration for students with MID, especially when websites are not designed for individuals with disabilities (Brown, 2010; Fichten et al., 2009). External websites can also be distracting for students when they include unnecessary graphics and extraneous information (Brown, 2010; Keeler & Horney, 2007). While this teacher felt that the lessons were less cluttered and the students were not being distracted by external websites, he/she believed that using the Internet beyond the course platform could help develop research skills. This topic could be explored further in future cycles of action research process to determine criteria for selecting websites that would develop students' research skills while still meeting the recommendations for students with MID discussed in the literature review.

Opinions differed between the interviewees regarding whether curriculum expectations should be listed for each assignment. While one interviewee stated that having the expectations or goals listed for the lesson could be valuable for these students; the interviewee did not agree with the requirements of administration to keep the course expectations written exactly as recorded in the Ontario curriculum documents.

While the interviewee felt that students' comprehension of the content was improved when the wording of expectations was simplified after the course had begun, the interviewee felt that it would be better for formal course expectations to be removed from the activities and instead be accessed by students through a link on the course homepage. General goals for the activity, rather than the overall and specific curriculum

expectations, could then be listed at the beginning of lessons, using simplified language and shorter sentences. This feedback corresponds to research that suggests individuals with cognitive disabilities who struggle with receptive language and processing benefit when teachers use the simplest language appropriate for conveying the content (Rowland, 2004). By including the general goals in lessons, while still providing the formal expectations within the parameters of the course, it was considered to meet the requirements of students and administration at the same time.

The interviewee further recommended that a maximum of three goals should be identified; however, for some lessons this change would be difficult. For instance, culminating activities and exams must together cover every one of the overall expectations of the course, and as a result, there would be more than three goals for the assignment.

The interviewees also questioned the use of the glossary for meeting the needs of students with MID, with one feeling unsure of how it worked, because he/she had not had the opportunity to observe students using it. Highlighting key words, such as in the use of the glossary in the revised course, and introducing new vocabulary at the beginning of a lesson, are instructional strategies seen to be beneficial when working with students with MID (College Committee on Disability Issues, 2006; Ontario Ministry of Education, 2002). Despite these recommendations and feedback from the first questionnaire advising that lessons provide definitions of key terms, the one teacher was uncertain if students would actually view the glossary. This is an additional design element that could be explored further in future cycles of the action research process using the revised course.

While all respondents to the questionnaire agreed that a variety of instructional methods were used in the revised math course, one interviewee felt that the students would benefit from having additional multimedia instructional resources that simulated classroom teaching. It was suggested that Camtasia Studio™ videos and voice-over Powerpoint presentations be inserted into activities to replace the written textual material. The literature on Aboriginal education and students with MID encourages teachers to build strong teacher/student relationships (Goulet, 2001; Ontario Ministry of Education, 2007), and Camtasia Studio™ videos could be useful in strengthening the connection, as the videos allow the student to see and hear their instructor. In online courses, the addition of video for staff introductions, presentations, and synchronous collaboration, through Adobe® Connect™, or other web 2.0 tools such as Camtasia Studio™, can provide for an enhanced sense of presence not previously available in many distance education courses (Shearer, 2013). In this new generation of learning environments, that includes the use of tablets and phones, small chunks of audio and video are preferred over full screens of text (Kearsley, 2013). To optimize learning engagement, e-Learning videos should be segmented into chunks of less than six minutes in length (Guo, Kim, & Rubin, 2014). Correspondingly, it was suggested by the interviewee that these video clips or presentations be less than three to four minutes in length. It was also suggested that these visual components include a link to a written summary and transcript of the presentation to assist students with difficulty in receptive language or hearing impairments. The literature supports this suggestion to offer alternatives to written expression (Brown, 2010; Keeler & Horney, 2007; Maina, More, 1999) presentation, and further recommends that when designing online courses for students with disabilities that

all audio/video components have a text transcript (CAST, 2013; IEEE, 2010; Keeler & Horney, 2007; More, 1999; Ontario Ministry of Education, 2002).

Lastly, the interviewee recommended that more content be included in the unit on conversions between the imperial and metric systems of measurement. Although this suggestion is not related to the design of the course, the proposed solution could be an option for other courses. The interviewee proposed that instead of increasing the length or number of lessons on the topic of conversions, that a link to the numeracy course be provided where this topic would be covered in detail. Students could then view lessons on their desired topic and complete ungraded activities to practice skills. By supplying a link to knowledge that should already be possessed, students with the skill and knowledge would not need to do extra reading or work, and students who needed this remedial instruction have an available option. The responses to the preliminary questionnaire informing the revision of the course, recommended having links to extra content and support. Altogether, the recommendations and ideas obtained from the interviews and post-intervention questionnaire will be considered in future cycles of the action research process for the revised math course and in future course development for students with intellectual disabilities.

### **Summary of Findings**

The principle research question for this study was “What elements of an online course specifically designed to meet the needs of high school students with mild intellectual disability, effectively met the needs of these students, as perceived by the teachers of the students completing this course? Overall, participating teachers at KiHS

felt that the following design elements were successful in meeting the needs of students with MID:

- Learning goals are listed at beginning of the lesson;
- Aboriginal content and images are incorporated throughout the course;
- Content is linked to real-life experiences of students;
- Language is simplified to match students' reading and comprehension levels;
- Flexibility is provided, such as alternate ways to submit assignments, and flexibility in scheduling, such as having the option for a paced course;
- Accessibility standards are met, when possible;
- Key words are highlighted;
- Key words are defined and linked to a glossary;
- Course navigation is straightforward and consistent;
- Course layout is consistent and uncluttered;
- External links are removed, or limited in use;
- Unnecessary graphics and content are removed;
- Content is chunked into manageable parts;
- Titles and headings are used to separate lesson components and organize content;
- Previously learned material is frequently reviewed (i.e., daily, weekly, and unit reviews are provided);
- Content is presented in multiple ways;
- The amount of text is reduced in lessons by incorporating video and audio components;



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- Text-equivalent options are offered for all non-textual materials (e.g., transcripts of video presentations);
- Available bandwidth is considered when selecting or producing audiovisual components;
- Graphics are presented with corresponding text, and are not separate entities;
- Difficult language or concepts are accompanied by alternative representations, such as tables, charts, graphics, concept maps, and videos;
- Hands-on learning activities are integrated into course and use materials easily located in the home or learning environment;
- Manipulatives are used when possible;
- The steps involved in learning a skill or concept are properly sequenced;
- The same concept or skill is taught in different situations or environments;
- Numerous opportunities to practice skills are provided;
- Interaction with the teacher is frequently offered (i.e., synchronous meetings, asynchronous chat, video announcements);
- Links to supports and services are present (e.g., glossary, numeracy resources, contact information)
- Opportunities for group work are available to students;
- A variety of assessment methods are utilized;
- Instructions are clear and straightforward; and
- Easier tasks and activities are provided first with other tasks and activities sequenced according to increasing levels of difficulty.

This chapter presented the results found during the evaluation of the intervention, as well as a discussion of these results. A post-intervention questionnaire and follow-up interviews were used to collect the perceptions on the success of the intervention in meeting the needs of students with MID. Chapter VIII will discuss the limitations and significance of these findings, along with areas for future research.

## Chapter VIII: Discussion, Summary, and Implications of Findings

This chapter will begin with a discussion of the limitations and significance of the findings presented in Chapter VII. The findings were the perceptions on the success of the set of design considerations, developed during the planning stage of the research, in meeting the needs of students with MID. The limitations and significance of the study were taken into consideration in developing the suggestions for future research, which can be found at the end of this chapter.

### **Limitations and Significance of Findings**

In addition to the limitations presented in Chapter IV, there were a few limitations identified after the study had been completed. Only two of the seven teachers participated in the interview, therefore, not all of the mixed results from the post-intervention questionnaire could be explored in further detail. As the school year at KiHS ended approximately two weeks after the interviews were to occur, scheduling of interviews earlier in the year may have yielded a higher response rate. Follow-up requests for interviews could also have increased this rate.

Although a variety of new methods of instruction were utilized in the revised course, difficulty was had in locating resources with Aboriginal content and images. This lack of culturally suitable resources may have contributed to the mixed results found in some of the questions evaluating the perceived applicability of content to students in the study.

The prohibited use of any resource from the OERB in a LMS other than the one provided by the province (Ontario Ministry of Education, 2015b), limited the ability of the researcher to run the revised MAT1L course in the years following the study. The

use of the OERB bank with Moodle was permitted in the 2012/2013 pilot, but the use of Desire2Learn, the platform used by the Ontario Ministry of Education, was stipulated in the subsequent years. With removal of the OERB learning objects, the identical MAT1L course could not be offered in Moodle. There was, therefore, no other opportunity to collect results for comparison with those from this study.

Despite the limitations discussed above, the intervention was considered a success by the majority of teacher participants. Therefore, it seems that students with MID could benefit from additional courses being revised at KiHS. As one of the interviewees suggested, courses that are compulsory for the OSSC would be excellent choices to consider for revision. The set of design features listed in Table 9 of Chapter V, along with the suggestions for further improvement from the post-intervention questionnaire, could be used to create these courses. Ideally also, further follow-up interviews could be carried out with teachers experienced in teaching other courses, to gain greater insight into their perceptions of what would work better for designing courses for students with MID.

In addition, while many of the design features were similar to universal design, the purpose of the study was not to determine the course design features that would benefit all learners at KiHS, but rather, only those with MID. One teacher in the study added, “While some design features could be good for all, we still want to challenge the other groups of students with the content.” Therefore some, but not all, of these features could be applied to other courses at KiHS to make them more suitable for all learners. Some examples of design features that may not be fitting for all learners at KiHS are:

simplified language; continual and frequent review of content; and limited use of external links and threaded discussions.

If having two versions of a course (one generic and the other adapted for learners with MID) was not feasible at KiHS, utilizing some of these design features in courses that may have a larger enrollment of students with disabilities, such as locally developed courses, may be an option for future course development.

The results from the study also have the potential to improve the special education services at KiHS. Ontario's Regulation 181/98 s. 9(2) requires that appropriate special education services must be provided to meet students' apparent needs (Government of Ontario, 2005), and this directive extends to all provincially-run schools, whether online or face-to-face. While private schools or federally-funded schools are not subject to this legislation, KiHS aims to meet this standard in their special education program. Students with MID can benefit from having a program that provides accommodations at all levels of instruction and assessment (Weber & Bennett, 2004). This study is unique in that there appears to be little, if any, research on how to provide online special education services to Aboriginal students with MID. There also do not seem to be any online secondary schools in Canada that provide courses purposely designed for this population.

Although the intervention was perceived as a success, there may be several barriers to revising future courses for students with MID. The chief obstacle would be attaining resources, such as time and money, as course development is a lengthy process requiring the expertise of a teacher certified in the province. The final approval for course development would need to be given by the administration of KiHS.

An additional barrier may be knowledge and expertise. The instructors developing the courses would need to understand the elements of the design that could successfully meet the needs of students with MID, and would benefit from being familiar with this study. Professional development in the following areas would be essential for instructors: special education; special education in online learning environments; and online instructional design.

### **Recommendations for Future Research**

Although the school environment at KiHS is unique, other students may also benefit from the results from this study. For example, the revised course was intended for Aboriginal students with MID; however students with other disabilities, but with similar needs, may also benefit from the course design. Furthermore, some or all of the design elements used in the revised course could be useful in other school districts or similar schools in other provinces. Non-Aboriginal students may be another population that could benefit from a set of online design considerations for students with MID. The findings could therefore be transferable to a wider population. Additional research would need to be undertaken in order to determine if the design considerations used in this study would benefit other students at KiHS, or other individuals outside of remote Aboriginal communities in Ontario.

In addition, research could be undertaken to determine if these considerations would be transferable to other age groups, such as students in the grade 7/8 online supplementary program delivered by KiHS, or students attending post-secondary schools.

Other measures to determine to appropriateness and effectiveness of the design elements for students with MID could include log data collected by the LMS, such as the

number of attempts to receive a passing grade on assignments and quizzes, assignment marks, and final grades. By collecting log data, information about the success of design elements in individual assignments could be analyzed, as well as the overall academic success of students in the revised course. Where internet connectivity is not an issue, such as in many of the schools participating in the grade 7/8 program, Moodle logs that record time (such as session length and total page views) could also be analyzed to determine the effectiveness of the design elements.

In addition, interviews with students, which would require more sensitive ethics scrutiny, would provide valuable feedback about the effectiveness of course design features. Students could provide insight into what design elements they felt were the most successful in meeting their needs and could also offer suggestions for further improvement.

### **Conclusion**

A set of design considerations for online course development for students with MID was developed in this research study and used to revise a course at KiHS in order to address the concern that staff members had about students with MID not having all of their needs met in the online courses at KiHS. Using participatory action research, the study addressed the research question: What elements of an online course specifically designed to meet the needs of high school students with mild intellectual disability, effectively met the needs of these students, as perceived by the teachers of the students completing this course?

A preliminary questionnaire and review of literature were used to develop the set of design considerations, including accommodations related to course design, in order to

meet the academic needs of students with MID. The questionnaire was administered to teachers at KiHS who had worked, or were working with students with MID. A response rate of 87.5% was realized for this questionnaire. The review of literature was informed by various books, online refereed journals, websites, books, reports, and printed and online publications.

The preliminary questionnaire was also used to select the course to revise using the set of design considerations. Of the courses being offered in term three, and for which students did not already possess a credit, the grade nine locally developed math (MAT1L) course was selected for revision.

Students were enrolled based on their identification as having MID, or similar needs. Nine students were enrolled, and four students were active mid-way. All students who were working in the revised course attended the learning centre in their respective communities and were able to receive support from the mentor, when required. Students could also obtain assistance from the course instructor in the online platform, or through email, web-conferencing, or telephone communication.

Using the set of design considerations, MAT1L was revised before the course was offered to students with MID in term three (January 7 – March 8, 2013). As part of the process of participatory action research, open development of the course continued past this initial revision. Using feedback from teachers working with students in the course, MAT1L was also revised during course delivery. Both the course instructor and the mentors who were assisting students in the learning centres were encouraged to provide feedback. This feedback was provided, when seen as necessary, through email or phone communication with the researcher.



In addition to the ongoing evaluation by teachers required to provide the feedback discussed above, the intervention was also evaluated at the conclusion of the course. A secondary questionnaire was delivered to participating teachers who were working with students in the revised MAT1L course in order to determine the perceived success of the intervention. The response rate to this questionnaire was 100%. The intervention was perceived as a success by participating teachers, with all agreeing to varying degrees, that they were satisfied with the changes made to the course to meet the needs of students with MID. The following set of design considerations were used in the course revision and were perceived as successful in meeting the needs of students with MID enrolled in the course:

- Learning goals are listed at beginning of the lesson;
- Aboriginal content and images are incorporated throughout the course;
- Content is linked to real-life experiences of students;
- Language is simplified to match students' reading and comprehension levels;
- Flexibility is provided, such as alternate ways to submit assignments, and flexibility in scheduling, such as having the option for a paced course;
- Accessibility standards are met, when possible;
- Key words are highlighted;
- Key words are defined and linked to a glossary;
- Course navigation is straightforward and consistent;
- Course layout is consistent and uncluttered;
- External links are removed, or limited in use;
- Unnecessary graphics and content are removed;

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- Content is chunked into manageable parts;
- Titles and headings are used to separate lesson components and organize content;
- Previously learned material is frequently reviewed (i.e., daily, weekly, and unit reviews are provided);
- Content is presented in multiple ways;
- The amount of text is reduced in lessons by incorporating video and audio components;
- Text-equivalent options are offered for all non-textual materials (e.g., transcripts of video presentations);
- Available bandwidth is considered when selecting or producing audiovisual components;
- Graphics are presented with corresponding text, and are not separate entities;
- Difficult language or concepts are accompanied by alternative representations, such as tables, charts, graphics, concept maps, and videos;
- Hands-on learning activities are integrated into course and use materials easily located in the home or learning environment;
- Manipulatives are used when possible;
- The steps involved in learning a skill or concept are properly sequenced;
- The same concept or skill is taught in different situations or environments;
- Numerous opportunities to practice skills are provided;
- Interaction with the teacher is frequently offered (i.e., synchronous meetings, asynchronous chat, video announcements);

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- Links to supports and services are present (e.g., glossary, numeracy resources, contact information)
- Opportunities for group work are available to students;
- A variety of assessment methods are utilized;
- Instructions are clear and straightforward; and
- Easier tasks and activities are provided first with other tasks and activities sequenced according to increasing levels of difficulty.

The design considerations that were perceived by teachers to be the most valuable were: incorporating Aboriginal content and images, linking content to real-life experience, simplifying language to match students' reading and comprehension levels, reviewing previously learned material, and presenting content in multiple ways.

Incorporating Aboriginal content and images into online courses could potentially increase the success of students at KiHS, as having curriculum and teaching strategies that reflect Aboriginal culture are two of the main factors that contribute to academic success for Aboriginal students (Ontario Ministry of Education, 2007). A strong foundation for learning is created when students are taught about their people and culture, resulting in higher academic success (Faries, 2009).

Linking content to real-life applications would be another beneficial design consideration for use in future courses, as students with MID benefit from content that is related to experiences in their daily lives (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002).

Simplifying language to the reading and comprehension levels of students could also be valuable to students with MID at KiHS, as the reading levels of the students in

this study ranged from grade three to six. In addition, students with MID could benefit from this design consideration, since students with MID experience difficulties understanding complicated language (Ontario Ministry of Education, 2002).

Individuals with intellectual disabilities may also struggle with retaining knowledge (Metro Consortium for Students with Mild Intellectual Disabilities, 2002; Ontario Ministry of Education, 2002; Weber & Bennett, 2004). Therefore, the design consideration of reviewing content would be beneficial in all courses frequently taken by students with MID.

The final design consideration that teachers felt was particularly successful in meeting the needs of students with MID was the use of a variety of instructional methods, mainly the use of learning objects and videos. Presenting the content in multiple ways is a successful practice in meeting the needs of learners with MID (Ontario Ministry of Education, 2002), and could continue to be effective in future courses for students with MID at KiHS.

There were a few limitations to the findings of the study. Based on the enrollment of students at KiHS, the parameters of the population were a limitation in this study. KiHS has a unique school environment that provides education to Aboriginal peoples located primarily in isolated First Nations communities in Northern Ontario. Therefore, some of the results from the study may not be transferable to other locations and cultures.

Another limitation was that not all students with MID at KiHS were enrolled in the revised course. Enrollment in the online course may have been limited by whether students had previously acquired credit for the course or chose to take another course during that term.

Only two teachers participated in the interview evaluating the outcome, and therefore not all of the mixed results from the post-intervention questionnaire could be explored in further detail. Scheduling the interviews to an earlier part of the term may have provided a greater participation rate, as one teacher who had originally agreed to participate in the interview was unavailable during the two week period at the end of the school year scheduled for interviews.

Difficulty was experienced in locating resources with Aboriginal content and images, which may also have contributed to the mixed results found in a couple of the questions evaluating the perceived applicability of content to students in the study. In future revisions, additional time could be taken to create original resources for the course, containing Aboriginal content and images.

In addition, the study could not be replicated again in the years following the study because of the prohibited use of any resources from the OERB bank in a LMS other than Desire2Learn, which was the fee-incurring LMS adopted in Ontario. As KiHS continued to use Moodle, this external decision required the removal of all OERB learning objects from the Moodle LMS. If the original license allowing the use of OERB resources in any LMS for KiHS was renewed at some future date, there would be opportunity to collect results for comparison with those from this study.

Despite the limitations, the findings from this study provide valuable information for creating future courses at KiHS that can meet the needs of students with MID. Along with offering additional courses utilizing the set of design considerations, these findings could be further expanded, with future research, to greatly enhance the experience of

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students with MID at KIHS and support them in achieving success in their secondary schooling. In addition, the findings could stimulate exploration of ways to meet the needs of students with other disabilities in online schools at the secondary school level. Ultimately, the findings may contribute to a stronger special education program at KiHS, which would be capable of meeting the needs of students with exceptionalities online.

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Appendix A: Invitation to Participating Teachers and Preliminary Questionnaire  
**Online Course Design for Students with Mild Intellectual Disabilities**

**Purpose**

The purpose of this study is to determine how to improve the design of courses at KiHS to better suit the needs of students with mild intellectual disability or students with similar needs. The results from this questionnaire, along with a review of literature, will be used to develop a course specifically for students with mild intellectual disability. This course will include only accommodations to meet their needs and any modifications will be done separately and on an individual basis. Therefore, the course being developed will still cover all of the expectations outlined in the Ontario curriculum. When answering the questions please keep in mind students who have mild intellectual disability or similar needs that you have worked with in your classroom or have had online in one of your courses. Please also consider what could be done in terms of how the course is presented to them in order to help them to increase their success.

**Definitions**

Mild intellectual disability – students with mild intellectual disability are “usually delayed by two or more years in academic, social, language and cognitive areas when compared to students of the same age. While their development is slower than students of the same age, they are able to learn academic skills, and to work and live independently upon completion of school” (Renfrew County District School Board, 2008). Those with mild intellectual disability also have deficits or impairments in adaptive functioning in at least two of the following skills areas: communication, self-

## ACCOMMODATING STUDENTS WITH MID

care, home living, social/interpersonal skill, use of community resources, self-direction, functional academic skill, work, leisure, health, and safety.

Course design – Course design includes five components: goals (curriculum expectations), context, content, teaching methods, and assessment (University of Waterloo, n.d.)\*.

## **Preliminary Survey**

### **Background Questions**

1. How many years have you been a teacher?
2. How many years have you worked in online education?
3. How many years have you worked at KiHS?
4. How many years have you worked with students with special needs?
5. How many years have you worked with students with mild intellectual disability or those with similar needs?
6. What qualifications and/or experience in special education do you have?
7. What qualifications and/or experience in course design do you have?

### **Course Design Questions**

#### Stop

1. Which features in the design of courses at KiHS do you feel impede the success of students with mild intellectual disability? If none, please indicate that no changes are necessary.

#### Continue

2. Which features in the design of courses at KiHS do you feel remove barriers or facilitate learning for students with mild intellectual disability and should remain in place? If none, please indicate that no course design features currently meet the needs of these students.

Start

3. Which course design features do you think should be included in courses at KiHS to facilitate learning and assist students with mild intellectual disability in achieving success? If none, please indicate that no changes are necessary.
4. Which course offered by KiHS would most benefit from re-design to better suit the needs of students with intellectual disabilities?

\*Source: Original design by Professor D.E. Ellis, T. Light, and K. Pryde, Centre for Teaching Excellence, University of Waterloo, 1999.

Appendix B: Post-Intervention Questionnaire

**Evaluation of Course Design in Meeting Needs of Students with Mild Intellectual  
Disability**

**Purpose** - In this survey, please evaluate the revised course in terms of course design and to what extent do you think it met the needs of Aboriginal students with mild intellectual disability or those with similar needs at KiHS.

**Definitions**

Course design – Course design includes five components: goals, context, content, teaching methods, and assessment (University of Waterloo, n.d.)\*.

Goals – The curriculum expectations from the Ontario Ministry of Education.

Context – How well the course fits into the target environment and population. For example, does the course fit the needs, interests, and skills of the students? Is it relevant to the environment in which the students live and study?

Content – The subject matter and resources used to meet the goals of the course.

Teaching methods – The methods used to convey the content of the course. For example, group discussions, case studies, online readings, web search.

Assessment – The methods used to evaluate the goals of the course. Questions to consider are: does the assessment accurately measure what it is supposed to? Is the assessment appropriate for the target population?

Please complete the following by questions by selecting one of the following options:

1 = strongly disagree

2 = disagree

3 = agree

4 = strongly agree

### **Questions**

1. The curriculum expectations are fully covered for the course.
2. The course is easy to navigate for the students.
3. The content of the course is applicable to the lives of the students.
4. The content of the course presented in a way that suits the reading and comprehension level of the students.
5. The content is presented in multiple ways.
6. The teaching methods used in the course are appropriate for the ability level of the students.
7. The instructions for the activities are presented in a way that suits the reading and comprehension level of the students.
8. The types of assessment used suit the abilities of the students.
9. Overall, I was satisfied with the changes that were made to the course to accommodate these students.

### **Suggestions**

10. What other suggestions do you have to further improve the course or make it more appropriate to the needs of the students?

\*Source: Original design by Professor D.E. Ellis, T. Light, and K. Pryde, Centre for Teaching Excellence, University of Waterloo, 1999.



Appendix C: Interview Questions

1. What experience did you have in teaching this course prior to the revised version?
2. Based on your experience, how well do you think that the design of the course met the needs of Aboriginal students with mild intellectual disability or those with similar needs?
3. What aspects of the course design worked and what did not? Please elaborate.
4. Do you feel that overall the intervention was successful? Please explain your reasoning.
5. What suggestions do you have for further development of this course?

Appendix D: KiHS Administration Approval



Date: July 6, 2012

Athabasca University Research Ethics Board

RE: Accommodating Aboriginal Students with Mild Intellectual Disability in Online Courses – Support for Research

To Whom It May Concern:

Angela Batsford, from the Doctor of Education (EdD) in Distance Education program, has explained the purpose of the research project is to identify the design elements for online courses that will meet the needs of Aboriginal students with mild intellectual disability or those not formally identified but who have similar needs. The design elements will be used to create an online course for this population of students attending Keewaytinook Internet High School. The study will involve contacting mentors and instructors who work at our organization to invite them to provide input into design elements for the online course, and also invite them to provide feedback on the success of the revised course. This research will occur over the 2012/2013 school year.

We understand that the results of the research will be available in academic and professional papers, and individuals will not be identifiable, however, our organization hereby gives permission to the researcher(s) to identify the organization in any publication arising from the research.

In order to conduct the research the researcher has asked, and our organization has agreed to support the research in the following ways:

- Allowing the researcher to contact employees, distribute and collect surveys, and establish further contact with employees who agree to an interview.
- Allowing the researcher to revise an online course for students with intellectual disabilities or those with similar needs, which will be offered to these students during the third school term. This course will be taught by the same instructor who teaches, or has taught, the unrevised version.

In return for the organization's support of the research, the organization will receive copies of the final research report, as well as a formal presentation by the researcher explaining results.

By signature below, the organization acknowledges the social and scientific value of the research undertaking, and at the same time recognizes the ultimate importance of freedom of individuals to make an informed decision to choose, or not to choose, to participate in human research. The organization promises to avoid coercing or exerting pressure on its employees and students to participate in the study.

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Signature of  
Darrin Potter  
K11S Principal  
[darrinpotter@knet.ca](mailto:darrinpotter@knet.ca)  
Tel: (807) 727 7448

July 6/12  
Date

Appendix E: Ethics Approval



MEMORANDUM

**DATE:** September 25, 2012

**TO:** Angela Batsford-Mermans

**COPY:** Dr. Debra Hoven (Research Supervisor)

Janice Green, Secretary, Athabasca University Research Ethics Board

Dr. Simon Nuttgens, Chair, Athabasca University Research Ethics Board

**FROM:** Dr. Rick Kenny, Chair, CDE Research Ethics Review Committee

**SUBJECT: Ethics Proposal #CDE-12-09: "Accommodating Aboriginal Students with Mild Intellectual Disability in Online Courses"**

The Centre for Distance Education (CDE) Research Ethics Review Committee, acting under authority of the Athabasca University Research Ethics Board to provide an expedited process of review for minimal risk student researcher projects, has reviewed the above-noted proposal and supporting documentation.

I am pleased to advise that this project has been awarded **APPROVAL TO PROCEED. You may begin your research immediately.**

This approval of your application will be reported to the Athabasca University Research Ethics Board (REB) at their next monthly meeting. The REB retains the right to request further information, or to revoke the approval, at any time.

**The approval for the study "as presented" is valid for a period of one year from the date of this memo.** If required, an extension must be sought in writing prior to the expiry of the existing approval. **A Final Report is to be submitted when the research project is completed.** The reporting form can be found online at <http://www.athabascau.ca/research/ethics/>.

As implementation of the proposal progresses, if you need to make any significant changes or modifications, please forward this information immediately to the CDE Research Ethics Review Committee via [rebsec@athabascau.ca](mailto:rebsec@athabascau.ca) for further review.

If you have any questions, please do not hesitate to contact the Committee Chair (as above), or the Research Ethics Board secretary [rebsec@athabascau.ca](mailto:rebsec@athabascau.ca).

## Appendix F: Examples of Design Features Utilized in Revised MATIL Course

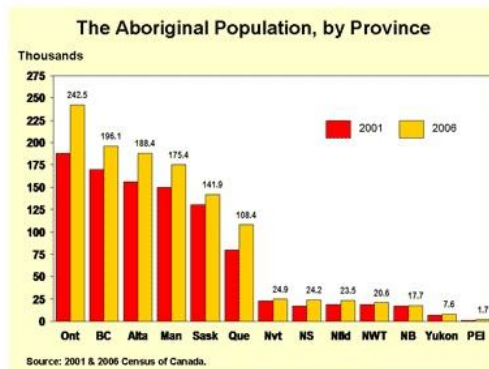
Bar Graphs: <http://www.mathleague.com/help/data/data.htm#bargraphs> (just read about Bar Graphs at this link)

- The total for the items shown in the bar graph does not have to be 100%.
- Bar graphs can also show number data, instead of percentage data.

Lesson about bar graphs in original course. Copyright 2013 by Keewatinook Internet High School.

### Bar Graphs


- Unlike pie charts, the total for the items shown in the bar graph does not have to be 100%.
- Bar graphs can also show number data, instead of percentage data.
- In the bar graph below it shows us how the population in the different provinces have changed over time. For example, you can see that in Ontario, the Aboriginal population increased from 2001 to 2006.
- You can also see that the Aboriginal population in PEI is much less than it is in Ontario.



Lesson about bar graphs in revised course removing external links, highlighting key words, and inserting relevant content. Copyright 2013 by Keewatinook Internet High School.

**Part A** **Read This**

Problem: How do you check if two ratios are equal?  
 Find x. Suppose we wanted to know whether the ratios 5/2 and 25/10 are equal?  
 $x^2 + 5x - 6 = 0$  One way we can prove they are equal is by cross-multiplying and checking:  
 Solution: Here it is.



$$\frac{5}{2} \stackrel{?}{=} \frac{25}{10}$$

$$\frac{5}{2} \times \frac{25}{10}$$

$$5 \times 10 \stackrel{?}{=} 2 \times 25$$

$$50 = 50$$

$$\frac{5}{2} = \frac{25}{10}$$

This shows that the ratios 5/2 and 25/10 are equal.

Lesson on proportions in original course. Copyright 2013 by Keewaytinook Internet High School.

**Read This**

**Proportions**

Proportions can be used for several different purpose. This week, we have already learned that proportions can help us convert a fraction to a percentage. Let's explore some other purposes.

**1. Determining if Ratios are Equal**

How do you check if two ratios are equal?  
 Suppose we wanted to know whether the ratios 5/2 and 25/10 are equal?  
 One way we can prove they are equal is by cross-multiplying and checking:

$$\frac{5}{2} \stackrel{?}{=} \frac{25}{10}$$

$$\frac{5}{2} \times \frac{25}{10}$$

$$5 \times 10 \stackrel{?}{=} 2 \times 25$$

$$50 = 50$$

$$\frac{5}{2} = \frac{25}{10}$$

are they equal?

1. To find out if they are equal, cross multiple

2. If these two numbers are the same, then the ratio is said to be equal

This shows that the ratios 5/2 and 25/10 are equal.

Lesson on proportions in redesigned course illustrating removal of unnecessary graphics, and use of titles and headings for organization. Copyright 2013 by Keewaytinook Internet High School.

**Estimating**  
Often, instead of taking an actual measurement of something, we estimate it.  
There are lots of reasons for doing this:

- We are in a hurry.
- We don't need an exact measurement
- The item we are estimating would be hard to measure without special tools.


Part C Do This

Lesson on estimating in original course. Copyright 2013 by Keewaytinook Internet High School. Included with permission from Principal, KiHS: available on request.

**Estimating**  
Often, instead of taking an actual measurement of something, we estimate it.  
There are lots of reasons for doing this:

- We are in a hurry.
- We don't need an exact measurement.
- The item we are estimating would be hard to measure without special tools.

**Practice**




Estimation versus Measurement

Before you can correctly measure an object, you have to be good at estimating.  
Let's practise our estimation skills first.  
Press the **Start** button.

Start

Lesson on estimating in revised course with additional practice of content/skills being taught. Copyright 2013 by Keewaytinook Internet High School.

Part A	Read This
	 <p>In this activity you will look at rates such as: 100 km/hr (speed), \$4.50/kg (prices) and a 15% tax rate.</p> <p>A rate is a comparison between two values such as money and the weight of bananas (price per kg). This sounds like a ratio you looked at in a previous activity.</p> <p>Here are the general differences between rates and ratios:</p> <ul style="list-style-type: none"><li>• ratios have no units and rates usually have units like km/hr.</li><li>• rates usually have 1 value that is dependent on the other. If bananas are selling at a rate of \$4.50/kg then the cost of a bunch of bananas goes up as the weight of the bunch increases. Price depends on weight.</li><li>• ratios usually compare two similar things like boys and girls, dogs and cats.</li><li>• rates usually compare 2 different things: money and weight, distance and time.</li></ul>  <p>Like the work you did with ratios, if you know a rate and 1 of the 2 values, you can work out an equation that looks very much like a proportion and solve for the unknown value.</p> <p>Rates are meaningless without the units. For example if I told you that Janice is travelling at a speed of 60 would you know her speed? You wouldn't know how fast or slow she is moving. It could be 60 km/hour (fast), 60 m/second (very fast) or 60 cm/minute (very slow).</p> <p>Whenever you write down a rate, always include the units. Rates of money are an exception. Rates of money like interest rates, mortgage rates and tax rates break these 2 general rules about rates:</p> <ul style="list-style-type: none"><li>• money rates are usually written without units.</li><li>• money rates are a comparison of 2 similar values: money</li></ul> <p>These rates have the units "dollars per dollar" written as a percentage. 15% tax rate means a charge of 15 cents for every \$1 spent at a store. 4% interest rate means the bank gives you 4 cents for every \$1 you have in your bank account.</p>

Lesson on rates and ratios in original course. Copyright 2013 by Keewatinook Internet High School.



**Rates**



**Practice**

Let's do a short practice exercise that helps us compare rates vs. ratios.



**Examples**

Example 1 - The Northern Store sells bottled water for \$1.75 each. It also sells cases of 24 bottles of water for \$40.00. Which price is a better deal? Compare the price per

Lesson on rates and ratios in revised course using a variety of teaching methods, less text, increased practice of content, and increased number of examples. Copyright 2013 by Keewatinook Internet High School.

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### **Final Price**

When we are dealing with tax, often we just want the final price and don't need to know how much tax we are being charged.

What is the total price for a snowboard with a list price of \$350?

$$\text{Total price} = 350 + 0.13 \times 350$$

350 is the common multiple

$$= 350 \times (1 + 0.13)$$

$$= 350 \times 1.13$$

$$= 395.50$$

The total price of the snowboard including tax is \$395.50

When the tax rate is 13%:

$$\text{Final Price} = 1.13 \times \text{List Price}$$

Lesson about tax in original course. Copyright 2013 by Keewatinook Internet High School.

### Example Three

When we are dealing with tax, often we just want the final price and don't need to know how much tax we are being charged.

**What is the total price for a snowboard with a list price of \$350?**

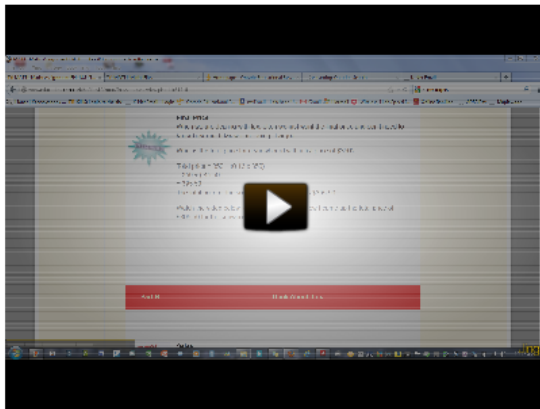
$$\text{Total price} = 350 + (0.13 \times 350)$$

$$\text{Total price} = 350 + (45.50)$$

$$\text{Total price} = 395.50$$

The total price of the snowboard including tax is \$395.50

Watch the video below for a demonstration of how I came up the total price of \$395.50 for the snowboard example above.



Lesson about tax in revised course using repetition, and alternative methods of instruction. Copyright 2013 by Keewatinook Internet High School.

Appendix G: Resources from Literature Review that Informed List of Design Elements

British Columbia Ministry of Education. (n.d.). *Students with intellectual disabilities: A*

*resource guide for teachers*. Retrieved from

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## Appendix H: Course Most Needing to be Revised

<b>Course</b>	<b># of Respondents</b>	<b>Percent</b>
Grade Nine Applied Science (SNC1P)	3	25%
Grade Nine Science, Academic (SNC1D)	3	25%
Grade Nine Learning Strategies, Open (GLS1O)	2	17%
Grade Nine Exploring Family Studies, Open (HIF1O)	1	8%
Grade 11 Raising Healthy Children, Open (HPC3O)	1	8%
Grade Nine Healthy Active Living, Open (PPL1O)	2	17%
Grade Nine Math, Applied (MAT1P)	1	8%
Grade Nine Math, Academic (MAT1D)	1	8%
Grade Nine Math, Locally Developed (MAT1L)	1	8%
Grade Eleven Mathematics for Work and Everyday Life, Essential (MEL3E)	1	8%
English	1	8%
Science	2	17%
All courses	2	17%