

# torontoeschool

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Course Name/Grade/Type:	Mathematics of Data Management, Grade 12, University Preparation
Course Code:	MDM4U
Credit Value:	1.0
Prerequisite:	Functions, Grade 11, MCR3U; or Mathematics for College Technology, Grade 12 MCT4C
Curriculum Policy :	<i>Growing Success: Assessment, Evaluation, and Reporting In Ontario Schools, 2010.</i>  <i>Mathematics, The Ontario Curriculum, Grades 11 and 12, (Revised 2007)</i>
Department:	Mathematics
Developed By/Date:	Toronto Eschool, 2014
Revised By/Date:	Toronto Eschool, 2015
Text:	<i>McGraw-Hill Ryerson Mathematics: Mathematics of Data Management, McGraw-Hill Ryerson, 2002.</i>

This course broadens students' understanding of mathematics as it relates to managing data. Students will apply methods for organizing and analyzing large amounts of information; solve problems involving probability and statistics; and carry out a culminating investigation that integrates statistical concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. Students planning to enter university programs in business, the social sciences, and the humanities will find this course of particular interest.

Unit	Titles and Descriptions	Time and Sequence
Unit 1	<p><b>Tools for Data Management</b></p> <p>Data Management comprises all the disciplines related to managing data as a valuable resource. Data does not have meaning unless we are able to use it, make decisions and sound judgment based on it. We do this by using tools for managing the data. In this course we will be using spreadsheets and graphing software to perform complex calculations and link, search, sort and graph data. Among other assignments students are introduced in this unit to the Statistics Canada website where they will learn methods of data retrieval and the creation of graphs using E-Stat.</p>	10 hours
Unit 2	<p><b>Collecting Data</b></p> <p>To summarize data and recognize the trends, we use tables and graphs. In this unit students will demonstrate an understanding of the role of data in statistical studies and the variability inherent in data, and distinguish different types of data; describe the characteristics of a good sample, some sampling techniques, and principles of primary data collection, and collect and organize data to solve a problem; demonstrate an understanding of the applications of data management used by the media and the advertising industry and in various occupations.</p>	10 hours
Unit 3	<p><b>Statistics of One Variable</b></p> <p>This unit will focus on the analysis and presentation of one-variable data. Students will process raw data and develop the skills to summarize it in terms of central tendency, spread and distribution. Students will analyze, interpret, and draw conclusions from one-variable data using numerical and graphical summaries and explore methods of describing a single piece of data in the context of a wider data set. Students use a variety of different software to analyze the presentation of data that has been collected and processed by others data. They develop the critical thinking skills necessary to interpret and assess the validity of secondary data and conclusions drawn from it, maintaining an awareness of the possibility of bias and misrepresentation, either deliberate or accidental.</p>	14 hours
Unit 4	<p><b>Statistics of Two Variables</b></p> <p>Two-variable statistics are the basis for many decisions personally and as a society. Although most two variable statistical tests are beyond the scope of secondary school math, this unit will examine some of the basic topics in two-variable statistics. Two-variable statistics provide methods for detecting relationships between variables and for developing mathematics of these relationships. The visual pattern in a graph or plot can often reveal the nature of the relationship between two variables. In this unit students will analyse, interpret, and draw conclusions from two-variable data using numerical, graphical, and algebraic summaries.</p>	14 hours
Unit 5	<p><b>Combinatorics</b></p> <p>Combinatorics is the branch of mathematics dealing with ideas and methods for counting, especially in complex situations. The techniques and mathematical logic for counting possible arrangements or outcomes are useful for a wide variety of applications. A computer programmer writing software for a game or industrial process would use these techniques, as would a basketball coach planning potential line-ups for a game, or a school board trying to make the most efficient use of its</p>	14 hours

	buses. Students will investigate the concepts of combinations and permutations. They will consider situations in which each should be used, and develop the skills to be able to determine which is most appropriate.	
Unit 6	<p><b>Probability</b></p> <p>Probability was first studied mathematically in the 17th century when Pierre de Fermat and Blaise Pascal attempted to analyze problems associated with gambling. Modern probability theory grew from their correspondence. In this unit students will solve problems involving the probability of an event or a combination of events for discrete sample spaces; solve problems involving the application of permutations and combinations to determine the probability of an event; demonstrate an understanding of discrete probability distributions, represent them numerically, graphically, and algebraically, determine expected values, and solve related problems from a variety of applications. Students will solve problems involving the probability of an event or a combination of events for discrete sample spaces; solve problems involving the application of permutations and combinations to determine the probability of an event; demonstrate an understanding of discrete probability distributions, represent them numerically, graphically, and algebraically, determine expected values, and solve related problems from a variety of applications.</p>	16 hours
Unit 7	<p><b>The Normal Distribution</b></p> <p>Students will gain an understanding of continuous distributions, and will investigate different shapes of distribution, considering situations that may generate them. Students will explore the normal distribution in detail, and investigate its many applications. They will make comparisons between the normal and binomial distributions. They will form an understanding of the conditions in which they might be used interchangeably, and develop the skills that will allow them to decide how and when to make use of these properties.</p>	16 hours
CDMI	<p><b>Culminating Data Management Investigation</b></p> <p>Building upon knowledge and skills acquired in the first five units, the student will have the opportunity to create a research document featuring an analysis of statistics. The project will take the form of a formal research paper, where the student will need to use existing data to calculate probabilities, develop hypotheses and support conclusions.</p>	14 hours
	<p><b>Final Exam</b></p> <p>The final assessment task is a proctored two hour exam worth 30% of the student's final mark.</p>	2 hours
	<b>Total</b>	<b>110 hours</b>

## Overall Curriculum Expectations: MDM4U

<b>Counting and Probability</b>	
110.060.01.01	solve problems involving the probability of an event or a combination of events for discrete sample spaces;
110.060.01.02	solve problems involving the application of permutations and combinations to determine the probability of an event.
<b>Probability and Distributions</b>	
110.060.02.01	demonstrate an understanding of discrete probability distributions, represent them numerically, graphically, and algebraically, determine expected values, and solve related problems from a variety of applications;
110.060.02.02	demonstrate an understanding of continuous probability distributions, make connections to discrete probability distributions, determine standard deviations, describe key features of the normal distribution, and solve related problems from a variety of applications.
<b>Organization of Data for Analysis</b>	
110.060.03.01	demonstrate an understanding of the role of data in statistical studies and the variability inherent in data, and distinguish different types of data;
110.060.03.02	describe the characteristics of a good sample, some sampling techniques, and principles of primary data collection, and collect and organize data to solve a problem.
<b>Statistical Analysis</b>	
110.060.04.01	analyse, interpret, and draw conclusions from one-variable data using numerical and graphical summaries;
110.060.04.02	analyse, interpret, and draw conclusions from two-variable data using numerical, graphical, and algebraic summaries;
110.060.04.03	demonstrate an understanding of the applications of data management used by the media and the advertising industry and in various occupations.
<b>Culminating Data Management Investigation</b>	
110.060.05.01	design and carry out a culminating investigation* that requires the integration and application of the knowledge and skills related to the expectations of this course;
110.060.05.02	communicate the findings of a culminating investigation and provide constructive critiques of the investigations of others.

## Teaching / Learning Strategies

As in a conventional classroom, instructors employ a range of strategies for teaching a course:

- Clear writing that connects mathematics to relevant situational problems
- Examples of full solutions in various contexts and opportunities to practice
- Direct instruction and coaching on student work by the teacher

In addition, teachers and students have at their disposal a number of tools that are unique to electronic learning environments:

- Electronic simulation activities
- Video presentations
- Discussion boards and email
- Assessments with real-time feedback
- Interactive activities that engage both the student and teacher in the subject
- Peer review and assessment
- Internet Instructional Videos

All course material is online, no textbook is required. Assignments are submitted electronically. Tests are completed online at a time convenient for the student, and the course ends in a final exam which the student writes under the supervision of a proctor approved by Toronto eSchool at a predetermined time and place. The final mark and report card are then forwarded to the student's home school.

Students must achieve the Ministry of Education learning expectations of a course and complete 110 hours of planned learning activities, both online and offline, in order to earn a course credit. Students must keep a learning log throughout their course which outlines the activities they have completed and their total learning hours. This log must be submitted before the final exam can be written.

The chart below indicates some general examples of online and offline activities.

<b>Online Learning Activities</b>	<b>Offline Learning Activities</b>
Watching instructional videos	Reading materials for course
Watching additional resources videos	Studying instructional material
Completing online timed assignments	Practicing skills
Contributing to Forums	Completing assignments
Uploading video presentations	Completing essays
Communicating with instructor	Preparing presentations
Participating in live conferences	Reviewing for tests and exams
Practicing through online quizzes	Researching topics on internet
Reviewing peer submissions	
Assessing peer presentations	
Completing online timed exam	

Students are expected to access and participate actively in course work and course forums on a regular and frequent basis. This interaction with other students is a major component of this course and there are minimum requirements for student communication and contribution.

Seven mathematical processes will form the heart of the teaching and learning strategies used.

1. *Communicating*: To improve student success there will be several opportunities for students to share their understanding both in oral as well as written form.
2. *Problem solving*: Scaffolding of knowledge, detecting patterns, making and justifying conjectures, guiding students as they apply their chosen strategy, directing students to use multiple strategies to solve the same problem, when appropriate, recognizing, encouraging, and applauding perseverance, discussing the relative merits of different strategies for specific types of problems.
3. *Reasoning and proving*: Asking questions that get students to hypothesize, providing students with one or more numerical examples that parallel these with the generalization and describing their thinking in more detail.
4. *Reflecting*: Modeling the reflective process, asking students how they know.
5. *Selecting Tools and Computational Strategies*: Modeling the use of tools and having students use technology to help solve problems.
6. *Connecting*: Activating prior knowledge when introducing a new concept in order to make a smooth connection between previous learning and new concepts, and introducing skills in context to make connections between particular manipulations and problems that require them.
7. *Representing*: Modeling various ways to demonstrate understanding, posing questions that require students to use different representations as they are working at each level of conceptual development - concrete, visual or symbolic, allowing individual students the time they need to solidify their understanding at each conceptual stage.

### **Assessment and Evaluation**

Toronto eSchool's approach to assessment and evaluation is based on the Ontario Ministry of Education's *Growing Success 2010* document. Assessment is the process of gathering information that accurately reflects how well a student is achieving the curriculum expectations in a subject or course.

The primary purpose of assessment is to improve student learning. Assessment for this purpose is seen as both "assessment for learning" and "assessment as learning". As part of assessment for learning, teachers provide students with descriptive feedback and coaching for improvement. Teachers engage in assessment as learning by helping all students develop their capacity to be independent, autonomous learners who are able to set individual goals, monitor their own progress, determine next steps, and reflect on their thinking and learning. Toronto eSchool teachers use evidence from a variety of sources in their assessment. These include formal and informal observations, discussions, conversations, questioning, assignments, projects, portfolios, self-assessments, self-reflections, essays, and tests.

Assessment occurs concurrently and seamlessly with instruction. Our courses contain multiple opportunities for students to obtain information about their progress and achievement, and to receive feedback that will help them improve their learning. Students can monitor their own success through the tracking of learning goals and success criteria throughout all courses.

Summative "assessment of learning" activities occur at or near the end of periods of learning. Evidence of student achievement for evaluation is also collected over time from different sources, such as discussions, conversations and observation of the development of the student's learning. Using multiple

sources of evidence increases the reliability and validity of this evaluation. The evaluations are expressed as a percentage based upon the levels of achievement.

### Strategies for Assessment and Evaluation of Student Performance

Assessment as Learning	Assessment for Learning	Assessment of Learning
<p>In all Units students can complete an online practice quiz on each lesson that tests their knowledge of fundamental facts and definitions. The quiz can be retaken as many times as needed and only the highest score is recorded. Students discover their areas of weakness and can take steps to improve on them. The student and instructor can then have a conversation on how best to assist the student's learning.</p>	<p>In all Units, students are expected to submit a mid-unit assignment directly to the instructor. The assignment provides a number of questions, problems, and activities balanced around the four categories of the Achievement Chart: Knowledge and Understanding, Thinking, Application, and Communication. The instructor grades each assignment and provides descriptive feedback and the student is asked to provide feedback on the feedback.</p>	<p>Each Unit ends with an assignment that is submitted directly to the instructor. A grade is recorded based on the Learning Goals and Success Criteria for that Unit. Students may be asked to resubmit parts of the assignment, or a modified assignment.</p>
<p>A Mid-Unit Assignment asks students to videotape themselves presenting solutions to various problems, or results of research, and post them to the forum for review by the instructor and selected peers. These comments and observations can be used to help the student assess their own listening and communicating skills, as well as their progress through the course. Feedback from both the instructor and the student can help the student advocate for their own learning.</p>	<p>Mid-Unit Video Presentation Assignments are used by the instructor as a form of diagnostic and formative assessment to help adjust instruction based on the needs of the student. It is another way the instructor gathers evidence for evaluating student performance.</p>	<p>At the end of each Unit, students complete an online test of the material. A grade is recorded and the instructor can initiate a conversation with the student if there are concerns.</p>
<p>Instructors communicate with their students through email or live chat sessions. Students can raise concerns and reflect on their own personal goals and learning during these one to one conversations with their instructors.</p>	<p>Occasionally instructors ask a student to post a solution to a unique problem designed for that student to the discussion forum, or to comment on the posting of another student. These activities become part of the student's grade under the category "Online Collaboration" and provide an opportunity for the instructor to provide feedback to the student.</p>	<p>At the end of the course, students complete a final exam that covers all the material studied in the course.</p>

## Example of an Assessment Rubric for an Assignment in this course

### MDM4U Assessment Rubric for Unit 3 Assignment

Learning Goals and Success Criteria	Level			
	1	2	3	4
1. Organize data effectively. Student can...				
Distinguish between discrete and continuous variables				
Determine which type of graph to create in a given situation				
Organize data into a frequency table				
Determine the cumulative frequency of a variable				
Determine the relative frequency of a variable				
Create an appropriate graph from a frequency table				
Create a histogram				
Create a bar graph				
Create a cumulative frequency curve				
Create a relative frequency polygon				
Interpret graphs				
2. Understand Measures of Central Tendency. Student can...				
Distinguish between mean, median and mode				
Calculate the mean of a data set				
Calculate the weighted mean of a data set				
Calculate the grouped mean of a data set				
Compare the grouped mean and mean of a data set				
Find the median of grouped data				
Interpret mean, median and mode				
Find the mode of grouped data				
3. Understand Measures of Spread. Student can...				
Calculate the standard deviation of a data set				
Calculate the variance of a data set				
Calculate the quartiles of a data set				
Calculate the Interquartile range of a data set				
Interpret a standard deviation				
Interpret an interquartile range				
Create a box and whisker plot				
Interpret a box and whisker plot				
4. Apply skills to a real life situation. Student can...				
Apply the statistical techniques of this unit to the Maple Leafs Assignment				
Teacher Feedback:				
Student Feedback:				

*Growing Success* articulates the vision the Ministry has for the purpose and structure of assessment and evaluation techniques. There are seven fundamental principles that ensure best practices and procedures of assessment and evaluation by Toronto eSchool teachers. Assessment and evaluations:

1. are fair, transparent, and equitable for all students;
2. support all students, including those with special education needs, those who are learning the language of instruction (English or French), and those who are First Nation, Metis, or Inuit;
3. are carefully planned to relate to the curriculum expectations and learning goals and, as much as possible, to the interests, learning styles and preferences, needs, and experiences of all students;
4. are communicated clearly to students and parents at the beginning of the school year or course and at other appropriate points throughout the school year or course;
5. are ongoing, varied in nature, and administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning;
6. provide ongoing descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement;
7. develop students self-assessment skills to enable them to assess their own learning, set specific goals, and plan next steps for their learning.

### **The Final Grade**

The evaluation for this course is based on the student's achievement of curriculum expectations and the demonstrated skills required for effective learning. The percentage grade represents the quality of the student's overall achievement of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the discipline. A credit is granted and recorded for this course if the student's grade is 50% or higher. The final grade for this course will be determined as follows:

- 70% of the grade will be based upon evaluations conducted throughout the course. This portion of the grade will reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.
- 30% of the grade will be based on a final exam administered at the end of the course.

The general balance of weighting of the categories of the achievement chart throughout the course is

Knowledge and Understanding	25%
Thinking	25%
Communication	25%
Application	25%

## **The Report Card**

Two official report cards are issued - midterm and final. Each report card will focus on two distinct but related aspects of student achievement. First, the achievement of curriculum expectations is reported as a percentage grade. Additionally, the course median is reported as a percentage. The teacher will also provide written comments concerning the student's strengths, areas for improvement and next steps. Second, the learning skills are reported as a letter grade, representing one of four levels of accomplishment. The report cards contain separate sections for the reporting of these two aspects. The report card also indicates whether an OSSD credit has been earned.

## **The Ontario Student Transcript**

The Ontario Student Transcript (OST) is an official document issued by public, Catholic, inspected private schools in Ontario or Ontario International Schools. The OST contains a list of the courses completed, withdrawals from courses occurring 5 days or longer after the midterm report card has been issued, repeated courses in Grades 11 and 12, and equivalent credits granted for work in non-inspected Ontario private schools or schools outside of Ontario. The OST is stored in the Ontario Student Record (OSR) and retained for 55 years after a student retires from school. If the student is currently attending another school - public or private - and is simply taking a single course from Torontoeschool, then that student's OSR continues to reside at the school that the student is attending. Upon completion of the course Torontoeschool will send a copy of the OST back to the home school where the course will be added to the ongoing list of courses on the student's transcript.

## **The Achievement Chart: Overall**

The purpose of the achievement chart is to:

1. provide a common framework that encompasses all curriculum expectations for all courses;
2. guide the development of high-quality assessment tasks and tools;
3. help teachers plan instruction for learning;
4. assist teachers in providing meaningful feedback to students;
5. provide various categories/criteria with which to assess and evaluate students' learning.

The achievement chart provides a reference point for all assessment practice and a framework within which achievement will be assessed and evaluated.

1. The chart is organized into four broad criteria; Knowledge / Understanding, Thinking / Investigation, Communication, and Application.
2. The achievement chart describes the levels of achievement of the curriculum expectations within each subset of criteria.
3. The "descriptor" indicates the characteristic of performance, with respect to a particular criterion, on which assessment or evaluation is focused.
4. A specific "qualifier" is used to define each of the four levels of achievement. It is used along with a descriptor to produce a description of performance at a particular level.
5. The following table provides a summary description of achievement in each percentage grade range and corresponding level of achievement:

A Summary Description of Achievement in Each Percentage Grade Range and Corresponding Level of Achievement		
Percentage Grade Range	Achievement Level	Summary Description
80-100%	Level 4	A very high to outstanding level of achievement. Achievement is <i>above</i> the provincial standard.
70-79%	Level 3	A high level of achievement. Achievement is <i>at</i> the provincial standard.
60-69%	Level 2	A moderate level of achievement. Achievement is <i>below, but approaching</i> , the provincial standard.
50-59%	Level 1	A passable level of achievement. Achievement is <i>below</i> the provincial standard.
below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted.

## Achievement Chart: Mathematics, Grades 9-12

<b>Knowledge and Understanding</b> – Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding)				
	The student:			
<b>Knowledge of content</b> (e.g., facts, terms, definitions)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
<b>Understanding of mathematical content</b> (e.g., concepts, ideas, theories, procedures, processes, methodologies, and/or technologies)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough and insightful understanding of content
<b>Thinking</b> – The use of critical and creative thinking skills and/or processes				
	The student:			
<b>Use of planning skills</b> (e.g., formulating and interpreting the problem, organizing an inquiry, asking questions, setting goals)	uses planning skills with limited effectiveness	uses planning skills with moderate effectiveness	uses planning skills with considerable effectiveness	uses planning skills with a high degree of effectiveness
<b>Use of processing skills</b> (e.g., inquiry process, problem-solving process, decision-making process, research process)	uses processing skills with limited effectiveness	uses processing skills with some effectiveness	uses processing skills with considerable effectiveness	uses processing skills with a high degree of effectiveness
<b>Use of critical/creative thinking processes</b> (e.g., problem solving, inquiry)	uses critical / creative thinking processes with limited effectiveness	uses critical / creative thinking processes with some effectiveness	uses critical / creative thinking processes with considerable effectiveness	uses critical / creative thinking processes with a high degree of effectiveness
<b>Communication</b> – The conveying of meaning through various forms				
	The student:			
<b>Expression and organization of mathematical ideas and thinking</b> (e.g., clear expression, logical organization) <b>in oral, graphic, and written forms, including media forms</b>	expresses and organizes ideas and information with limited effectiveness	expresses and organizes ideas and information with some effectiveness	expresses and organizes ideas and information with considerable effectiveness	expresses and organizes ideas and information with a high degree of effectiveness
<b>Communication for different audiences</b> (e.g., peers, adults) <b>and purposes</b> (e.g., to present and justify a solution or mathematical argument) <b>in oral, written, and visual forms</b>	communicates for different audiences and purposes with limited effectiveness	communicates for different audiences and purposes with some effectiveness	communicates for different audiences and purposes with considerable effectiveness	communicates for different audiences and purposes with a high degree of effectiveness
<b>Use of conventions</b> (e.g., terms, symbols), <b>vocabulary, and terminology of the discipline in oral, written, and visual forms</b>	uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	uses conventions, vocabulary, and terminology of the discipline with some effectiveness	uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
<b>Application</b> – The use of knowledge and skills to make connections within and between various contexts				
	The student:			
<b>Application of knowledge and skills</b> (e.g., concepts, procedures, processes, and/or technologies) <b>in familiar contexts</b>	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
<b>Transfer of knowledge and skills</b> (e.g., concepts, procedures, methodologies, technologies) <b>to new contexts</b>	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness
<b>Making connections within and between various contexts</b> (e.g., connections between concepts, representations, and forms within mathematics; past, present, and future; environmental; social; cultural; spatial; personal; multidisciplinary)	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness

## Resources required by the student

- Access to MHF4u online course of study
- Access to a scanner or digital camera
- Access to a spreadsheet and word-processing software
- Access to an online graphing calculator
- Access to Youtube

## Reference Texts

Note: This course is entirely online and does not require or rely on any textbook. Should students wish to seek additional information we would recommend these texts:

- *Advanced Functions 12*, McGraw-Hill Ryerson, 2008.
- *Advanced Functions*, Nelson Education Ltd., 2009.

## Program Planning Considerations

Teachers who are planning a program in this subject will make an effort to take into account considerations for program planning that align with the Ontario Ministry of Education policy and initiatives in a number of important areas

1. Education for students with special education needs
2. Environmental education
3. Equity and inclusive education
4. Financial literacy education
5. Ontario First Nations, Metis, and Inuit education
6. Role of information and communications technology
7. English language learners
8. Career education
9. Cooperative education and other workplace experiences
10. Health and safety

1. Education for Students with Special Education Needs:

Torontoeschool is committed to ensuring that all students are provided with the learning opportunities and supports they require to gain the knowledge, skills, and confidence they need to succeed in a rapidly changing society. The context of special education and the provision of special education programs and services for exceptional students in Ontario are constantly evolving. Provisions included in the Canadian Charter of Rights and Freedoms and the Ontario Human Rights Code have driven some of these changes. Others have resulted from the evolution and sharing of best practices related to the teaching and assessment of students with special educational needs.

The provision of special education programs and services for students at Torontoeschool rests within a legal framework The Education Act and the regulations related to it set out the legal responsibilities pertaining to special education. They provide comprehensive procedures for the identification of exceptional pupils, for the placement of those pupils in educational settings where

the special education programs and services appropriate to their needs can be delivered, and for the review of the identification of exceptional pupils and their placement.

Teachers will take into account the needs of exceptional students as set out in the students' Individual Education Plan. The online courses offer a vast array of opportunities for students with special education needs to acquire the knowledge and skills required for our evolving society. Students who use alternative techniques for communication may find a venue to use these special skills in these courses. There are a number of technical and learning aids that can assist in meeting the needs of exceptional students as set out in their Individual Education Plan. In the process of taking their online course, students may use a personal amplification system, tela-typewriter (via Bell relay service), an oral or a sign-language interpreter, a scribe, specialized computer programs, time extensions, ability to change font size, oral readers, etc.

## 2. Environmental Education:

Environmental education teaches students about how the planet's physical and biological systems work, and how we can create a more sustainable future. Good curriculum design allows environmental issues and topics to be woven in and out of the online course content. This ensures that the student will have opportunities to acquire the knowledge, skills, perspectives and practices needed to become an environmentally literate citizen. The online course should provide opportunities for each student to address environmental issues in their home, in their local community, or even at the global level.

## 3. Equity and Inclusive Education:

Torontoeschool is taking important steps to reduce discrimination and embrace diversity in our online school in order to improve overall student achievement and reduce achievement gaps due to discrimination. The Ontario Equity and Inclusive Education Strategy was launched in April 2009 and states that all members of the Torontoeschool community are to be treated with respect and dignity. This strategy is helping Torontoeschool educators better identify and remove discriminatory biases and systemic barriers to student achievement. These barriers related to racism, sexism, homophobia and other forms of discrimination may prevent some students from reaching their full potential. The strategy supports the Ministry's key education priorities of high student achievement, reduced gaps in student achievement and increased accountability and public confidence in Ontario's schools. Students, regardless of their background or personal circumstances, must be given every opportunity to reach their full potential. Research shows that when students feel welcomed and accepted in their school, they are more likely to succeed academically. Torontoeschool desires to create a culture of high expectations where factors such as race, age, gender, sexual orientation and socio-economic status do not prevent students from achieving ambitious outcomes.

## 4. Financial Literacy Education:

Financial literacy may be defined as having the knowledge and skills needed to make responsible economic and financial decisions with competence and confidence. Since making financial decisions has become an increasingly complex task in the modern world, students need to have knowledge in various areas and a wide range of skills in order to make informed decisions about financial matters.

Students need to be aware of risks that accompany various financial choices. They need to develop an understanding of world economic forces as well as ways in which they themselves can respond to those influences and make informed choices. Torontoeschool considers it essential that financial literacy be considered an important attribute of a well-educated population. In addition to acquiring knowledge in such specific areas as saving, spending, borrowing, and investing, students need to develop skills in problem solving, inquiry, decision making, critical thinking, and critical literacy related to financial and other issues. The goal is to help students acquire the knowledge and skills that will enable them to understand and respond to complex issues regarding their own personal finances and the finances of their families, as well as to develop an understanding of local and global effects of world economic forces and the social, environmental, and ethical implications of their own choices as consumers. The Ministry of Education and Torontoeschool are working to embed financial literacy expectations and opportunities in all courses as appropriate, as part of the ongoing curriculum review process.

#### 5. Ontario First Nations, Metis, and Inuit Education:

First Nation, Metis, and Inuit students in Ontario will need to have the knowledge, skills, and confidence they need to successfully complete their elementary and secondary education in order to pursue postsecondary education or training and/or to enter the workforce. They will need to have the traditional and contemporary knowledge, skills, and attitudes required to be socially contributive, politically active, and economically prosperous citizens of the world. All students in Ontario will need to have knowledge and appreciation of contemporary and traditional First Nation, Metis, and Inuit traditions, cultures, and perspectives. Torontoeschool and the Ministry of Education are committed to First Nation, Metis, and Inuit student success. Torontoeschool teachers are committed to (1) developing strategies that will increase the capacity of the education system to respond to the learning and cultural needs of First Nation, Metis, and Inuit students; (2) providing quality programs, services, and resources to help create learning opportunities for First Nation, Metis, and Inuit students that support improved academic achievement and identity building; (3) providing a curriculum that facilitates learning about contemporary and traditional First Nation, Metis, and Inuit cultures, histories, and perspectives among all students where possible; and (4) developing and implementing strategies that facilitate increased participation by First Nation, Metis, and Inuit parents, students, communities, and organizations in working to support the academic success of the student.

#### 6. The Role of Information and Communications Technology in the Curriculum.

Information literacy is the ability to access, select, gather, critically evaluate, and create information. Communication literacy refers to the ability to communicate information and to use the information obtained to solve problems and make decisions. Information and communications technologies are utilized by all Torontoeschool students when the situation is appropriate within their online course. As a result, students will develop transferable skills through their experience with word processing, internet research, presentation software, and telecommunication tools, as would be expected in any other course or any business environment.

#### 7. English Language Learners:

This Torontoeschool online course can provide a wide range of options to address the needs of ESL/ELD students. This online course must be flexible in order to accommodate the needs of

students who require instruction in English as a second language or English literacy development. The Torontoeschool teacher considers it to be their responsibility to help students develop their ability to use the English language properly. Appropriate modifications to teaching, learning, and evaluation strategies in this course may be made in order to help students gain proficiency in English, since students taking English as a second language at the secondary level have limited time in which to develop this proficiency. This online course can provide a wide range of options to address the needs of ESL/ELD students. Well written content will aid ESL students in mastering not only the content of this course, but as well, the English language and all of its idiosyncrasies. Torontoeschool has created course content to enrich the student's learning experience. In addition, since many occupations in Canada require employees with capabilities in the English language, many students will learn English language skills which can contribute to their success in the larger world.

#### 8. Career Education:

As the online student progresses through their online course, their teacher is available to help the student prepare for employment in a huge number of diverse areas. With the help of their teacher, students will learn to set and achieve goals and will gain experience in making meaningful decisions concerning their career choices. The skills, knowledge and creativity that students acquire through this online course are essential for a wide range of careers. Throughout their secondary school education, students will learn about the educational and career opportunities that are available to them; explore and evaluate a variety of those opportunities; relate what they learn in their courses to potential careers in a variety of fields; and learn to make appropriate educational and career choices.

#### 9. Cooperative Education and Other Workplace Experiences:

By applying the skills they have developed, students will readily connect their classroom learning to real-life activities in the world in which they live. Cooperative education and other workplace experiences will broaden their knowledge of employment opportunities in a wide range of fields. In addition, students will increase their understanding of workplace practices and the nature of the employer-employee relationship. Torontoeschool teachers will try to help students link to Ministry programs to ensure that students have information concerning programs and opportunities.

#### 10. Health and Safety:

The Mathematics program provides the reading and analytical skills for the student to be able to explore the variety of concepts relating to health and safety in the workplace. Teachers who provide support for students in workplace learning placements need to assess placements for safety and ensure that students can read and understand the importance of issues relating to health and safety in the workplace.