IGNITE MY FUTURE

THINK SOLVE CREATE CONNECT

LESSON TITLE

Career-o-Matic

Guiding Question: What Does Happiness Mean?

SUBJECTS

Math
Computer Science
Career Development
Social and Emotional Learning

COMPUTATIONAL THINKING PRACTICE

Recognizing and Defining Computational Problems

COMPUTATIONAL THINKING STRATEGIES

Analyze Data
Develop Algorithms

MATERIALS

Writing materials

Scrap paper

Dice (set of two)

Career Search
Student Capture Sheet

Career-o-Matic Algorithm Development Worksheet

Ignite Curiosity

- What extent does a person's career choice impact his or her happiness in life, and why?
- Why are people interested in different jobs?
- What are the jobs of the future and how can one prepare for them?
- What are the jobs you've heard about recently that you never knew existed? How can one teach students and workers about these jobs?

In this lesson, students will act as data scientists who have been tasked with creating the Career-o-Matic. Career-o-Matic is a new instrument that identifies the perfect career for a student based on various inputs. In **THINK**, students consider the role that probability plays in identifying a satisfying career by playing an interactive game. They also explore career search resources, analyze the strengths and weaknesses of those resources, and record them in a capture sheet. In **SOLVE**, , students will use the computational thinking strategy of analyzing data to identify the elements involved in selecting and pursuing a fulfilling job and design an appropriate method for measuring those elements. In **CREATE** students design an application that incorporates those measurements into an algorithm that helps students identify appropriate careers for themselves. In **CONNECT**, students consider how such an application would help improve the lives of individuals and learn about careers that might relate to such a project.

Students will be able to:

- **Analyze** the factors involved in identifying a fulfilling and satisfying career
- **Apply** that analysis to a career aptitude measurement tool
- **Create** an algorithm that returns a rating of predicted career satisfaction

Students simulate the role of data scientists who have been challenged to create an instrument called the Career-o-Matic. This assessment tool will match a user with a series of fulfilling vocations.

1 **Read** the following scenario to students:

Imagine that you are data scientists working for one of the world's largest companies. The company's leadership has seen an alarming problem develop in recent years— job applications from recent post-secondary graduates has dropped off significantly. The leadership isn't sure why this is happening but they suspect that it's because the jobs that the company is hiring for aren't listed in common career aptitude tests. The company has hired you and your team to create a new career aptitude test called the Career-O-Matic. This assessment will match a user with a career that is ideal for them based on a series of inputs. Can you think like a computer to design a career aptitude test for the 21st century? Let's find out!

2 **Present** the following questions to the class for consideration:

- The leading industries of the future are healthcare, education, and computer science. How do you know which will have the best job prospects when you're ready to graduate?
- Should you finish school before you begin working? Why might you want to start working right at the end of high school? Does post-secondary education make you more prepared for the job market?
- If you could make more money by starting your own business but also have a higher risk of losing money, what should you do?
- Is it more profitable to go to graduate school or enter the workforce right after you complete your post-secondary education?

3 **Ask** students to provide answers to the questions. Explain that we must make a series of choices as we go through life. These choices could be as small as what to eat for breakfast or as large as what career path to pursue. In order to make the best choice possible, we rely on probability. Probability is the likelihood of something happening.

4 **Demonstrate** the concept of probability by engaging students in an interactive game called THINK. The object of the game is to accumulate the greatest number of points possible.

- Begin by drawing a T-chart on the board that separates the letter T, H, I, N, and K. Have students follow along by drawing the same chart on a piece of paper.
- Ask students to stand up. Roll the dice and record the total number in the column under "T" (e.g., if you roll a four and a two, you'll record the number six under the "T" column). The number on the dice applies to all the students, so each student will write the number six on his or her sheet under the "T" column.
- Explain that for each roll of the dice, the students gain points. There are just two exceptions: if a one is rolled, then the student will lose all points in the current column they are playing in. If two ones are rolled, then all points are wiped out. If a student chooses to sit, they "freeze" their points and protect them from getting wiped out if a one is rolled. However, they can't collect any more points moving forward.
- Before your next roll, ask students to decide if they want to sit or stand.
- Roll the dice and record the total on the board.
- Continue in this column until you roll a one. Once a one is rolled, the points are removed and you move to the next column.
- Repeat this until you have moved through the "K" column.

5 **Play** the game two or three times. Students will begin to develop strategies to improve his or her score.

6 **Ask** students the following critical thinking questions:

- Did you improve with each round of the game? Why or why not?
- Did **THINK** involve both chance and choice? Where did chance come in? Where did choice come in?
- Can you think of different ways to play the game of **THINK**? Did some of your classmates play it safer than others?
- How could you determine the average amount of points scored before a one comes up? Why is this important?

7 **Explain** to students that their task in this lesson is the development of the Career-o-Matic, an instrument designed to guide students in their choice of a satisfying and appropriate career. Just as in the game THINK, students will use both chance and choice to determine a career path for an end-user. Ask students why the concept of probability is important when considering which career to pursue.

In small groups, students create a list of key factors that contribute to career satisfaction, determine a method for measuring each of those factors, and identify ways to incorporate technology.

1 **Distribute** the Career Search student capture sheet. Direct students to compare the following sites and their respective approaches to providing career guidance.

- National Occupational Classification
- Statistics Canada Job Satisfaction Tool

Explain to the students that they are to evaluate the strengths and weaknesses of both sites for two aspects:

- **Content:** What is the information provided? Would the career advice and guidance prove to be effective? How does the site provide advice and guidance?
- **Technical:** Is the platform used effective to provide career guidance? Is the information clear and accessible? Is it easy to understand? Is it easy to navigate through the platform?

2 **After** the students complete their analysis of the career resources, lead them in a discussion of how they could use these resources in the development of the Career-o-Matic:

- Which of the aspects of career aptitude are determined by chance? Which are determined by choice?
- What are the strengths and weaknesses of these resources?
- How much do the resources focus on fulfillment and satisfaction in career choice? If needed, how could this be improved?
- How personalized and individualized are the information and the guidance provided by these career resources?
- To what extent is the full capability of technology utilized in these resources?
- What changes or additions should be made to make these resources more useful?

3 **Divide** students into small groups, and distribute the Career-o-Matic Algorithm Development student capture sheet to each group.

4 **Instruct** groups to create a list of four to six key factors that contribute to career satisfaction. Two of these factors should be education and income.

5 **After the groups have developed their lists of key factors,** let them discuss and develop a plan for how to measure each factor.

- Explain that all measurements should be made on a scale of 0 to 100.
- Explain that measurements should represent a rating of a particular career for that category. The system should be able to be used for any career.
- Explain that some factors can be measured based solely on the objective traits of the career itself, while other factors will require information both about the career and the individual student before a measurement can be provided. For example a category, such as "personal fulfillment" depends on the user taking the assessment.
- Explain that a baseline level of zero on an income scale should represent an annual income that is below the basic living expenses for an average family.

6 **Check for understanding** by asking students the following critical thinking questions:

- Which of the elements in the assessment are objective, meaning they apply no matter who is taking the test? Which of the elements are subjective, meaning that their meaning changes depending on who is taking the test?
- How can you design an assessment with both objective and subjective components?
- Should all of your factors have the same weightage or should some matter more than others? Why?

Students develop an algorithm that matches a user with a career that is ideal for them.

1. **Instruct** groups to develop a plan for customizing the weighting of the career satisfaction factors for individuals. They should write a description of their plan on the Career-o-Matic Algorithm Development student capture sheet.

   Ask students a few questions to spur on their thoughts:

   - Should individuals simply be asked to list their priorities among the factors?
   - Should individuals always know their priorities, or should one help them in discovering those priorities? If so, then how can this be done?
   - Does everyone have the same strength of feeling about their prioritization? Should this be taken into account?

2. **Have each group write down** a weight for each of their six factors, ensuring that the weights add up to 100 percent.

3. **Have each group develop** a list of 20 careers using the Labour Market Tool produced by the government of Canada. This "career bank" will be the dataset for their assessment and should be diverse.

4. **Provide** students with time to develop a flowchart algorithm that sorts the careers into groups based on the six points of criteria each group has created.

5. **Then,** students should further sort each group using subjective criteria.

6. **Once each group has completed their algorithm,** lead the class in a brainstorming session about how to turn these algorithms into assessments that can identify career matches.
   - How would you frame a question to determine how much education a person wants to pursue?
   - How would you determine how important money is to someone?
   - Does your algorithm let the user tell you about their skills and interests? If not, how could you incorporate that into an assessment?

How can computational thinking help individuals find more satisfying and fulfilling careers and thus improve their lives?

Select one of the strategies listed below to help students answer these questions:

- **How do this problem and solution connect to me?**
- **How do this problem and solution connect to real-world careers?**
- **How do this problem and solution connect to our world?**

1. **Write** the three questions on PPT or flip chart slides, and invite students to share out responses.
2. **Display** chart paper around the room, each with one question written on it. Ask students to write down their ideas on each sheet.
3. **Assign** one of the questions to three different student groups to brainstorm or research and then share out responses.
4. **Invite** students to write down responses to each question on a sticky note, and collect them to create an affinity diagram of ideas.

How does this connect to students?

Choosing a career path is one of the most significant and impactful choices that any student will make. Individually tailored career guidance can give students valuable insights into which careers would be an ideal match for them. This saves the student's valuable time and money in pursuit of a satisfying job. In this activity, students will learn how to use the computational thinking strategies of analyzing data and developing algorithms to update career aptitude tests for the 21st century.

How does this connect to careers?

Career counsellors assist people with the process of making career decisions by helping them develop skills or choose a career or educational program.

Human resources specialists recruit, screen, interview, and place workers. They often handle other human resources' work, such as those related to employee relations, compensation and benefits, and training.

Social workers help people solve and cope with problems in their everyday lives. One group of social workers—clinical social workers—also diagnose and treat mental, behavioural, and emotional issues.

High School Teachers help prepare students for life after graduation. They teach academic lessons and various skills that students will need to attain post-secondary or when enter the job market.

How does this connect to our world?

If students find a fulfilling career path early, could they make a difference or accomplish more in their chosen field? With so many new careers available today, it's hard to know what skills to learn and what will be in demand in the future. By understanding the concept of probability, students can account for the roles of chance and choice in their professional lives.

TATA Consultancy Services recently co-authored a report on the skill development and inclusion of indigenous peoples in Canada within the IT sector. You can read the brief here or the full report here.

Find more easy-to-implement resources to integrate computational thinking practices into your classroom by visiting **ignitemyfutureinschool.ca**

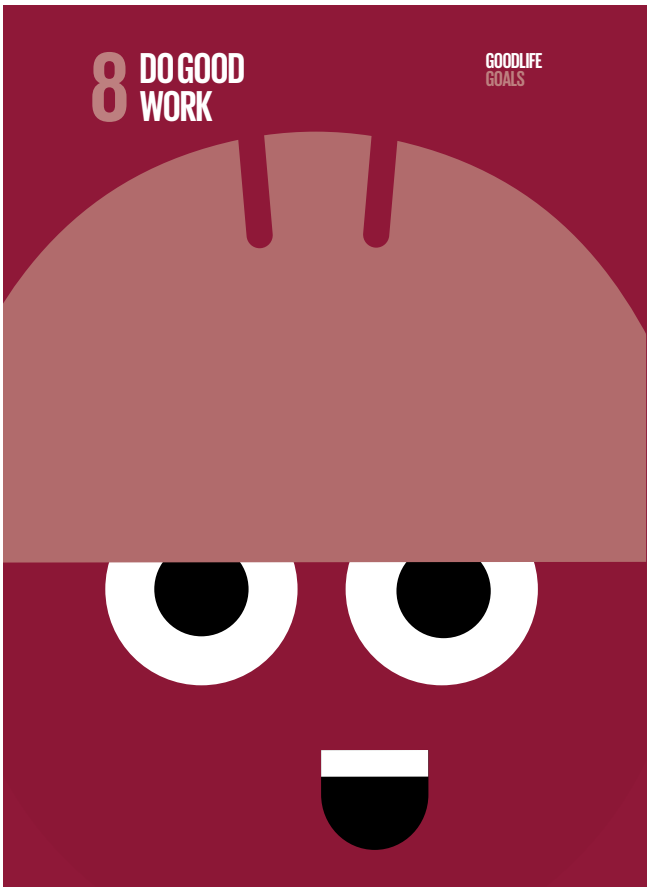
Curriculum Connections

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

8 DECENT WORK AND ECONOMIC GROWTH

"For the goals to be reached, everyone needs to do their part: governments, the private sector, civil society and **people like you**."
–The United Nations

"The Sustainable Development Goals are the blueprint for a better future. And together we can reach them. By following the Good Life Goals, we can all help make tomorrow better than today. Let's do this! #GoodLifeGoals"



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Global Competencies

CMEC (Council of Ministers of Education, Canada) Pan-Canadian Global Competencies Descriptions

Highlighted sections apply to this lesson

Global Competency	Definition	Student Descriptors
Collaboration	Collaboration involves the interplay of the cognitive (including thinking and reasoning), interpersonal, and intrapersonal competencies necessary to participate effectively and ethically in teams. Ever-increasing versatility and depth of skill are applied across diverse situations, roles, groups, and perspectives in order to co-construct knowledge, meaning, and content, and learn from, and with, others in physical and virtual environments.	Students participate in teams by establishing positive and respectful relationships, developing trust and acting co-operatively and with integrity. Students learn from and contribute to the learning of others by co-constructing knowledge, meaning, and content. Students assume various roles on the team, respect a diversity of perspectives, and address disagreements and manage conflict in a sensitive and constructive manner. Students network with a variety of communities/ groups and use an array of technology appropriately to work with others.
Communication	Communication involves receiving and expressing meaning (e.g., reading and writing, viewing and creating, listening and speaking) in different contexts and with different audiences and purposes. Effective communication increasingly involves understanding both local and global perspectives, societal and cultural contexts, and adapting and changing using a variety of media appropriately, responsibly, safely, and with regard to one's digital footprint.	Students communicate effectively in different contexts in oral and written form in French and/ or English through a variety of media. Students communicate using the appropriate digital tools and create a positive digital footprint. Students ask effective questions to acquire knowledge, listen to understand all points of view, voice their own opinions, and advocate for ideas. Students gain knowledge about a variety of languages and understand the cultural importance of language.

Global Competencies cont.

Highlighted sections apply to this lesson

Global Competency	Definition	Student Descriptors
Global Citizenship and Sustainability	Global citizenship and sustainability involve reflecting on diverse worldviews and perspectives and understanding and addressing ecological, social, and economic issues that are crucial to living in a contemporary, connected, interdependent, and sustainable world. It also includes the acquisition of knowledge, motivation, dispositions, and skills required for an ethos of engaged citizenship, with an appreciation for the diversity of people, perspectives, and the ability to envision and work toward a better and more sustainable future for all.	Students understand the ecological, economic, and social forces, their interconnectedness, and how they affect individuals, societies, and countries. Students take actions and responsible decisions that support quality of life for all, now and in the future. Students recognize discrimination and promote principles of equity, human rights, and democratic participation. Students understand Indigenous traditions and knowledge and its place in Canada, learn from and with diverse people, develop cross-cultural understanding, and understand the forces that affect individuals, societies, and nations. Students engage in local, national, and global initiatives to make a positive difference. Students contribute to society and to the culture of local, national, global, and virtual communities in a responsible, inclusive, accountable, sustainable, and ethical manner. Students as citizens participate in networks in a safe and socially responsible manner.

Global Competencies cont.

Highlighted sections apply to this lesson

Global Competency	Definition	Student Descriptors
Critical Thinking and Problem Solving	Critical thinking and problem solving involve addressing complex issues and problems by acquiring, processing, analysing, and interpreting information to make informed judgments and decisions. The capacity to engage in cognitive processes to understand and resolve problems includes the willingness to achieve one's potential as a constructive and reflective citizen. Learning is deepened when situated in meaningful, real-world, authentic experiences.	Students will solve meaningful, real-life, complex problems by taking concrete steps to address issues and design and manage projects. Students will engage in an inquiry process to solve problems as well as acquire, process, interpret, synthesize, and critically analyse information to make informed decisions (i.e., critical and digital literacy). Students will see patterns, make connections, and transfer what they have learned from one situation to another, including in real world applications. Students will construct, relate, and apply knowledge to all domains of life such as school, home, work, friends, and community. Students will analyze the functions and interconnections of social, economic, and ecological systems.
Innovation, Creativity and Entrepreneurship	Innovation, creativity, and entrepreneurship involve the ability to turn ideas into action to meet the needs of a community. The capacity to enhance concepts, ideas, or products to contribute new-to- the-world solutions to complex economic, social, and environmental problems involves leadership, taking risks, independent/unconventional thinking and experimenting with new strategies, techniques, or perspectives, through inquiry research. Entrepreneurial mindsets and skills involve a focus on building and scaling an idea sustainably.	Students formulate and express insightful questions and opinions to generate novel ideas. Students contribute solutions to complex economic, social, and environmental problems or to meet a need in a community in a number of ways including; enhancing concepts, ideas, or products through a creative process, taking risks in their thinking and creating, making discoveries through inquiry research, and by hypothesizing and experimenting with new strategies or techniques. Students demonstrate leadership, initiative, imagination, creativity, spontaneity, and ingenuity in a range of creative processes and motivate others with an ethical entrepreneurial spirit.

Global Competencies cont.

Highlighted sections apply to this lesson

Global Competency	Definition	Student Descriptors
Learning to learn and to be self-directed and self-aware	Learning to learn and to be self-directed and self-aware, means: becoming aware and demonstrating agency in one's process of learning, including the development of dispositions that support motivation, perseverance, resilience, and self-regulation. Belief in one's ability to learn (growth mindset), combined with strategies for planning, monitoring and reflecting on one's past, present, and future goals, potential actions and strategies, and results. Self-reflection and thinking about thinking (metacognition) promote lifelong learning, adaptive capacity, well-being, and transfer of learning in an ever-changing world.	Students learn the process of learning (metacognition) (e.g., independence, goal-setting, motivation) and believe in their ability to learn and grow (growth mindset). Students self-regulate in order to become lifelong learners and reflect on their thinking, experience, values, and critical feedback to enhance their learning. They also monitor the progress of their own learning. Students develop their identity in the Canadian context (e.g., origin and diversity) and consider their connection to the environment. They cultivate emotional intelligence to understand themselves and others. They take the past into account to understand the present and approach the future. Students develop personal, educational, and career goals and persevere to overcome challenges to reach these goals. They adapt to change and show resilience to adversity. Students manage various aspects of their lives: physical, emotional (relationships, self-awareness), spiritual, and mental well-being.

Career Search Resources Capture Sheet

	Content Evaluation	Technical Evaluation
National Occupational Classification		
Statistics Canada Job Satisfaction Tool		

Career-o-Matic Algorithm Development Worksheet

Description of Plan for Customizing the Weighting of Each Factor

Key Factors in Career Satisfaction
ex: Income

Technologies to Incorporate

Plan for Measuring Each Factor

Career-o-Matic Algorithm Development Worksheet Cont.

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Rating					
x	x	x	x	x	x
Weighting					
=	=	=	=	=	=
Personalized Factor Score					
	Score 1	Score 2	Score 3	Score 4	Score 5

Sum of Individual Scores = Career Score