



IGNITE MY FUTURE

LESSON TITLE

Deciphering Diabetes

Guiding Question: How can we connect with each other?

SUBJECTS

Science
Math

COMPUTATIONAL THINKING PRACTICE

Collaborating Around Computing

COMPUTATIONAL THINKING STRATEGY

Analyzing Data

MATERIALS

[Data Collection](#) student
capture sheet

[Case Study](#) student handout

[Presentation Outline](#) student
capture sheet

[Presentation Feedback Form](#)

Computers with Internet access
(optional)

Ignite Curiosity

- Have you ever had an illness that prevented you from going to school or participating in activities that you love?
- Do you have a friend who lives with a chronic condition like asthma, sickle cell anemia, or another disorder that means he or she has to visit a doctor often?
- Can smartphones provide medical care?
- How can computers help doctors to treat patients remotely?

Diabetes is a prevalent disease in Canada. It impacts many senior citizens and leads to other health problems like heart disease and stroke. For many diabetic senior citizens, it is difficult to leave home for routine medical care. Diabetic patients must test their blood sugar to know their overall health. If their blood sugar is low, they can take insulin to provide the body with enough glucose it needs to function. If a patient forgets to check his or her blood sugar and the glucose level is too low, it could result in acute health problems like coma. In **THINK**, students will gain a common understanding of what diabetes is, how common it is in Canada, and how it impacts the people who have to live with it. In **SOLVE**, students will investigate the causes of diabetes and think of ways to manage the condition while also promoting the search for a cure. In **CREATE**, students will create a presentation to bring awareness of the diabetes epidemic to family and friends who might be unaware of the disease. In **CONNECT**, students will explore three motivational videos about diabetes in Canada and connect to various professions linked to diabetes.

Students will be able to:

- **Identify** correlations between age and chronic diseases to collect quantitative data related to diabetes
- **Analyze** data to form a hypothesis about how health traits correlate to diabetes
- **Create** a scatter plot chart and collaborate in groups to apply information about diabetes



Students will examine how risk factors like age, correlate to diabetes.

1 Share the following [video](#) with your students. Ask students the following questions to gauge their knowledge on the topic of diabetes. Provide them with sticky notes if you wish to display the questions centrally on the board.

- What is diabetes?
- How many people have diabetes?
- What kind of people have or can develop diabetes? (old, young, all?)
- What do you know about this medical condition?
- Do you know someone who has diabetes?

Based on your own knowledge and the knowledge of students, share the following [video](#) and [article](#) from Diabetes Canada to address some of the knowledge gaps in the classroom.

2 Distribute the [Data Collection](#) student capture sheet and explain to the students that they will be collecting data and then writing statements about diabetes that answers the following questions:

- Who is affected by diabetes?
- What kind of medical care is required for diabetic patients?
- What can one do to help solve health crises, like diabetes?

Teacher Note: Write all three questions in a central location. They are also on the [Data Collection](#) student capture sheet.

Distribute copies of the following handouts as resources for collecting data:

- [Diabetes Canada 2019 facts](#)
- [National Diabetes strategy required in Canada](#)
- [Canadians opinion on diabetes](#)

At the end of the [Data Collection](#) student capture sheet, instruct students to pick one question to answer and then prepare to share with the class.



Students will investigate the causes of diabetes and how we can manage and prevent it.

- 1 Share** the following [article](#) with students. Now that they are aware of how common diabetes and prediabetes is, they can begin to think about ways to help their family and friends prevent it.
- 2 For those of us who have diabetes or know someone who has the disease,** how can one use technology to monitor one's condition to live our best life? Students will use the following [document](#) to learn about the three most common methods of glucose monitoring. Distribute the [Case Study](#) student capture sheet to students. Ask students which monitoring method they would recommend to each person in the case study and why.
- 3 Encourage** students to share their case study results with each other and the class. Debrief by asking students if there is an advantage to having different ways of monitoring blood glucose.



Students will collaborate in teams to create a presentation using technology to control diabetes.

- 1 Students** will create a short presentation (approximately 2 minutes) using a mode of their choice (paper-based, digital, or both) to share what they have learned about diabetes and the current technology that exists to help and support people living with diabetes. Students can use the [Presentation Outline](#) student capture sheet to put their work together. Remind the students that their target audience is family and friends who have little to no knowledge about diabetes.
- 2 Students will share their presentations with classmates**, who in turn can provide feedback using the [Presentation Feedback Form](#).



Students will explore how we are getting closer and closer to curing diabetes through a series of three video clips below. Students will be encouraged to take action to help in the fight against diabetes.

- 1 Share** the following [video](#) with students. The video begins with various people with diabetes sharing how the disease is too much for them to handle. In the middle, there is a turning point when they all realize that they can reframe their thinking by working together to fight against diabetes.
- 2 With the major progress that has been made over the past century,** we are closer to finding a cure and more effective ways of managing diabetes. Watch the first 50 seconds of the [video](#) to learn how families with diabetes work together to support each other.
- 3 D-Camps** (Diabetes camps) are a great opportunity for children with type 1 diabetes to have a safe and impactful summer camp experience. Diabetes Canada runs these camps across the country. Watch the [video](#) to see their work and understand why it is important.



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 PowerPoint or flip chart slides and invite students to share out responses.
- 2 Display** pieces of chart paper around the room, each with one question written on it. Ask students to write down their ideas related to the questions 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?

Students probably know a friend or family member with diabetes or are diabetic themselves as nearly 1 in every 10 people has diabetes.

Most students can easily access and understand phone applications. If a phone app can check and control blood sugar, students with the disease can easily monitor their blood sugar. Students can also assist family members who are disabled or elderly using the application. A “smart” insulin pen would be similar to an app and just as easy for students to operate.

Recent graphical models such as infographics use charts to represent data and recognize correlations. Infographics are a great way to summarize data in a big-picture thinking strategy. They are also user friendly and appear more engaging to students than regular graphs and charts.

How does this connect to careers?

Statisticians work for a variety of businesses to collect and analyze data. They work with research data, performance data, and data that are produced by the CDC and other health organizations. Their work solving problems impacts businesses, the environment, health, and a variety of other industries and fields.

Medical Scientists research on public health to improve the well-being of society. They produce advancements in medicines and treatments for illnesses and diseases. The work of medical scientists involves investigative research and clinical trials to produce data about human health.

Registered Nurses work directly with patients to administer medicines and assist with medical procedures. They also provide health education and organize patient care. Registered Nurses work in hospitals, doctor’s offices, and other medical facilities.

Dietitians and **Nutritionists** work with patients to monitor health data and design treatment plans to improve overall health.

Biomedical Engineers create devices and equipment for use in healthcare.

How does this connect to our world?

Diabetes affects people around the world. Developing an app to monitor and report blood sugar levels to doctors positively impacts society on several levels. First, it reduces the “distance” between the doctor and patient. Second, digital applications are readily available to everyone with a smartphone. Third, apps can enhance existing technology that takes blood sugar readings.

Statistics to improve health is a world language, as Math is a world language. Data and equations need no translation and are understood in the same way around the world. If students, health professionals, or scientists use statistics to solve a problem related to health, the data they produce can help others improve on their current work.

Watch this [video](#) to learn how TATA Consultancy Services provides governments with Information Technology solutions to help make public healthcare more affordable and accessible.

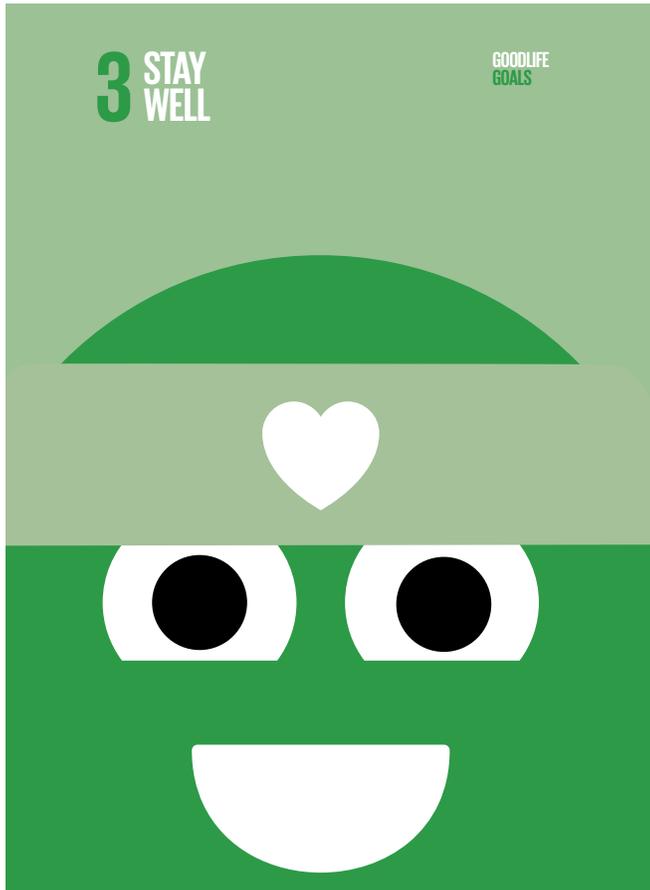
Curriculum Connections

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS



“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”



STAY WELL
Actions

3

1
Learn about, and share, ways to stay healthy

4
Value mental health and well-being

2
Wash your hands and exercise regularly

5
Demand medical care and vaccinations for all

3
Stay safe on or near roads



Ensure healthy lives and promote well-being for all at all ages.

SUSTAINABLE DEVELOPMENT GOALS

Source:

[The Good Life Goals by Futerra Sustainability Communications Ltd and 10-Year Framework of Programmes on Sustainable Lifestyles and Education Programme](#) is licenced under CC BY-ND 4.0.

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

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.	<p>Students participate in teams by establishing positive and respectful relationships, developing trust and acting co-operatively and with integrity.</p> <p>Students learn from and contribute to the learning of others by co-constructing knowledge, meaning, and content.</p> <p>Students assume various roles on the team, respect a diversity of perspectives, and address disagreements and manage conflict in a sensitive and constructive manner.</p> <p>Students network with a variety of communities/groups and use an array of technology appropriately to work with others.</p>
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.	<p>Students communicate effectively in different contexts in oral and written form in French and/or English through a variety of media.</p> <p>Students communicate using the appropriate digital tools and create a positive digital footprint.</p> <p>Students ask effective questions to acquire knowledge, listen to understand all points of view, voice their own opinions, and advocate for ideas.</p> <p>Students gain knowledge about a variety of languages and understand the cultural importance of language.</p>

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.	<p>Students understand the ecological, economic, and social forces, their interconnectedness, and how they affect individuals, societies, and countries.</p> <p>Students take actions and responsible decisions that support quality of life for all, now and in the future.</p> <p>Students recognize discrimination and promote principles of equity, human rights, and democratic participation.</p> <p>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.</p> <p>Students engage in local, national, and global initiatives to make a positive difference.</p> <p>Students contribute to society and to the culture of local, national, global, and virtual communities in a responsible, inclusive, accountable, sustainable, and ethical manner.</p> <p>Students as citizens participate in networks in a safe and socially responsible manner.</p>

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.	<p>Students will solve meaningful, real-life, complex problems by taking concrete steps to address issues and design and manage projects.</p> <p>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).</p> <p>Students will see patterns, make connections, and transfer what they have learned from one situation to another, including in real world applications.</p> <p>Students will construct, relate, and apply knowledge to all domains of life such as school, home, work, friends, and community.</p> <p>Students will analyze the functions and interconnections of social, economic, and ecological systems.</p>
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.	<p>Students formulate and express insightful questions and opinions to generate novel ideas.</p> <p>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.</p> <p>Students demonstrate leadership, initiative, imagination, creativity, spontaneity, and ingenuity in a range of creative processes and motivate others with an ethical entrepreneurial spirit.</p>

Global Competencies cont.

Highlighted sections apply to this lesson

Global Competency	Definition	Student Descriptors
<p>Learning to learn and to be self-directed and self-aware</p>	<p>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.</p>	<p>Students learn the process of learning (metacognition) (e.g., independence, goal-setting, motivation) and believe in their ability to learn and grow (growth mindset).</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Students manage various aspects of their lives: physical, emotional (relationships, self-awareness), spiritual, and mental well-being.</p>

Data Collection

Using handouts provided by the teacher, collect data in the form of “fact statements” to answer the following questions:

- 1** Who is affected by diabetes?
- 2** What kind of medical care do people with diabetes need?
- 3** What can we do to help solve health crises like diabetes?

Write the facts below and then circle the question each answers.

Fact Statements	Answers question #		
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3
	1	2	3

Case Study

Profile	Recommended glucose monitoring method	Rationale (Why is this the best option for this person? Consider the pros and cons of your research.)
<p>Jay has type 1 diabetes. He is an athlete and wants to decrease the time he spends in hypoglycemia (low blood sugar). He just got funding for a new glucose monitoring device.</p>		
<p>Juliana has type 1 diabetes and isn't great at recognizing when she has low blood sugar.</p>		
<p>Jamie is diagnosed with type 2 diabetes. She has a tight budget and doesn't need to measure her blood sugar often. She isn't afraid of needles and is looking for a simple and affordable way to monitor her blood sugar.</p>		

What is the advantage of having different ways of monitoring glucose for different people?

Presentation Outline Student Capture Sheet

Hook: Start with an unexpected introduction to hook the audience (e.g., a question, a joke, a personal story, a quote, a dance routine, etc.)

Tell the audience three facts you learned about diabetes.

Tell the audience how technology improves the lives of people with type 1 and type 2 diabetes.

Conclude by restating your point and asking for support to get your desired way of giving instructions.

Presentation Feedback Form

Share feedback with the presenters by answering the following prompts.

Content—Did the speaker(s) state their points clearly and persuasively?

Speaking—Was the speaker(s) easy to understand?

Engaging—Did you find the presentation interesting and wanted to hear more?