



IGNITE MY FUTURE

LESSON TITLE

About Faces

Guiding Question: How does perspective change our understanding?

SUBJECTS

English/Language Arts
Social Studies

COMPUTATIONAL THINKING PRACTICE

Developing and
Using Abstractions

COMPUTATIONAL THINKING STRATEGIES

Find Patterns
Abstraction

MATERIALS

[Deepfake](#) dataset

Computers with Internet access

A projector and screen

Chalkboard or whiteboard

[Deepfake](#) teacher resource

Ignite Curiosity

- What would happen if we could change a video of a world leader to have them act however we wanted and nobody could tell?
- Is it always easy to recognize if a video is real or fake?
- What are some of the special effects used in the movies to change how people look? Could these special effects have other uses outside of entertainment?

In this lesson, students will use the computational thinking strategies of finding patterns and abstraction to develop a tool a news-consumer can use to identify if a video has been altered by deepfake technology. In **THINK**, students act as journalists tasked with watching a series of videos made with this technology. They will use the computational thinking strategy of abstraction to identify indicators of videos that have been altered. In **SOLVE** students use the patterns they identified in Think to create a scale that rates the likelihood that a piece of media content has been manipulated. In **CREATE** students use the scale they developed in Solve to construct an online test that news watchers can use to help them discern if the content they are watching is real or manipulated. In **CONNECT**, students identify how content manipulation connects to careers and to problems of tomorrow.

Students will be able to:

- **Analyze** data to describe the characteristics of modified videos,
- **Evaluate** patterns and common features of these videos in order to develop a rating scale, and
- **Create** a test a news-consumer can use to identify videos made using deepfake technology.



Students act as journalists that are researching sources for a news story. They will study footage of selected deepfake videos in order to abstract out general indicators of facial manipulation.

1 Read the following scenario to students:

Imagine that you are journalists writing a news story about some strange videos that have recently appeared on the Internet. In these videos, many important world leaders are singing pop songs in the middle of their speeches! It has caused a media uproar and many news watchers are confused. Why would these leaders break into song in the middle of serious speeches? Is this some kind of contagious global sing-along or have these videos been digitally manipulated with deepfake technology? Deepfake software allows a person to alter clips of previously-recorded video by transferring their own expressions onto the face of the speaker. This innovative technology has positive uses, like helping correct audio/video matching in movies, but it also comes with a big risk: anyone can transfer their facial expressions to a video of an important leader, making it look as though they said or did something that they didn't. This means that it will be harder for people to trust the leaders and media of the future.

As today's leading journalists, it is up to you and your colleagues to devise a scale that a news-watcher can use to figure out if a video has been manipulated using deepfake technology. Can you keep the public's trust by helping them to spot fake videos? Let's see how well you do!

2 Divide students into pairs. Instruct each pair of students to examine this [video](#) (stop at 2:00 minutes) of deepfake technology known as deepfake and answer the questions below. The video is hosted on a [CBC page](#).

Have each pair complete the following tasks:

- Identify and write down the steps of how these facial expressions were manipulated as best they can.
- On a scale of 1-10, with 1 being not difficult and 10 being very difficult, rate how difficult it would be for a normal person to identify that the image had been altered.

3 Ask students the following guiding questions:

- How can you tell if a news article or online video is real or fake?
- What are some possible benefits of deepfake technology? What are some risks?
- Why is it important to know how to distinguish actual news content from manipulated news content?

4 Instruct each student pair to partner with another student pair, forming groups of four. Distribute the [Deepfake](#) dataset. Assign one of the following four roles to each student in the group:

- **Scribe**—writes down as much detail as possible about the video
- **Sceptic**—looks for evidence that proves the video has been manipulated
- **Believer**—looks for evidence that proves the video is real
- **Judge**—uses the scribe's notes and listens to the arguments of the sceptic and the believer in order to issue a final judgement on whether or not the video has been manipulated

5 Provide each group with 10 minutes to watch the videos and come to a judgement on whether they are real or manipulated.

Find more easy-to-implement resources to integrate computational thinking practices into your classroom by visiting [ignitemyfutureinschool.ca](https://www.ignitemyfutureinschool.ca)



- 6** When all groups have completed the task, check for understanding by asking students the following questions:
- What were your final judgements about each of the videos—were they real or manipulated?
 - Across all of the videos that you determined were manipulated, what was some common evidence used?
 - Across all of the videos that you determined were real, what was some common evidence used?
- 7** Explain to students that this process of generalizing characteristics is a form of abstraction. Abstraction is a computational thinking strategy that is useful for developing one approach that can solve many different problems. Considering that there are many different forms of news (video, photos, articles and social media, to name a few), what are some common characteristics we can abstract that can help us spot manipulated content.



Students use the computational thinking strategies of abstraction and finding patterns to develop a scale that news consumers can use to determine if news content is accurate.

- 1 Draw** a T-chart on the board.
- 2 Have the sceptic** from each student group come up and write one characteristic of manipulated news content on the board (extreme facial expressions, lags between expressions and words, inconsistent shadows, pixelation, appears out of context, etc.).
- 3 Have the believer** from each student group come up and write one characteristic of real news content on the board (authentic facial expressions, lists reputable sources, words and expressions match, etc.).
- 4 Divide students** into new groups of three to five. Provide each group with 10 minutes to develop a rating scale with assessment criteria that helps a user to determine if a video was manipulated with facial deepfake technology.
- 5 Once students have developed their scales**, check for understanding by having students answer the following questions:
 - What patterns did you find in the data on the board and how did that inform the creation of your rating scale?
 - How does the computational thinking strategy of finding patterns serve as a useful tool in identifying manipulated video content?
 - Do you think that a person using this rating scale will always be able to determine with 100% accuracy if a video has been manipulated? Why or why not?
 - What elements of news content are subjective? How does our own worldview shape how we interpret news and media?



Students use their rating scales to develop an online test that news consumers can use to identify videos that have been made using deepfake technology. They work in groups to create thorough test questions that would help a user spot fake videos.

1 In their groups, instruct students to turn each piece of criteria on their rating scales into a multiple-choice question.

Ex: If a group's rating scale includes the criterion "Eye Expression," a possible multiple-choice question could be: Which of the following choices does the speaker's eye expressions most closely resemble?

- Moderate eye movement NOT in keeping with other facial expressions
- Moderate eye movement in keeping with other facial expressions
- Lots of eye movement NOT in keeping with other facial expressions
- Lots of eye movement in keeping with other facial expressions

2 Using their rating scales, students should evaluate how to assign point values to each answer choice that would indicate the likelihood that the video uses or does not use manipulation.

3 Provide groups with 5-10 minutes to compile their questions into a quiz and develop a scoring key for the quiz. This can be done on paper or in a word processing tool.

Optional extension: Students can use the free online application [Kahoot](#) to develop their quiz.

4 Instruct each group to pass their quiz to the group immediately to their left.

5 Have each group analyze the image below and complete the quiz. Once they have completed the quiz, instruct the group to score their answers using the key provided.



6 Ask each group for their determination: is the video real or manipulated? Once each group has responded, ask the following questions:

- Why are the computational thinking strategies of abstraction and finding patterns useful for analyzing media?
- Why is it important that we have tools to help us identify accurate media? What sources do you trust?



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** 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 Direct** 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 may not realize it, but many of the videos they watch and photos they see online have been digitally manipulated.

By learning about digital manipulations such as facial expression transfer, students will become more informed consumers of media and will be better able to evaluate the veracity of news content.

How does this connect to careers?

Public Officials such as detectives, lawyers and judges need a clear understanding of what constitutes authentic evidence and what has been digitally manipulated to serve the justice system appropriately.

Reporters searching for sources and looking to verify information need to be able to distinguish truth from fiction as they evaluate the veracity of a video or image.

Artists, particularly animators, can use facial expression transfer technology to create realistic images and videos that evoke a wide range of human expression.

How does this connect to our world?

Technologies enabling the manipulation of videos have improved at a rapid rate and will continue to do so. Technologies like deepfake have the potential to proliferate rapidly throughout society, spreading misinformation and guiding people to the wrong conclusions. Media literacy will be increasingly important for students as they mature and navigate a complicated information landscape.

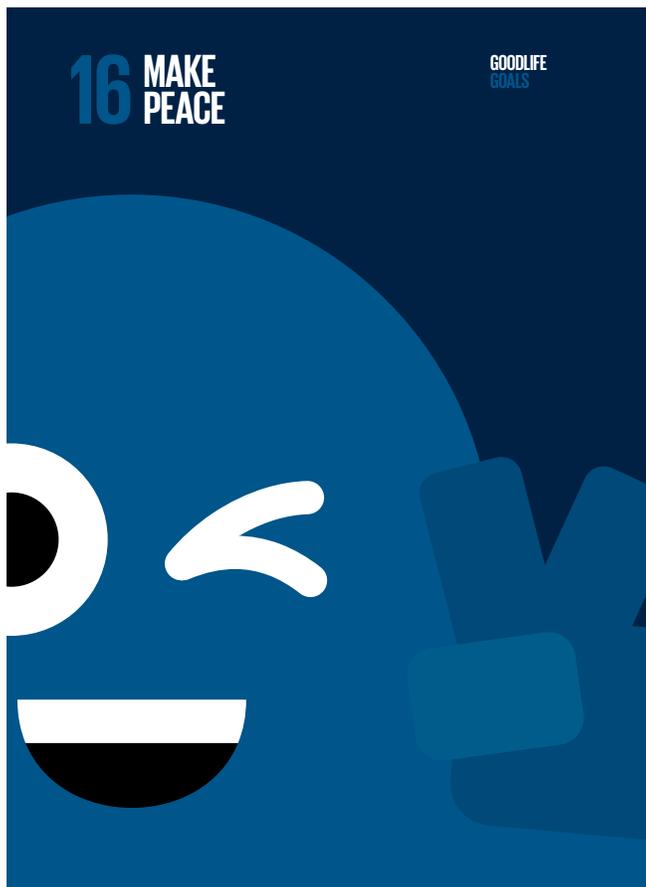
TATA Consultancy Services has released a [white paper on the Deepfake phenomenon](#) looking at both benefits and drawbacks.

Curriculum Connections



“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”



MAKE PEACE
 Actions

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- 1 **Learn about and use your rights**
- 2 **Be kind and tolerant**
- 3 **Resist corruption and abuse of power**

- 4 **Support the institutions that support people**
- 5 **Stand up for fairness and peace**



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

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.

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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.	<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
<p>Global Citizenship and Sustainability</p>	<p>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>	<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>

Deepfake Dataset

As you view the following videos and images, take notes to record your ideas and responses to the guiding questions for each source on this sheet.

[New York Times Video: Manipulating Faces from Afar](#)

In this video, you will learn about the new technology that has allowed for facial manipulation and its possible uses.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

[Daniel Craig Facial Reenactment](#)

This series of images shows how one image of actor Daniel Craig has been manipulated to show Craig wearing various expressions.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

[President Obama Facial Reenactment](#)

This series of images shows how images of President Barack Obama can be manipulated using another person's facial expressions.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

Deepfake Dataset Cont.

[Deepfake Reenactment Process - CTV video](#)

This video demonstrates that even when the sources look nothing alike, it is possible to transfer an expression from one person's face to another person's face using facial reenactment technology.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

[GIF Deepfake \(GIPHY\)](#)

This demonstration of the facial reenactment process shows the different components that go into creating a realistic facial expression transfer.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?