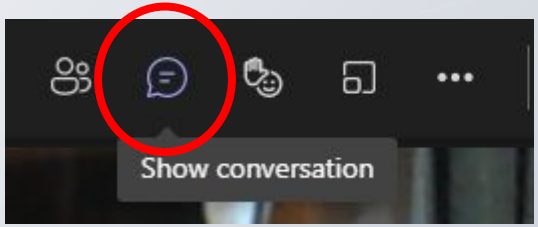
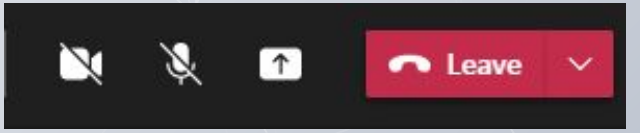
While we wait to get started ...

Open the chat



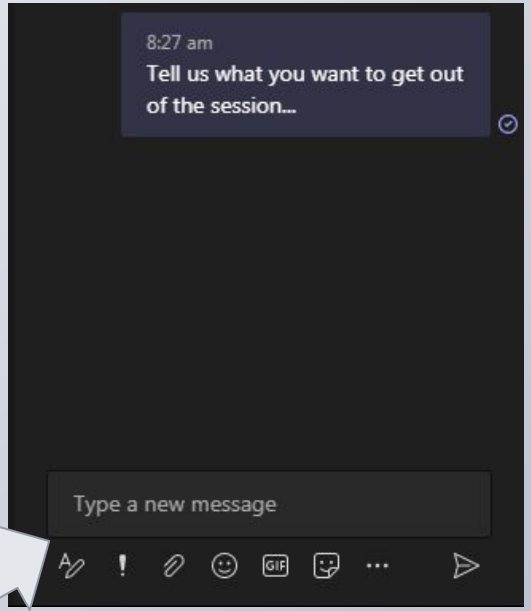


Your mic is on mute
... and camera disabled

Tell us what you want to get out of the session.

NOTE:
your name will appear with your comment.

The chat won't be part of the recorded version.



Have you implemented lessons with an Ethics focus?

Tell us about it in the chat...

DIGITAL TECHNOLOGIES HUB

Discovering **Artificial Intelligence (AI)**

AI and ethics

DIGITAL TECHNOLOGIES HUB

Acknowledgement of Country

ESA acknowledges the Eastern Kulin Nation, Traditional Custodians of the land on which our head office stands, and pays our respects to Elders past and present.

We recognise the Traditional Custodians of Country across Australia and their continuing connection and contribution to lands, waters, communities and learning

By the end of this session

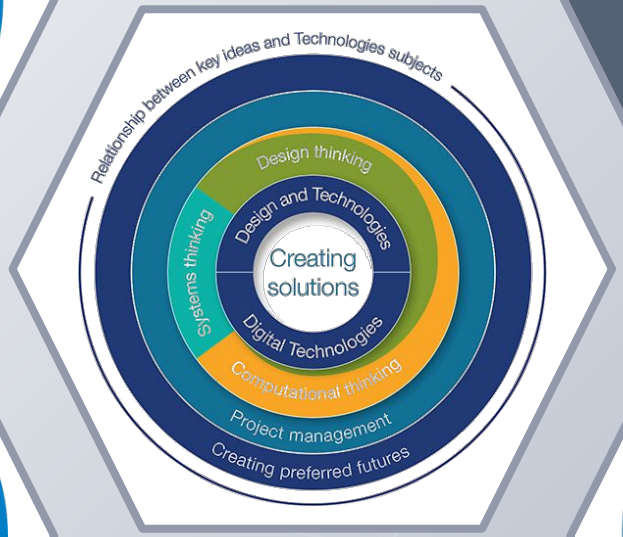
Explore a range of **ethical issues and dilemmas** that AIs may face. Consider implications on makers, users and third parties.

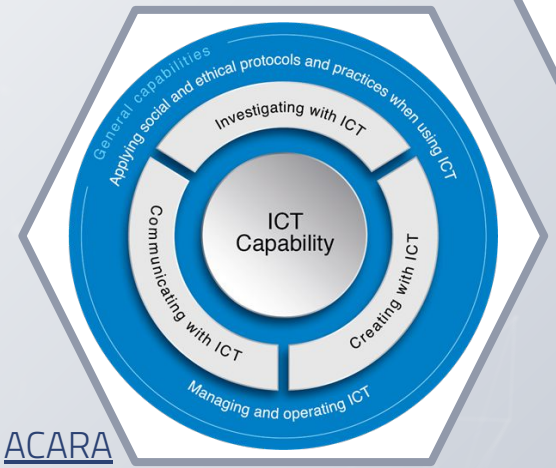
Discover learning and assessment to support students in developing **ethical understanding**:

- How do we make decisions when there is no easy answer?
- How should an AI be trained to make decisions?
- Who is responsible when an AI causes harm?

Australian CURRICULUM

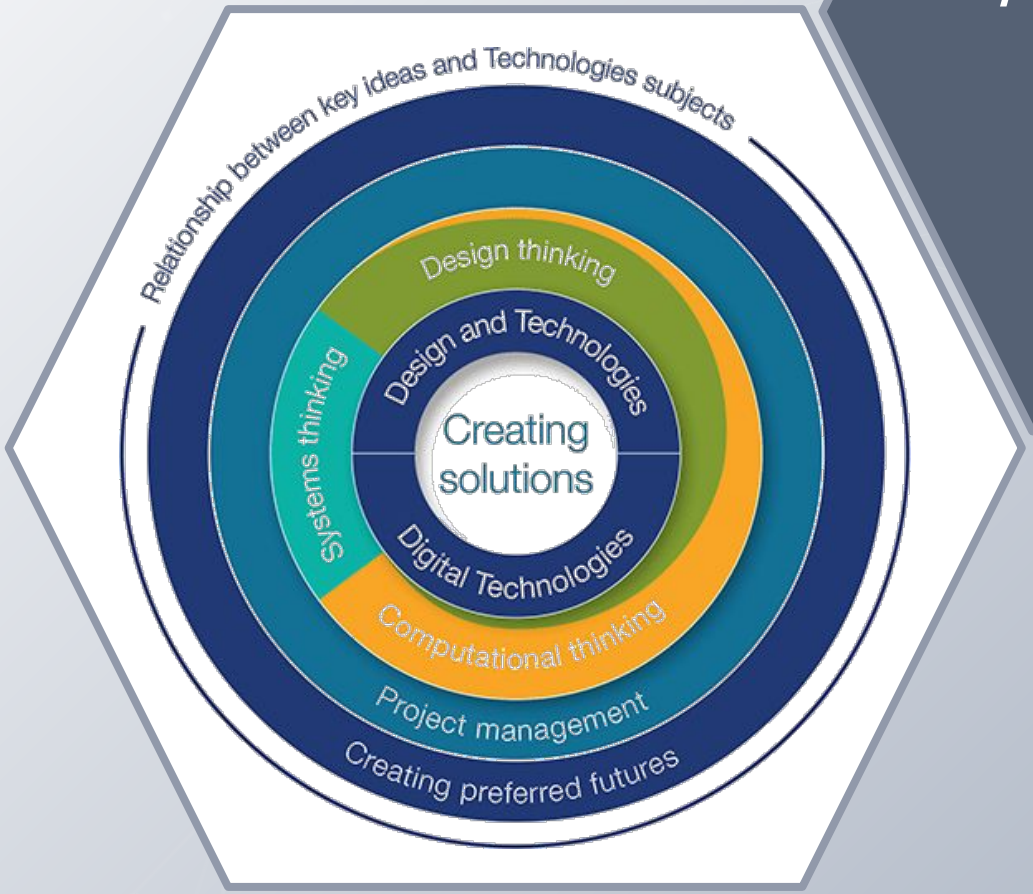
AI topics



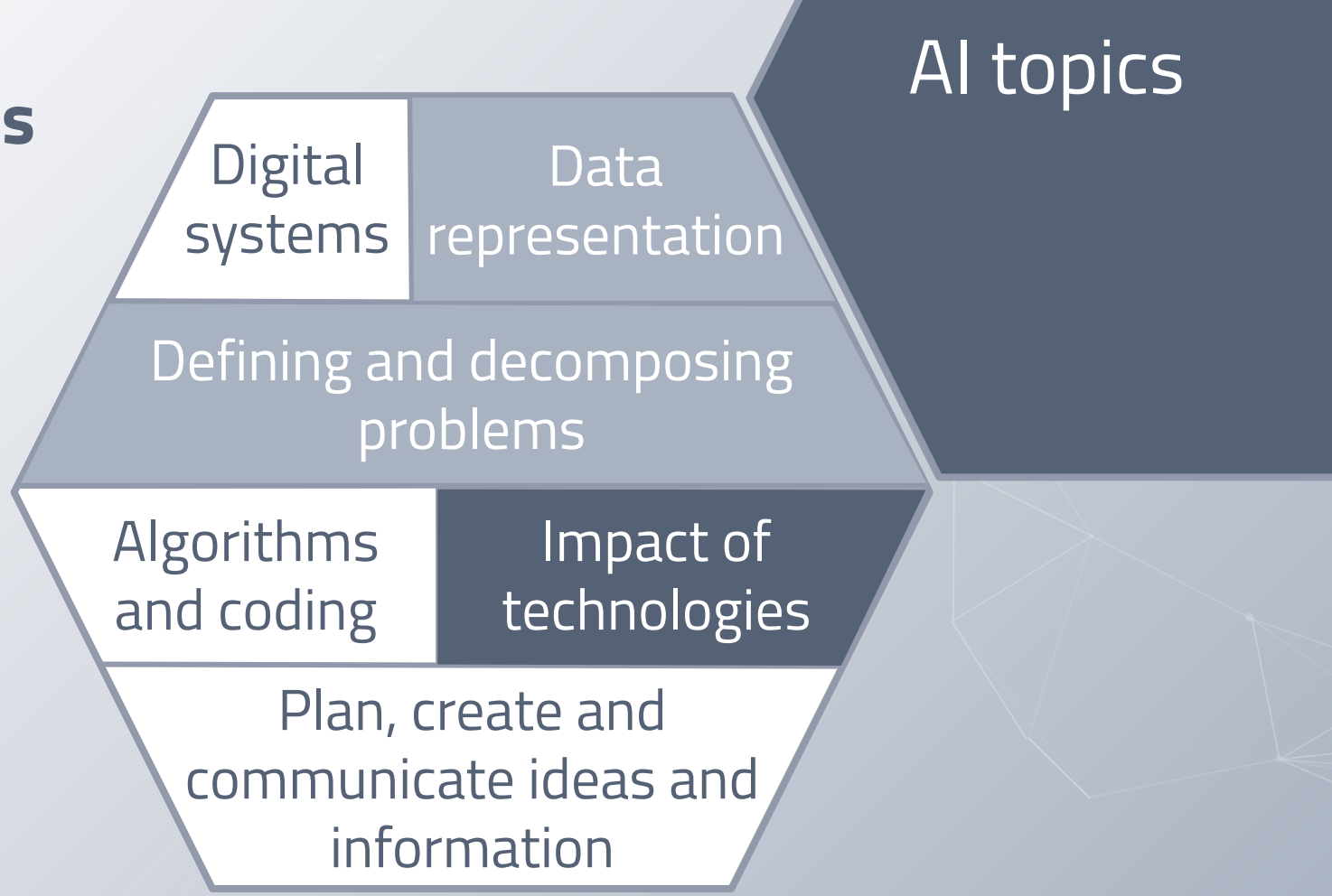


Source: ACARA

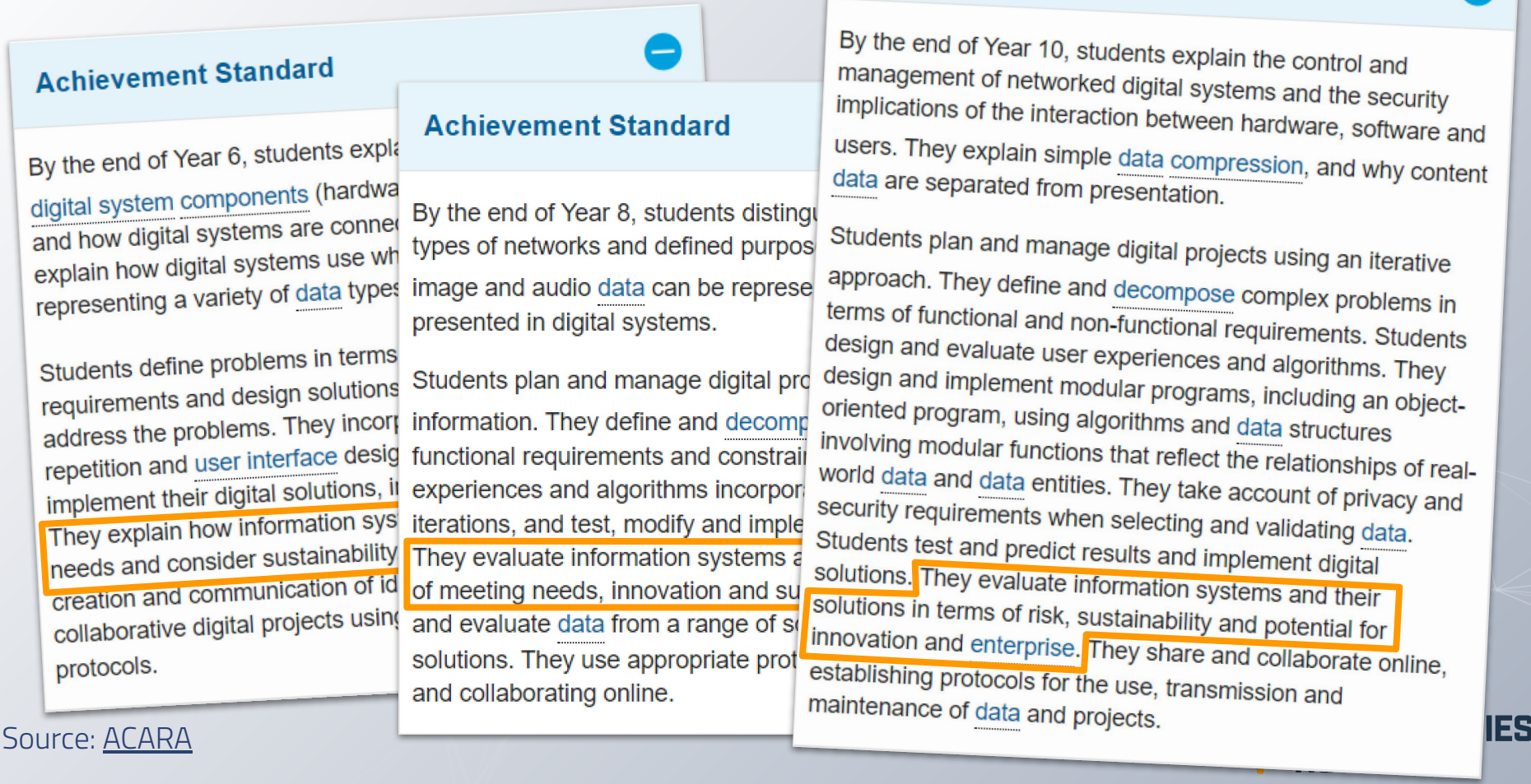
AI topics


Relationship between key ideas and Technologies subjects
Design thinking
Design and Technologies
Systems thinking
Creating solutions
Digital Technologies
Computational thinking
Project management
Creating preferred futures

Foci for this deep dive:



Achievement standards:



Achievement Standard

By the end of Year 6, students expla

digital system components (hardwa
and how digital systems are connec
explain how digital systems use wh
representing a variety of data types

Students define problems in terms
requirements and design solutions
address the problems. They incorp
repetition and user interface desig
implement their digital solutions, i
They explain how information sys
needs and consider sustainability
creation and communication of id
collaborative digital projects using
protocols.

Achievement Standard

By the end of Year 8, students distingu
types of networks and defined purpos

image and audio data can be represe
presented in digital systems.

Students plan and manage digital pro

information. They define and decomp
functional requirements and constrai
experiences and algorithms incorpor
iterations, and test, modify and imple
They evaluate information systems a
of meeting needs, innovation and su
and evaluate data from a range of s
solutions. They use appropriate prot
and collaborating online.

Achievement Standard

By the end of Year 10, students explain the control and management of networked digital systems and the security implications of the interaction between hardware, software and users. They explain simple data compression, and why content data are separated from presentation.

Students plan and manage digital projects using an iterative approach. They define and decompose complex problems in terms of functional and non-functional requirements. Students design and evaluate user experiences and algorithms. They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and predict results and implement digital solutions. They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.

Source: ACARA

Considering impact of AI

AI is among many digital innovations changing our lives.

EXPLAINER VIDEO: AI Systems

Topics of interest to Secondary students?

Which topics are **safe**, **risky**, or **no-go zones** in your school?

To what extent are issues being sensationalised?

- **content recommender algorithms:** filter bubbles, radicalisation, politics and society
- **employment:** automation of 'white collar' work, over-monitoring or control of workers
- **mass data collection and use:** privacy, intrusive or controlling companies, totalitarian states

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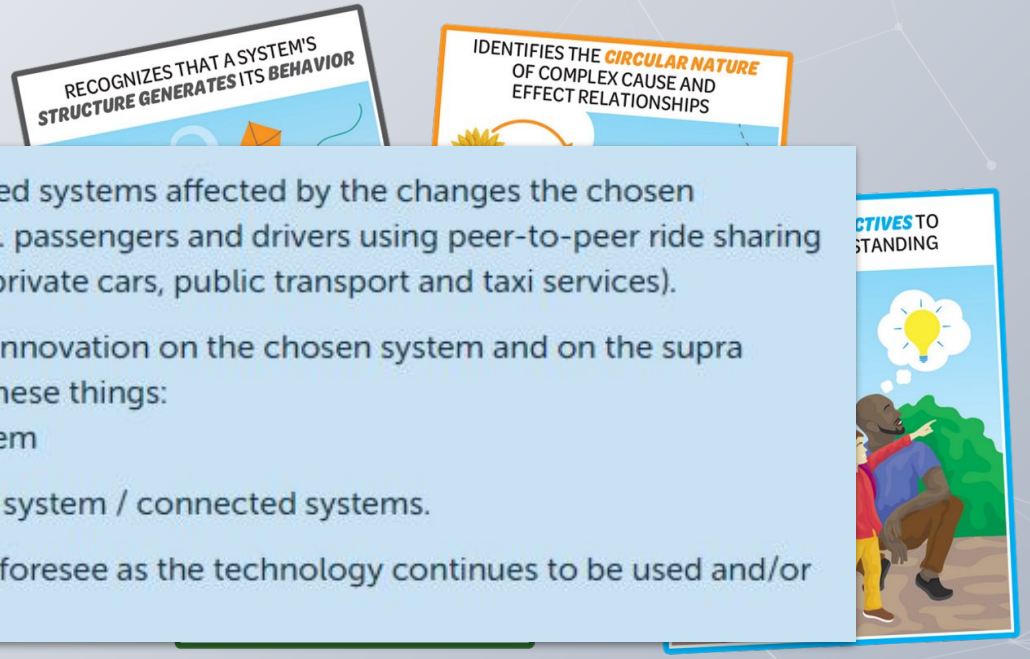
Systems Thinking for framing an understanding



- Identify one or more supra systems or connected systems affected by the changes the chosen innovation has made to the chosen system (e.g. passengers and drivers using peer-to-peer ride sharing are part of a transport supra system, including private cars, public transport and taxi services).
- Write a list of known impacts from the chosen innovation on the chosen system and on the supra system/connected systems. Consider both of these things:
    - two different perspectives within the system
    - two different perspectives from the supra system / connected systems.
- Write a list of any future, potential impacts you foresee as the technology continues to be used and/or developed.

LESSON: Habits of a Systems Thinker (Years 7-10)

LESSON: Systems Thinking and AI applications (Years 7-10)


General capabilities
Exploring values, rights and responsibilities
Understanding ethical concepts and issues
Reasoning in decision-making and actions
Ethical Understanding

Reflect on and interrogate core ethical issues:

- recognise the complexity of many ethical issues
- draw on a process to make ethical decisions

Artificial Intelligence and ethics

a context within Digital Technologies for supporting students in **Ethical Understanding**

What is ethics?

Ethics is largely concerned with...

- what we ought to do,
- how we ought to live.

.... based on a set of values.

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What is AI?

The creation of machines to mimic human capabilities.

- Teaching a machine to “see” (recognise objects in an image).
- Teaching a machine to “read” and “listen” (interpret and analyse text and sounds).

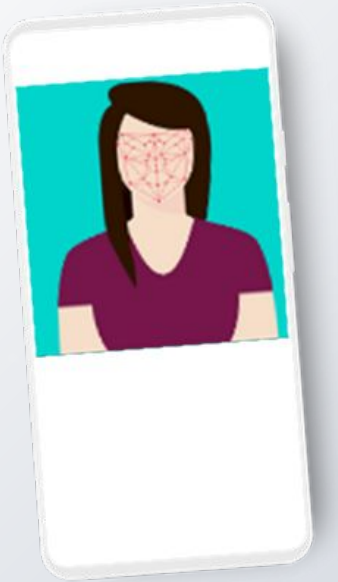
… solve problems autonomously without explicit guidance from a human being.

Can an AI make **ethical decisions?**

Can we trust an AI to ‘do the right thing’?

Is an AI going to be fair?

Ethical dilemmas



Use an ethical dilemma to develop ethical understandings

1. **Explore** an ethical issue and interactions
2. **Select** and justify an ethical position
3. **Reflect** on and interrogate core ethical issues

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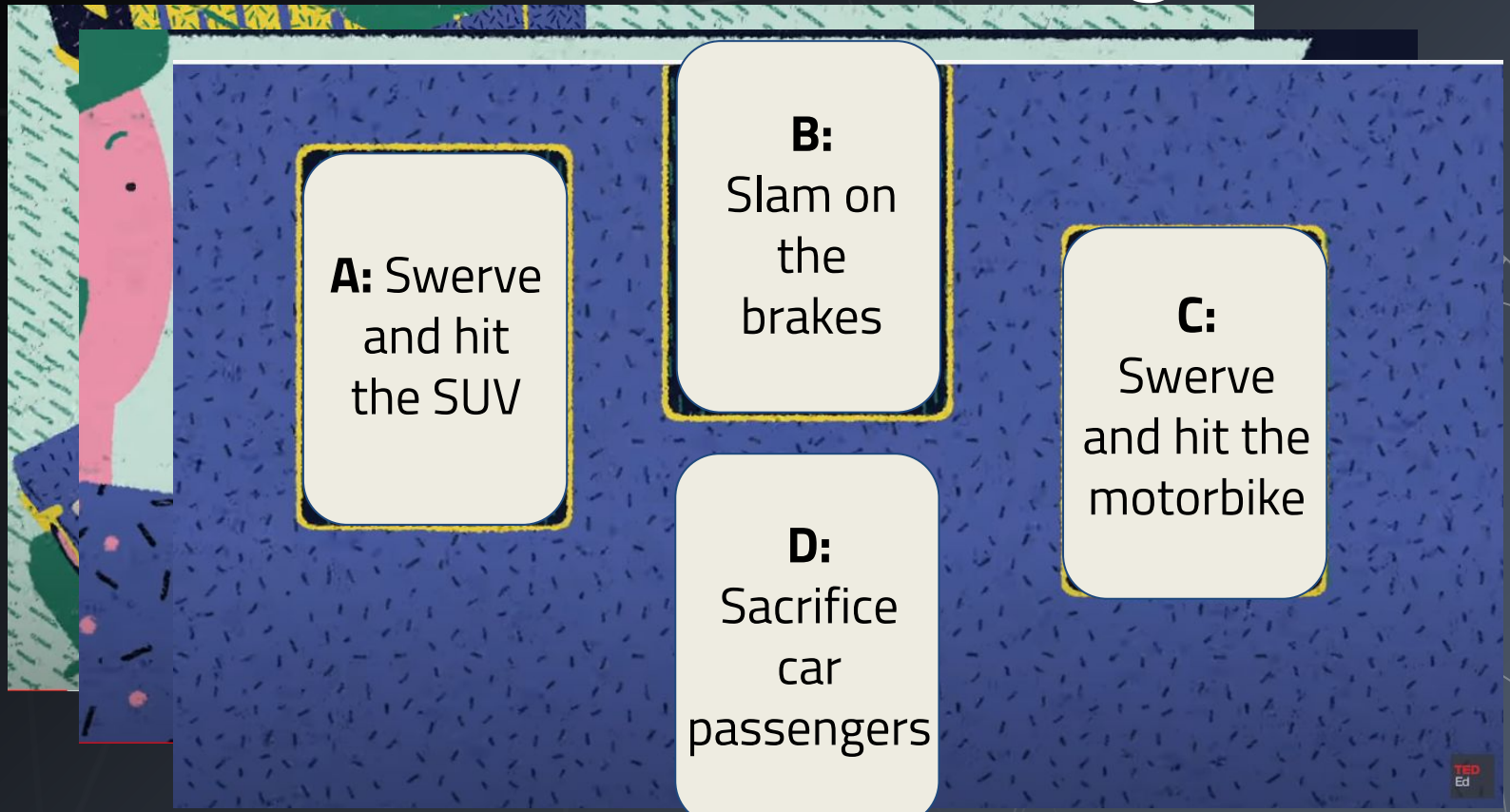
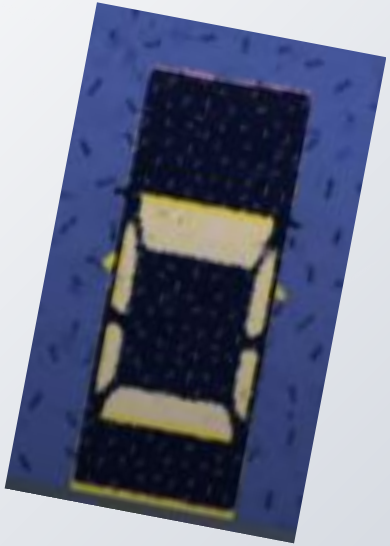
Ethical dilemma of self-driving cars



The ethical dilemma of self-driving cars - Patrick Lin

Reflection



People react.
Machines are purposely trained.

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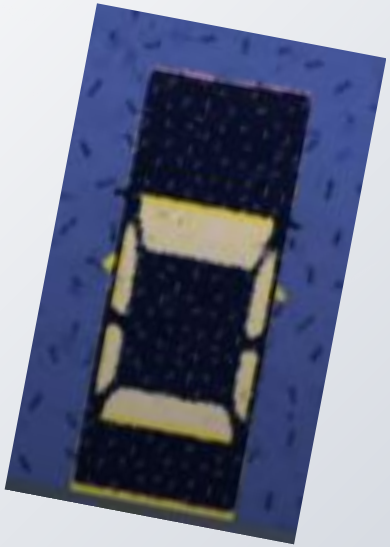
Reflection



How should the AI car prioritise whom to protect first and foremost?

A: The car passengers
B: The motorcyclist
C: The SUV
D: The driver immediately behind

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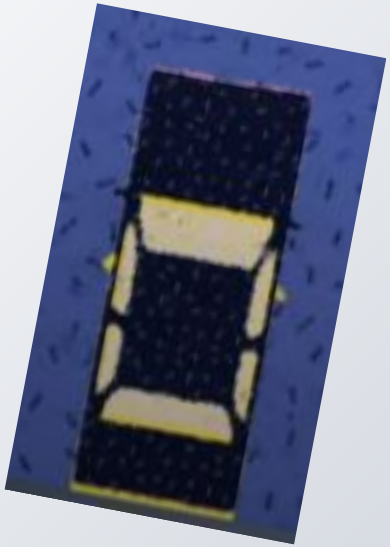
Reflection



Who makes the rules / sets the parameters?

A: AI Developers
B: Government
C: Ethics advisory groups
D: Judiciary systems (judges and lawyers)

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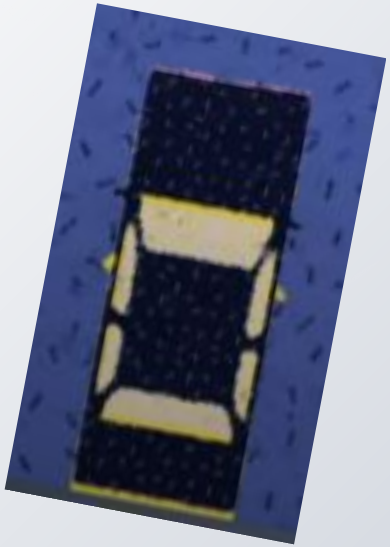
Reflection



RULE = ‘Cause least harm’

But… no rule can cater for all eventualities and …

every rule has an impact!

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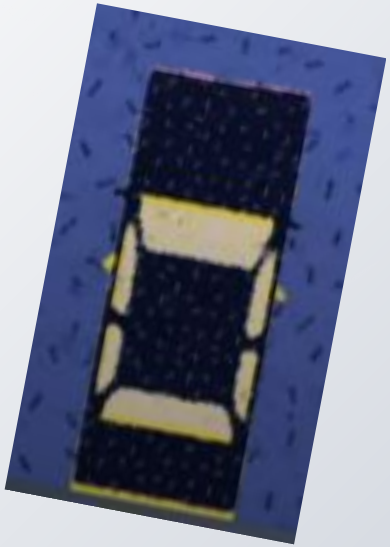
Antithetical outcomes



Would you still buy a SUV if you knew other cars would be programmed to crash into you when needed?

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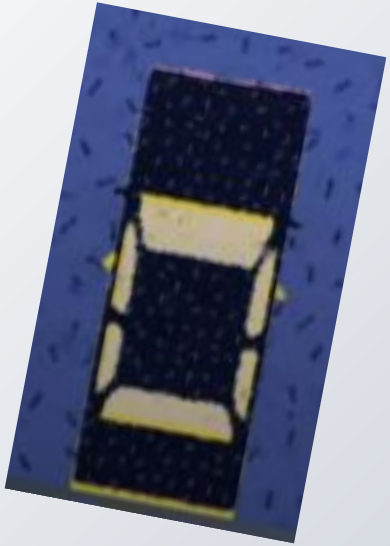
Antithetical outcomes



If it was common knowledge that most cars on the road used the same decision making system, might it encourage motorcyclists *not* to wear helmets?

(An example of how systems with predictability can be "gamed".)

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Artificial Intelligence?

A rich source of interesting ethical questions that students can identify with, or feel connected to.

Artificial Intelligence (AI)

ETHICS QUIZ

Scenarios: drawing on ethical understanding

Aim: stimulate thinking about Artificial Intelligence (AI) applications and some of the ethical issues that may arise from them.

An ethical issue exists when there are competing alternatives and the right thing to do is not clear.

Right or wrong answers may not be universally agreed upon.

In each question, consider what you think is the ‘right’ thing to do. There are four options for each question - A, B, C and D.

LESSON: AI Quiz (Years 7-8)

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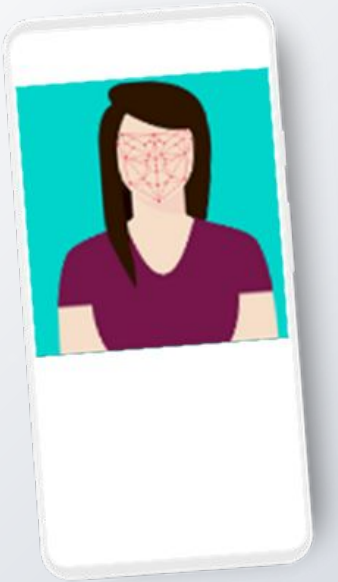
Scenarios: Facial recognition



A company is behind schedule and over budget in building an AI application.

The AI uses face recognition to unlock a smartphone.

Through testing, the company found that the AI worked with **most** people's faces.

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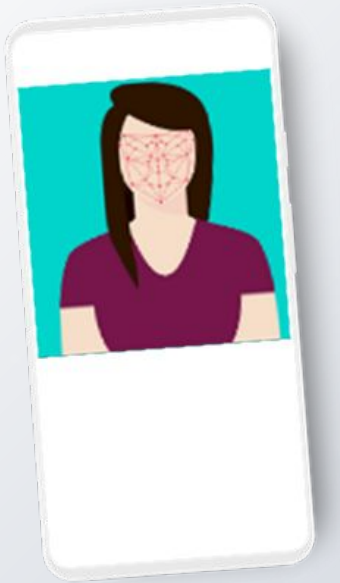
LESSON: AI Quiz (Years 7-8)

Scenarios: Facial recognition



Should the company…

A: Sell the phone using this AI to make money and fix the AI in the next version of the phone. Don't mention any issues.

B: Take longer and spend more time and money to retrain the AI so it works for all people.

C: Sell the phone using this AI but also include a warning alerting customers that face scan may not work for everyone.

D: Fix the AI and sell the phone at a higher price to still make a profit.

LESSON: AI Quiz (Years 7-8)

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Scenarios: Facial recognition

A company is testing its new AI application.

The AI uses face recognition to recognise and classify people's facial expressions.

As people watch the movie the AI records the audience's reactions to particular scenes.

The company sends the results to the movie creator providing data about whether scenes met expected audience reactions.

The audience got a free movie.
The developer got free data.

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Scenarios: Facial recognition

The company should …

A: Inform the audience that their facial expressions will be recorded and potentially skew the results.

B: Ensure that the recorded facial data is not used beyond the AI development.

C: Don’t inform the audience that their facial expressions will be recorded ensuring the results are valid.

D: Present the data to the movie creators using snapshots of the audience as evidence of the AI in action.

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Scenarios: hacking

An employee working for a company on an AI project finds out that the AI application could be hacked and used for criminal purposes.

The manager of the project instructs the employee to ignore it, saying **‘Don’t worry, that won't happen!’**

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LESSON: AI Quiz (Years 7-8)

Scenarios: hacking

Should the company…

A: Do as they are told in case they might lose their job.

B: Try and come up with a fix that might work.

C: Inform someone higher up in the company such as the Managing Director.

D: Wait until the product is in use and if there is a problem tell the project manager ‘I told you so’.

LESSON: AI Quiz (Years 7-8)

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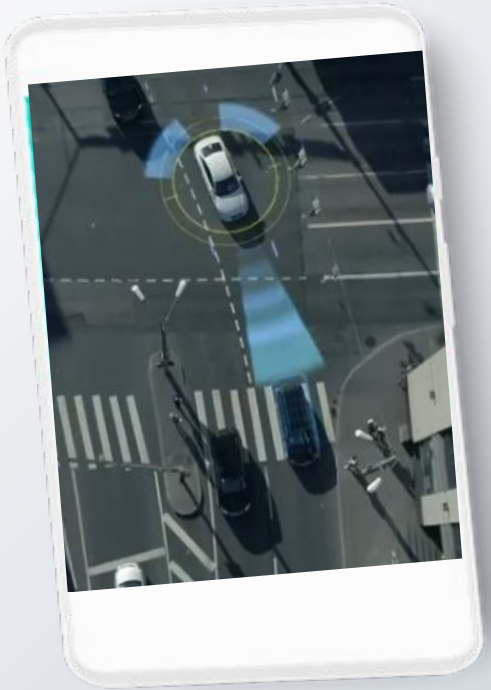
Scenarios: self-driving car



A parent with a pram crosses the road illegally while the don't walk sign is flashing. They step in front of an AI self-driving car. The AI has to decide whether to:

brake hard and accept it will hit the parent and pram

OR

avoid the parent and pram and turn into the nearby bike lane but hit a cyclist.

LESSON: AI Quiz (Years 7-8)

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Scenarios: responsibility

Image: Pixabay

The AI self-driving car decided to avoid hitting the parent with the pram.

Instead:

- It slammed on the brakes and turned into the bike lane, hitting the cyclist.
- The cyclist suffered severe injuries, had to go to hospital and could not work for a long period.

LESSON: AI Quiz (Years 7-8)

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Scenarios: responsibility

Who is responsible?

A: The owner of the car, even though they are the passenger.

B: The car manufacturer who built the AI.

C: The parent crossing the road illegally, causing the accident.

D: The cyclist, who should have avoided the car.

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LESSON: AI Quiz (Years 7-8)

Empathise and justify

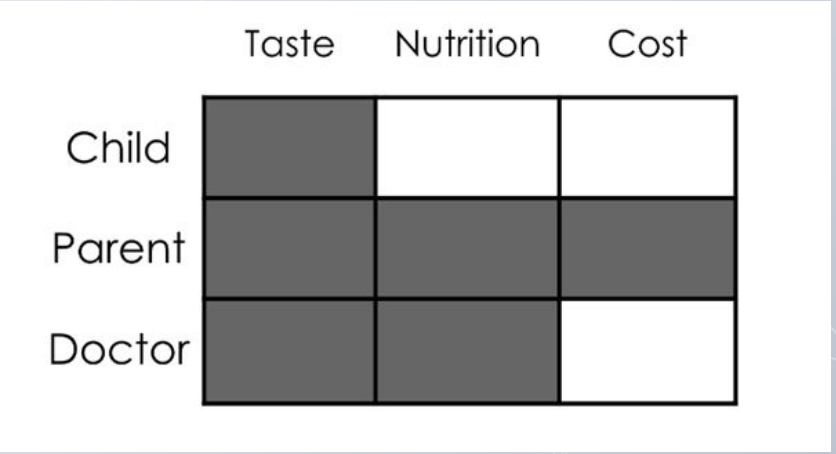
(think-pair-share)

“Put yourself into the shoes of…

- how would you decide if you were …?

Give reasons for your decision.”

Modify to show matrix values



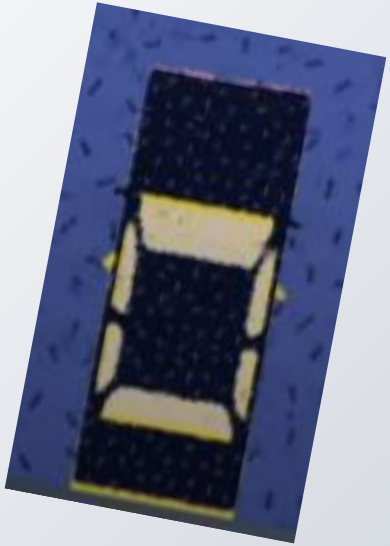
Ethical Dilemma Story Pedagogy

A type of transformative learning.

Initiated by confronting students with an ethical dilemma.

A situation in which a decision has to be made which can potentially lead to harmful outcomes, and where there is no simple right or wrong answer.

Review the approach



PMI
(Pluses, Minuses, Interesting)

1. Explore an ethical issue and interactions
2. Select and justify an ethical position
3. Reflect on and interrogate core ethical issues

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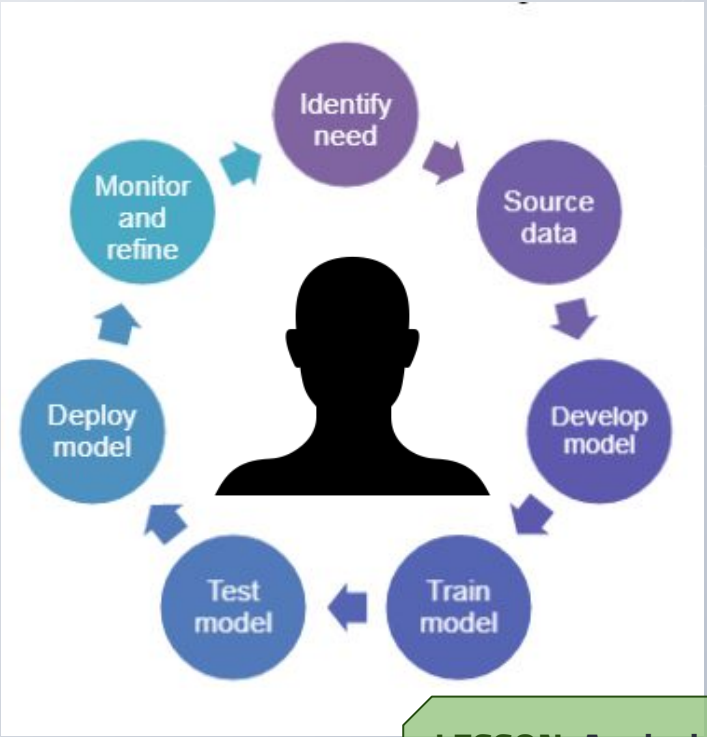
Lifecycle model of AI development

It is important to have
‘a human in the loop’



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LESSON: **Analysis of AI applications, drawing on ethical understandings** (Years 7-8)

Exploring ethical issues further

Ethical considerations: Flowchart A

What is the ethical issue associated with the AI application?

For example, is it to do with privacy, safety, justice (equality, fairness)?

Consider if Australians have mixed views about this AI application.

Who (or what, such as the environment) is affected by the AI application?

Consider how important this AI application is to them.

What are some benefits of this AI application, and for whom?

What are some harmful or negative effects and risks from this application?
Who is being affected?

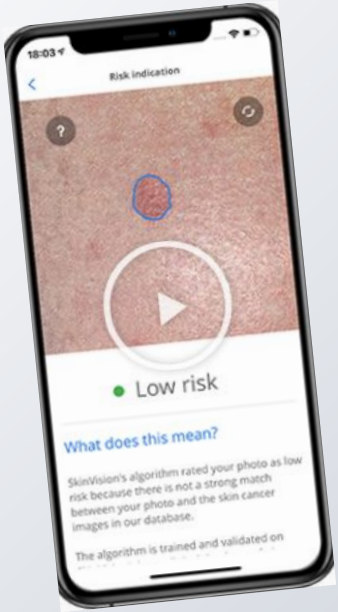
Would you feel safe using this AI application?

Who is responsible if something goes wrong with the application?

What could be done to reduce the harmful or negative effects of the AI application?

LESSON: Analysis of AI applications, drawing on ethical understandings (Years 7-8)

APP: AI Skin cancer diagnosis



Skin vision

Did you know that in 2018 Australia had the highest rate of melanoma skin cancer in the world?

Smartphone apps with AI technology

Smartphone apps with AI technology are assisting people to diagnose potential skin cancers. These apps uses your camera to 'see and identify' possible skin cancers on your skin. As you hover the camera over a skin spot it automatically takes a picture, calculates a risk profile, and prepares the picture for a doctor's diagnosis. For a small fee you can send the image to a doctor for diagnosis and suggest the action you need to take.

AI works on a range of skin types

Use the fact sheet Check for signs of skin cancer. This fact sheet can be used to discuss the importance of a diverse range of skin types to create the AI model and potential for risk of incorrect classification.

Scientific support of AI technology

Refer to this article that describes scientists' support for AI improving accuracy of skin cancer diagnosis: For the first time, researchers put AI skin cancer diagnosis to the test in the real world

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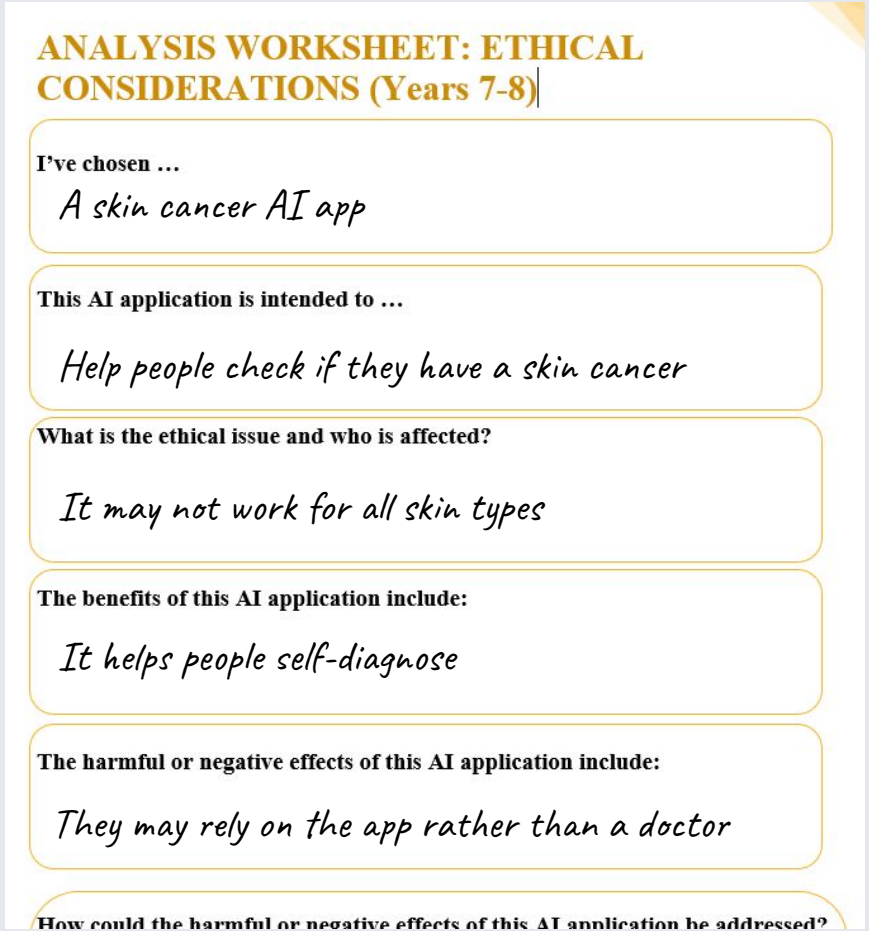
Using the flowchart

Provides a scaffold to discuss benefits and potential risks.



ANALYSIS WORKSHEET: ETHICAL CONSIDERATIONS (Years 7-8)

I've chosen …

A skin cancer AI app

This AI application is intended to …

Help people check if they have a skin cancer

What is the ethical issue and who is affected?

It may not work for all skin types

The benefits of this AI application include:

It helps people self-diagnose

The harmful or negative effects of this AI application include:

They may rely on the app rather than a doctor

How could the harmful or negative effects of this AI application be addressed?

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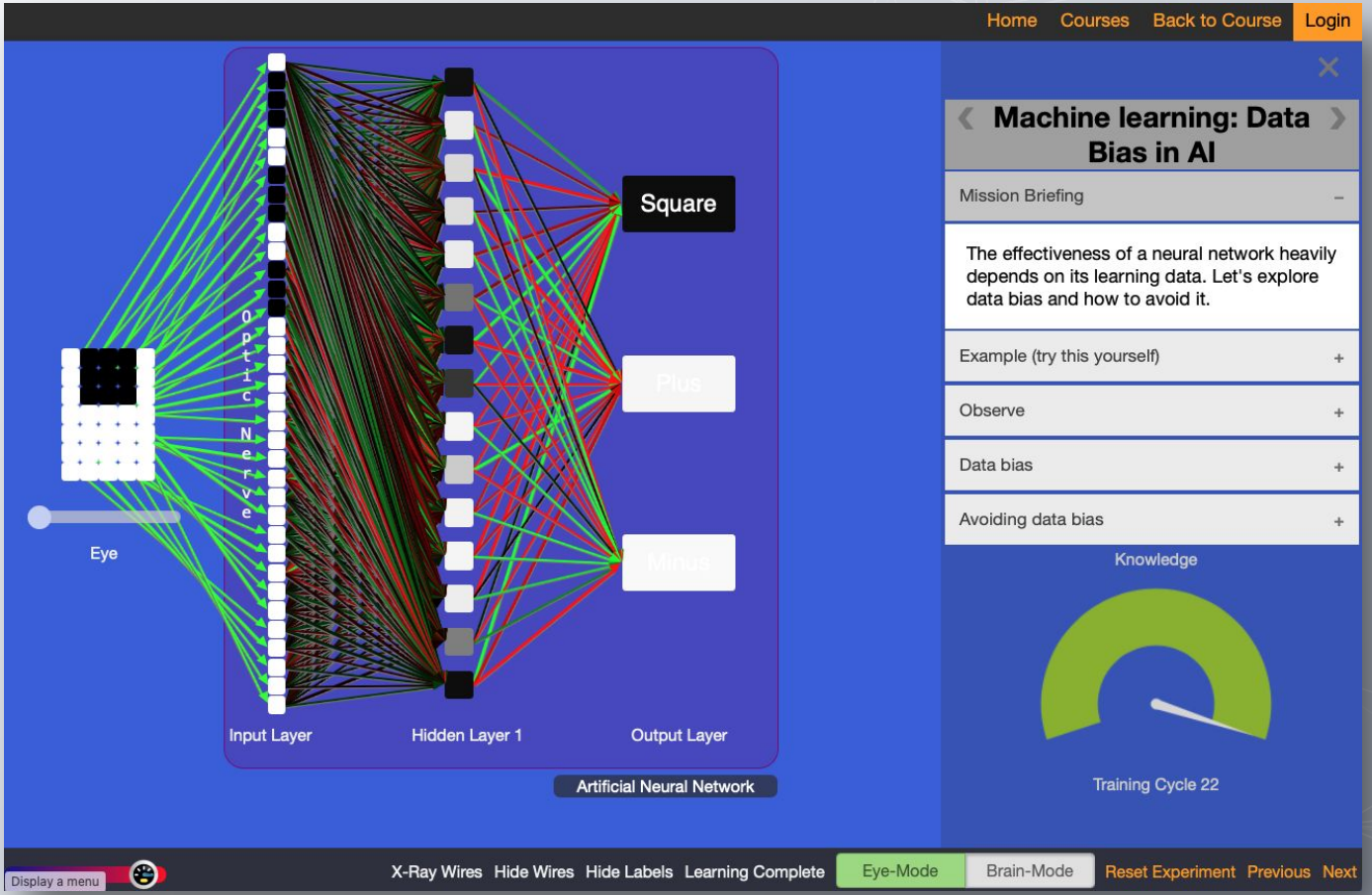
Fairness: Bias

For an AI system to be unbiased requires the training data to be balanced.

Bias can be intentional, but often creeps in unintended.

Practically any subset of the world is biased.



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LESSON: Data Bias in AI (Years 7-8)

Assessment of students' ethical understanding

Self-reflection

- How did they respond to the AI quiz?
- What did they learn?

Analysis

- Analyse a dilemma
- Discuss criteria used in a rubric

Assessment

To what extent did a student:

- identify and describe an ethical issue
- weigh up multiple perspectives to make informed decisions
- respond to a problem fairly, justly and responsibly?

Who is responsible?

A: The owner of the car, even though they are the passenger.

B: The car manufacturer who built the AI.

C: The parent crossing the road illegally, causing the accident.

D: The cyclist, who should have avoided the car.

The issue here is that an AI caused harm and it is difficult to see who is responsible. We chose C. You can't blame the driver as they were not in control. The AI had no choice to swerve and hit the cyclist. I feel sorry for the cyclist. Before AI cars are on the road we need to work out these issues. Marco and Anna 5B

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	Quantity of knowledge			Quality of understanding	
Ethics used in AI	No examples given.	Describes a decision as right or wrong.	Describes a decision as right or wrong giving reasons related to fairness, equality, diversity.	Describes a situation that requires ethical judgment correctly using terms such as fairness, equality, and diversity.	Describes a situation that requires ethical judgment correctly using terms such as fairness, equality, and diversity. Explains the potential impact of AI systems both positive and negative.

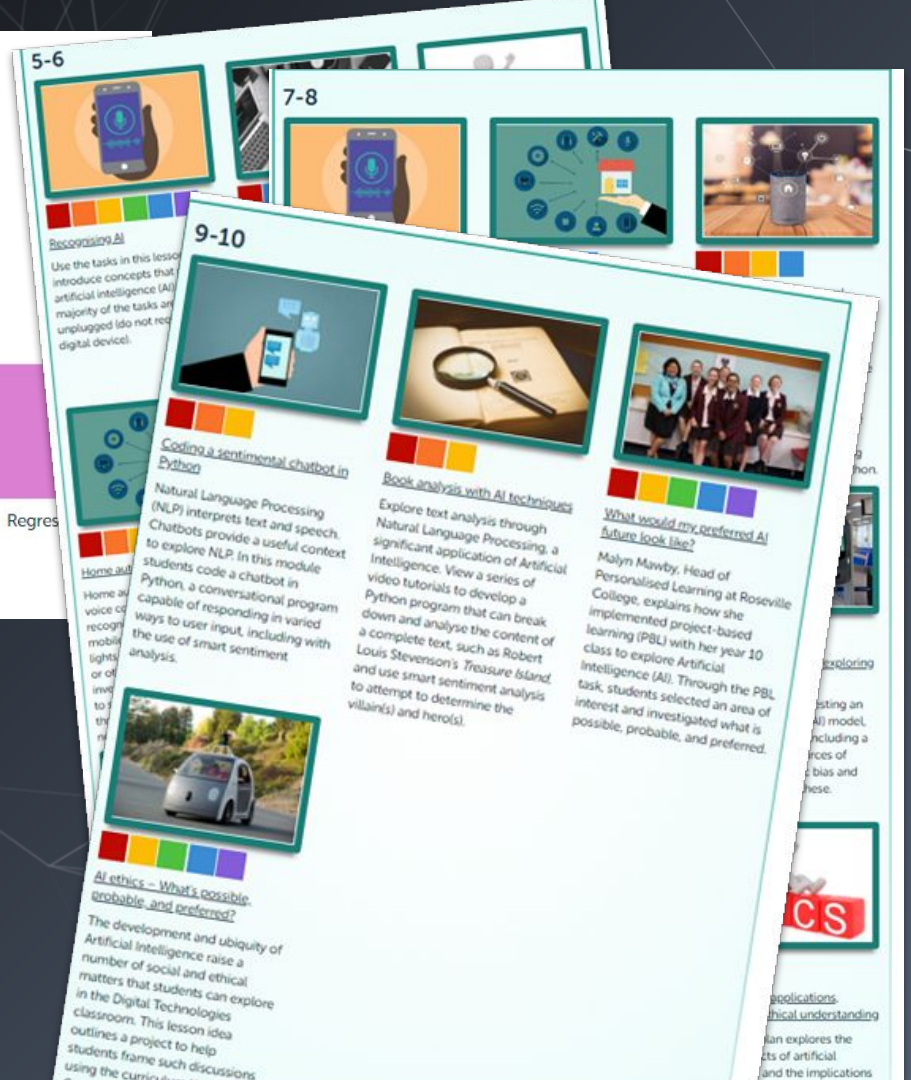
Artificial Intelligence lesson plans

Humans display natural intelligence in contrast to machines that demonstrate artificial intelligence (AI).

AI has various definitions however for our purposes we are using the definition 'any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals' [1]. Read more...

The following lesson ideas cover a range of specialisations and subsets as indicated by the colour coding. Click on the coloured squares to learn more about each definition.

Machine learning | Supervised learning | Natural language processing | Computer vision | Classification | Clustering | Regres



Lesson plans

Artificial Intelligence

Access DT Hub AI lesson plans

Summary

AI is a rich field that provides many opportunities to consider ethical implications of human actions in a classroom setting.

It reflects on our own human struggle with ethics and moral decision making.

Can machines that we make in our own image result in a more just world (utopia), or will they amplify our own faults (dystopia)?

Is sci-fi relevant?

Two classic future universe sci-fi texts are getting major TV/cinema adaptations in the next couple of years:

- Frank Herbert's **Dune**: *Thinking machines* long ago became taboo after a galaxy-wide cultural Jihad against the idea.
- Isaac Asimov's **Foundation**: Robots and AI long ago became a mental and physical prosthetic that prevented human progress.

5h

-

267 slides

-

many live demos

Presenters:

Dr Karsten Schulz, Digital Technolgies Institute and Nathan Alison, Professional Learning Coordinator for Digital Learning and Teaching Victoria

Karsten and Nathan have been instrumental in the development of the AI supporting resources on the DT Hub.

Dr Karsten Schulz has extensive experience in programming and Digital Technologies including building his own AI to enable students to explore how an Artificial Neural Network operates.

Nathan Alison taught Digital Technologies and senior computing courses in Victoria for 11 years before beginning work for DLTV. He brings a background in Computer Systems Engineering and years of hobby coding, as well as a keen desire to help teachers with more complex Computer Science concepts through clear explanations and relevant activities.

- Introduction to AI in the classroom
- Deep Dive 1: AI and conventional programming
- Deep Dive 2: Investigate training a machine learning model
- Deep Dive 3: Natural Language Processing for large text analysis
- Deep Dive 4: AI and ethics

You are stopped in the school yard ...

A parent asks why are you teaching about AI?

What would you say?

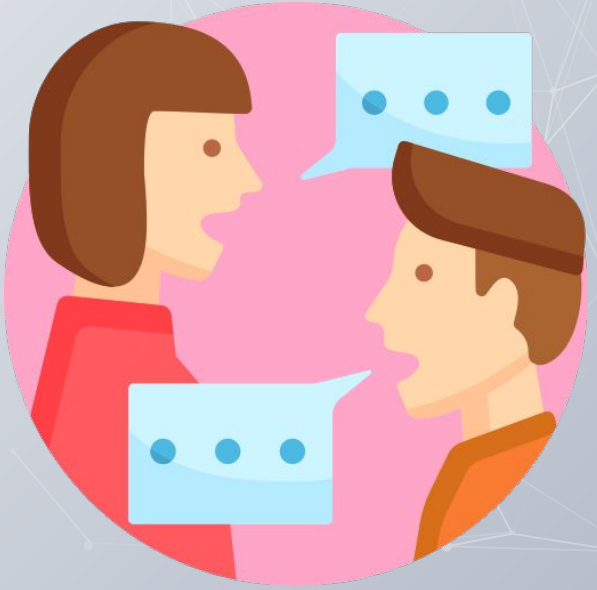


Image source: Flaticon

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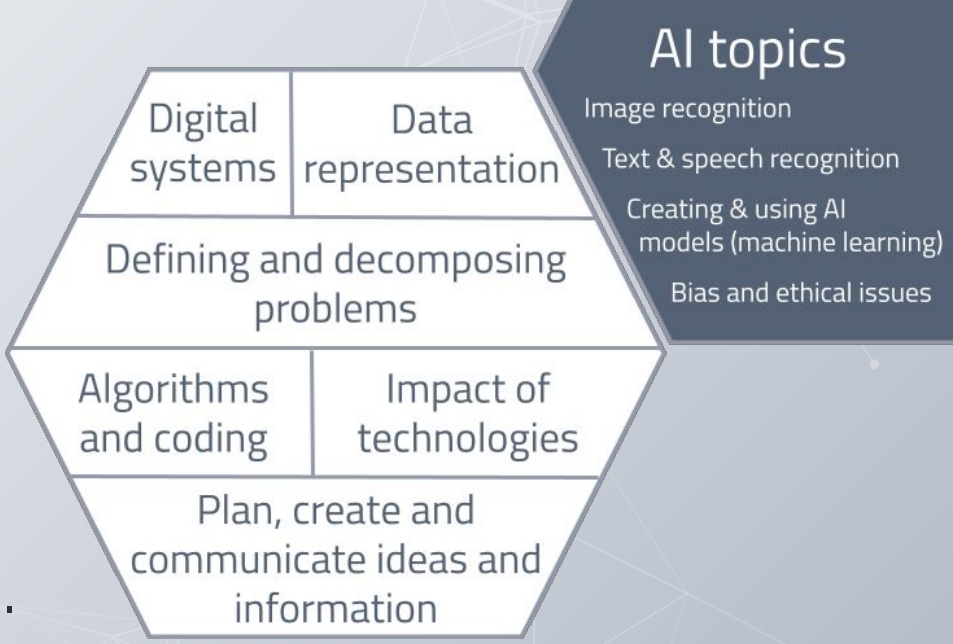
Next steps

Making a commitment to implementing AI in your classroom

Use the chat to **write your idea** of where you will include AI as part of your teaching and learning program.

Connecting and sharing with the group.

email:
digitaltechnologieshub@esa.edu.au



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