Assessing students' work in robotics

Summary

In this **short video**, Dr Ethan Danahy talks through his assessment approach for a unit where students design and create a robotic animal in teams. This could be useful for teachers who are seeking ideas for designing assessment around robotics projects, including assessment characteristics.

Description

In this 7-minute video, Dr Danahy from Tufts University Engineering and Outreach Centre talks through his assessment framework for his students' team robotics projects. The students are in a first-year undergraduate engineering course, and use LEGO NXT. Although Dr Danahy talks about assessment for college students, ideas from his approach and key indicators for assessment can transfer to bands 7–8 and 9–10.

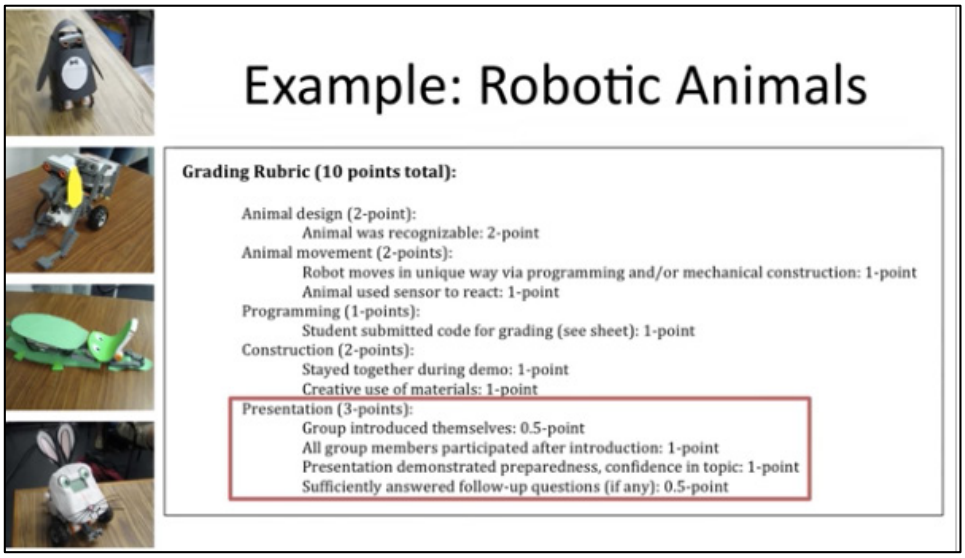
Dr Danahy shares his assessment components, which include: weekly challenges, a final project (design documents, development, self- and peer-grading and presentation) and a midterm exam. In the video, Danahy explains the assessment criteria in the context of designing a robotic animal. Advice from his assessment framework can be adapted for other robotics projects.

Dr Danahy talks through the characteristics of assessment, which include looking at: design, interactions/interface, programming/code (functionality, structure), construction/stability, performance, presentation and documentation. Situated in the context of a robotics animal project he describes how he breaks down the marking criteria around these characteristics.

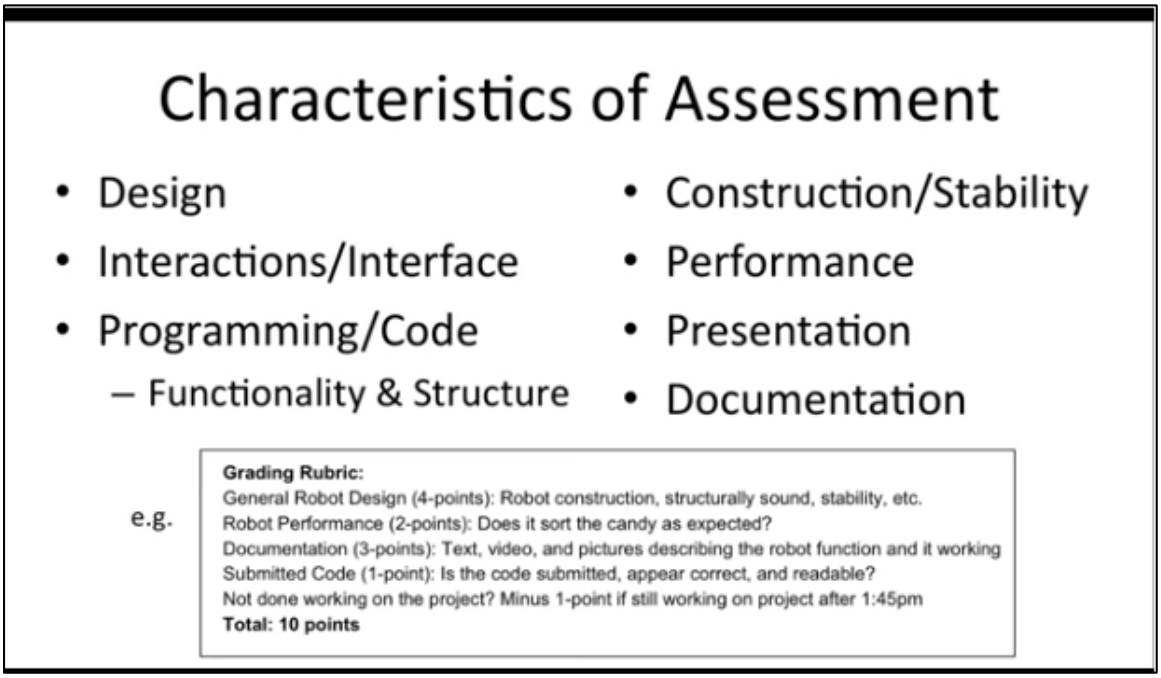
This video could provide a starting point for educators before moving on to more rigorous assessment design and planning.

Year level bands

7–8, 9–10



Slide from Dr Danahy's assessment presentation



Slides from Dr Danahy's assessment presentation

Guidance for use

This video could be used for personal professional learning, or viewed by a group of teachers in a school before designing assessment for a robotics project.

Advice

- At the start of the unit Danahy provides a syllabus to students that explains the course content, assessment and learning intentions. It also describes engineering content and other relevant skills that will be explored in the unit.
- He has students submit their work to an online environment to display their design documents, code, videos, images of their robot, etc. These can be reviewed by educators for formative and summative assessment. He uses this to provide feedback to the groups.
- His exam questions include questions testing students' abilities to read/analyse and debug code, and their conceptual understandings, among other elements.
- Consider co-designing assessment rubrics with students at the start of the unit.

Australian Curriculum Digital Technologies alignment

Years 7–8

Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints (ACTDIP027)

Design the user experience of a digital system, generating, evaluating and communicating alternative designs (ACTDIP028)

Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029)

Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030)

Evaluate how student solutions and existing information systems meet needs, are innovative, and take account of future risks and sustainability (ACTDIP031)

Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)

Years 9–10

Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)

Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)

Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases (ACTDIP040)

Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language (ACTDIP041)

Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)

Create interactive solutions for sharing ideas and information online, taking into account safety, social contexts and legal responsibilities (ACTDIP043)

Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)