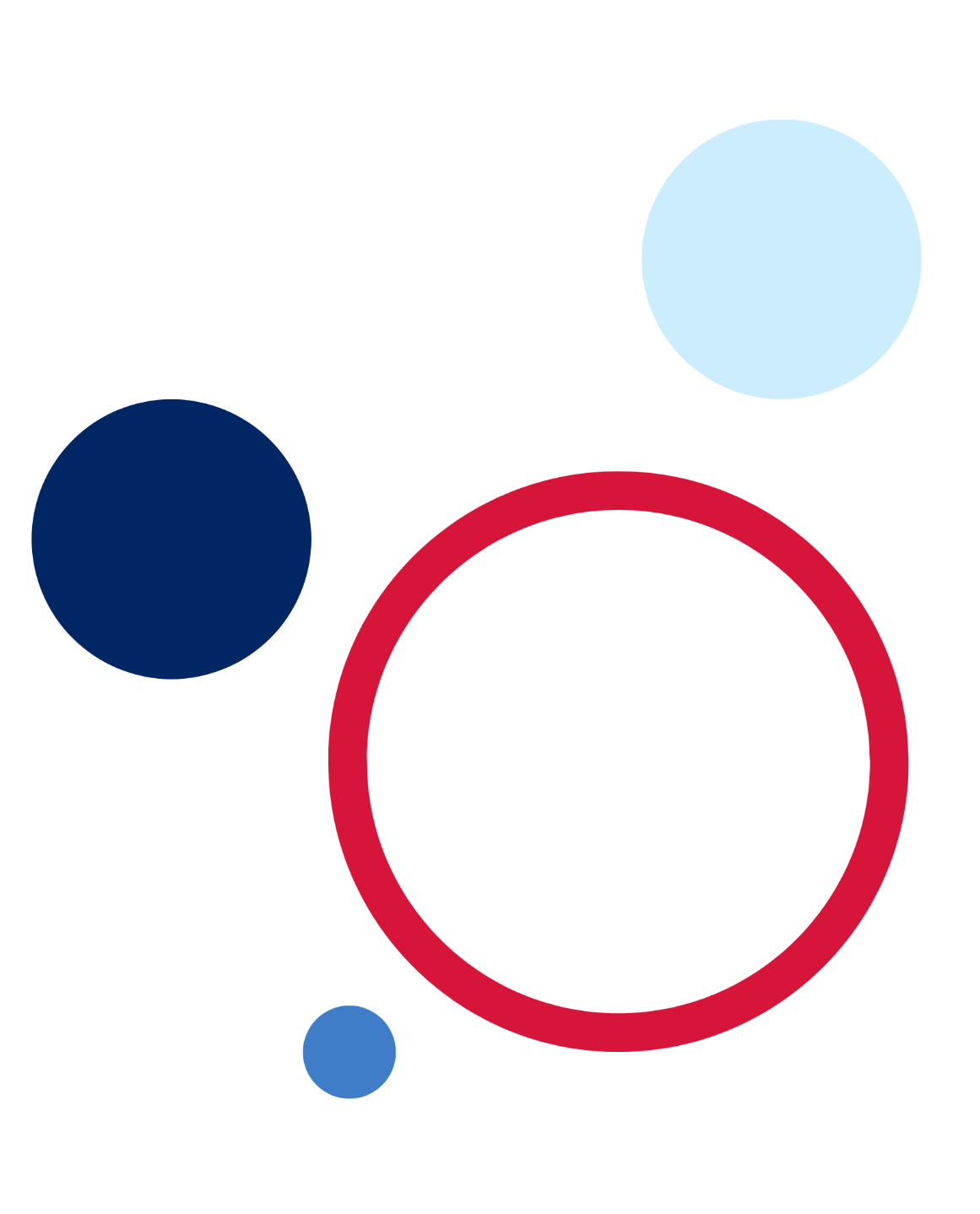
# iSTEM – project-based learning: localised food production sample assessment package



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## Advice to teachers

**Note:** the examples in this package are provided so that schools and teachers may choose relevant information and adjust them for their contexts and school-based practices. Relevant information should be transferred into the school’s assessment task template.

### Communicating design solutions

In the iSTEM project-based learning topic, students are introduced to the idea of pitching ideas to an audience to achieve a particular purpose, for example:

* to generate finance for further development or production
* creating product awareness
* testing ideas on potential customers.

Students should build and demonstrate the skills needed to design and deliver a pitch that communicates a design solutions properties and effectiveness. This authentic assessment task is designed to promote real-world entrepreneurial skills (Bosco and Ferns 2014).

### Task

One of the main aims of this assessment is for students to demonstrate clear and concise communication to achieve a purpose. As part of the [iSTEM project-based learning localised food production learning sequence [DOCX 177KB]](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-ls-pbl-localised-food-production.docx) students investigate current and emerging food production issues and explore different ideas in response to the question ‘How do we solve emerging agriculture problems through localised food production?’. Throughout the entire sequence students investigate, plan, prototype, evaluate, redesign, and then build an indoor plant growing system as a response to a localised food production design challenge. This assessment task requires students to communicate their ideas, solution or product.

Prompting students through the task may assist with success. For example, you could demonstrate the use of persuasive techniques to help explain the problem that the design solution addresses, such as: Are your indoor herbs going yellow? Are they wilting? Do they need more light but you just don’t have the windows? Do you want an affordable and beautiful solution to make your herbs luscious, green, and delicious?

It's important to note that persuasive language can be used for positive or negative purposes. While it can be used to advocate for positive change, it can also be used to manipulate or deceive an audience. It's important to note the use of persuasive language ethically and responsibly.

Different video or presentation applications could be used for this task. Teachers are encouraged to use the application that suits their context and students. One example is PowerPoint. Students could use PowerPoint to create a presentation that they export to video. If exporting a PowerPoint to video, students will need to use appropriate transition timing. The final video or presentation should not be longer than 2 minutes in length. Adjust the ‘advice to students’ section in this document to provide direction on which application students should use.

### Evidence of learning

As part of the engineering design process, students should learn to articulate the role of a pitch to communicate a design solution and produce a pitch that uses persuasive language to communicate design solutions. The pitch is a clear and concise communication tool that students should use to quickly introduce information about the problem the design solution solves. The pitch should then outline the unique features of their design solution and explain how these features solve certain problems.

### Assessment type

This task is intended to directly contribute to the final course assessment, either formative (when developing student skills and knowledge), or summative (when determining student achievement in outcomes for this learning sequence).

Formative assessment is an active learning process that enables teachers to continuously gather evidence of learning and respond to student learning with the goal of improving student achievement (Cowie and Bell 1999). It is an interactive process that monitors student learning to provide ongoing feedback and can be used by teachers to improve their teaching and by students to improve their understanding. During the assessment task, teachers should continuously question student thought processes and decisions to help the self-assessment of the pitch they are creating.

### Duration

Three lessons of class time are required to complete the pitch. Assessment advice and due dates should be informed by school assessment policy and assessment schedules.

### Scheduling and weighting

As part of an evolving sequence of learning, this task is designed for Week 9 of the [iSTEM project-based learning localised food production learning sequence [DOCX 177KB]](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-ls-pbl-localised-food-production.docx). Consider this when creating your iSTEM scope and sequence. School reporting timelines may dictate when this learning sequence and assessment is used.

Weightings are a school-based decision.

### Inclusion and wellbeing

This assessment package has been prepared by the NSW Department of Education. It has been developed as a model for teachers, to assist in the development of an assessment task that can be contextualised to an individual school’s needs.

The specific implementation of the assessment should reflect the school’s context, expertise of the teachers, and the prior knowledge and English language proficiency of the students.

Plan assessment tasks that are inclusive and accommodate the needs of all students in your classroom. Some students may require more specific adjustments and enhancements to allow them to participate on the same basis. The iSTEM [learning sequences](https://education.nsw.gov.au/teaching-and-learning/curriculum/department-approved-courses/istem#/asset3) have example adjustments and enhancements. For further advice, see [Inclusive practice resources for secondary school](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/secondary-school).

Outcomes referred to in this document are from the [iSTEM course document](https://education.nsw.gov.au/teaching-and-learning/curriculum/department-approved-courses/istem#/asset2) © NSW Department of Education for and on behalf of the Crown in the State of New South Wales, 2021.

## Advice to students

Teachers should include their details of due date, weighting, and submission guidelines as per their school practice.

### Task details

**Type of task:** presentation

**Format:** video or presentation pitch

**Weighting:** school-based decision

**Submission:** complete a 3 to 4-minute pitch for your solution, idea or product.

**Description:** produce a pitch that communicates your design solution properties and effectiveness.

**Outcomes assessed:**

* **ST5-2** demonstrates critical thinking, creativity, problem-solving, entrepreneurship and engineering design skills and decision-making techniques in a range of STEM contexts
* **ST5-6** selects and safely uses a range of technologies in the development, evaluation, and presentation of solutions to STEM-based problems
* **ST5-8** uses a range of techniques and technologies, to communicate design solutions and technical information for a range of audiences

## Creating your pitch

A pitch is a short, persuasive presentation of an innovative idea, problem solution, or prototype. The objective of a pitch is to convince an audience to invest in your idea or solution. These are 2 examples of a 3-minute pitch:

* [Calf Catcher (2:54)](https://www.youtube.com/watch?v=3-5F-83W9nc)
* [Shark Tank US | 10-Year-Old Entrepreneur Wows Sharks With Her Baby Spoon Product (7:07)](https://www.youtube.com/watch?v=BaUkuszb7dg)

**Note:** these examples have a problem, solution and details of the product. Both examples have the option of having closed captions switched on to improve accessibility. Whilst one has non-verbal communication and uses visuals well, it could be improved by adding design details, persuasive techniques, and text to improve the messaging. The other uses high modality and emotional appeals. It also details the product and its functionality well.

### Components of a pitch

The following components are used to create an effective pitch. Effective pitches use several of these components at the same time. They may also jump very quickly from the problem, solution and details using persuasive techniques.

**How can using multiple persuasive techniques at once, and jumping between the problem, solution and details be seen in the following example?**

‘Do you squash your tomatoes when you try to cut them? Then this kitchen knife is the product for you. The serrated laminated stainless steel blade cuts through the toughest objects like a hot knife through butter.’

#### Language

A pitch is different from a science report and engineering report. In a pitch the goal is to influence and persuade. Use persuasive language to create your pitch. Persuasive language involves communicating in a way that is intended to convince or persuade your audience that the solution or product you have developed is effective and worth purchasing or investing in. The goal is to use language in a way that makes a strong and convincing case for the position being advocated.

Some common techniques used in persuasive language to create high modality include:

* Use of evidence: Providing factual evidence, images or statistics to support an argument can help to persuade an audience by demonstrating the usefulness of your design.
* Credibility: Establishing your solution as credible can be a powerful persuasion tool. This can involve citing reputable sources or sharing personal experience. For example, ‘A recent study in the Food Research International Journal found that using different LED colour combinations increased the production of nutrients in certain plants. This is a brilliant reason why the grow chamber is a great addition to your home.’
* Use of rhetorical questions: Asking questions that encourage your audience to consider a particular viewpoint can be a powerful persuasion tool, for example ‘Are you tired of watering your indoor plant?’
* Repetition: Repeating a particular phrase or point can help to reinforce an argument and make it more memorable. For example, throughout your pitch you could repeatedly use terms like ‘fresh crunchy vegetables’ or ‘delicious fresh herbs’. This will continually evoke a positive response in people during the pitch.
* Emotional appeals: Using connotative language that draws on people’s emotions can be effective in persuading your audience. For example, ‘eliminate the heartache and frustration of slow internet connection with our efficient product.’ Heartache and frustration are linked with negative emotions, and efficiency makes us think of positive emotions.

#### Briefly explain the problem

Clearly and concisely identify and explain the design problem to your audience.

#### Overview of your design solution

Introduce the design solution. This should include a description of the device or solution, as well as any key features or benefits. Identify the most important features of the design solution as well as dimensions, materials, strength, scale, labels, function or any other features that help the audience understand the exact nature of your design solution.

#### Solution

Clearly explain how your solution solves the design challenge problem. Possibly explain how the design solution is an improvement on what is commonly used. This should include details about how the product or design is used, as well as any potential benefits for consumers or users.

#### Evidence

The pitch should provide evidence to support the effectiveness of the proposed design solution. This could include evaluation results, user research, data, videos or images of success or other relevant information.

#### Visuals

The pitch should include visuals such as sketches, wireframes, diagrams, or other visual aids that help to illustrate the proposed or created design solution and how it works.

#### Accessible communication

Create your pitch so that it communicates ideas to a range of audiences with different communication processes. This means you should use audio and visual text and include closed captions to assist audiences receiving your message. Clear audio explaining a relevant technical image may also assist different audiences. Using clear non-technical language may be preferable to using excessive technical language.

## Marking rubric

**Note:** the criteria and outcomes presented in this table are not mandatory for assessing the task. Teachers are encouraged to select and/or adjust criteria based on their students’ needs and the assessment and reporting requirements of their school.

Table 1 – marking rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | A | B | C | D | E |
| Persuasive techniques  ST5-2 | Uses evidence, credibility, rhetorical questions, repetition, and emotional appeals to build and progress a credible argument to persuade a specific audience. | Uses evidence along with other persuasive techniques to build an argument to persuade a specific audience. | Uses evidence along with other persuasive techniques to persuade an audience. | Uses some persuasive techniques. | Uses at least one persuasive technique. |
| Organisation and structure  ST5-2 | The pitch is well-organised and engages the audience, making the argument memorable and powerful. | The pitch is memorable, organised and structured. | The pitch is engaging for an audience. | The pitch is memorable but the message is unclear. | More organisation is needed to create a cohesive pitch. |
| Problem  ST5-6 | Design problem is identified and explained, demonstrating a deep understanding of the problem and its context. | The design problem is thoroughly identified and explained | The design problem is identified and described | Defines the design problem. | Identifies information about the design problem. |
| Design solution  ST5-6 | Demonstrates a clear and meaningful understanding of how the design solution or idea addresses the problem.  Features and structure are clearly identified and described including materials, dimensions, functioning, and components. | The link between design problem and solution is explained. The design solution structure is identified and described including most materials, dimensions, functioning, and components. | The design solution is described, and some features are identified. | The design solution is described. | The design solution is identified. |
| Visuals  ST5-6 | Visuals illustrate the design solution and how it functions. Labels, scales, animations or clips are used to demonstrate function and clarify structure. | Visuals illustrate the design solution and its function. Labelling and detail is present. | Visuals illustrate the function of the design solution. | Uses images that show the design solution, idea or prototype. | Uses visuals. |
| Accessibility  ST5-8 | Ensures accessibility by communicating ideas effectively to a range of audiences with different communication processes. Audio and visual text is clear and well-paced. Clear language used to explain technical images. | Uses accessibility features by communicating ideas effectively to a range of audiences with different communication processes. Audio and visual text is clear and well-paced. | Two methods of communication for all elements of the presentation. Audio is clear and well-paced. Accompanying text is attempted. | Audio and text are used to increase access by audiences. | Audio and text are used. |

## Additional information

The information below can be used to support teachers when using this assessment package for iSTEM.

### Rationale

Australian businesses competing in a global economy will need more employees trained in science, technology, engineering, and mathematics (STEM). Research indicates that 75% of the fastest growing occupations require STEM skills. Global accounting firm PwC (formerly known as Price Waterhouse Coopers) produced a report titled ‘[A Smart Move](https://www.pwc.com.au/publications/a-smart-move.html)’ where it found that shifting just 1% of the Australian workforce into STEM roles would add $57.4 billion to the Gross Domestic Product (GDP) (net present value over 20 years).

iSTEM is a student-centred Stage 5 elective course that delivers science, technology, engineering, and mathematics education in an interdisciplinary, innovative, and integrated fashion. It was developed in direct response to industry’s urgent demand for young people skilled in science, technology, engineering, and mathematics.

The course was developed in collaboration with, and is supported by, industry, business, government, and universities, ensuring that students develop future-focused STEM skills. The course has a number of specialised topics, many of which are aligned with NSW State Government Priority Industries, identified in the [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/).

iSTEM develops enabling skills and knowledge that increasingly underpin many professions and trades, and the skills of a technologically enabled workforce. It provides students with learning opportunities to develop knowledge and skills to use the most up-to-date technologies including additive manufacturing (3D printing), laser cutters, augmented and virtual reality, drones, smart robotics and automation systems, Artificial Intelligence (AI) and a range of digital systems.

Students gain and apply knowledge, deepen their understanding, and develop collaborative, creative and critical thinking skills within authentic, real-world contexts. The course uses inquiry, problem, and project-based learning approaches to solve problems and produce practical solutions utilising engineering-design processes.

iSTEM is aligned to the concept of ‘[Industry 4.0](https://www.weforum.org/agenda/2019/01/why-companies-should-strive-for-industry-4-0/)’ which refers to a new and emerging phase in the industrial revolution that heavily focuses on interconnectivity, automation, machine learning and real-time data.

iSTEM has been developed to meet the goals of National Federation Reform Council (NFRC) Education Council’s [National STEM School Education Strategy (2016-2026)](https://www.dese.gov.au/education-ministers-meeting/resources/national-stem-school-education-strategy), and supports the NSW Government’s [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/), the NSW Department of Education’s [Rural and Remote Education Strategy (2021-2024)](https://education.nsw.gov.au/about-us/strategies-and-reports/rural-and-remote-education-strategy-2021-24) and the [High Potential and Gifted Education Policy](https://education.nsw.gov.au/policy-library/policies/pd-2004-0051).

### Aim

The aim of the course is to engage and encourage student interest and skills in STEM, appreciate the scope, impact and pathways into STEM careers, and learn how to work collaboratively, entrepreneurially, and innovatively to solve real-world problems.

### Purpose and audience

This assessment package provides a range of assessment strategies and supplementary material that can be used to support student achievement in the task outlined. This resource is for teachers to use when creating a program of assessment for the iSTEM course.

### When and how to use this document

Use the assessment package in the context that best supports your school context.

### Assessment for learning

Possible formative assessment strategies that could be included:

* Learning intentions and success criteria assist educators to articulate the purpose of a learning task to make judgements about the quality of student learning. These help students focus on the task or activity taking place and what they are learning and provide a framework for reflection and feedback. [Online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622) can assist implementation of this formative assessment strategy.
* Eliciting evidence strategies allow teachers to determine the next steps in learning and assist teachers in evaluating the impact of teaching and learning activities. Strategies that may be added to a learning sequence to elicit evidence include all student response systems, [exit tickets](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/543), mini whiteboards (actual or [digital](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/575)), [hinge questions](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/560), [Kahoot](https://kahoot.com/), [Socrative](https://www.socrative.com/), quick quizzes to ensure that individual student progress can be monitored and the lesson sequence adjusted based on formative data collected.
* Feedback is designed to close the gap between current and desired performance by informing teacher and student behaviour (AITSL). AITSL provides a [factsheet to support evidence-based feedback](https://www.aitsl.edu.au/teach/improve-practice/feedback#:~:text=FEEDBACK-,Factsheet,-A%20quick%20guide).
* [Peer feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/549) is a structured process where students evaluate the work of their peers by providing valuable feedback in relation to learning intentions and success criteria. It can be supported by [online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Browser?cache_id=1d29b).
* Self-regulated learning opportunities assist students in taking ownership of their own learning. A variety of strategies can be employed and some examples include reflection tasks, [Think-Pair-Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645), [KWLH charts](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/562), [learning portfolios](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/583) and [learning logs](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/583).

The primary role of assessment is to establish where individuals are in their learning so that teaching can be differentiated and further learning progress can be monitored over time.

Feedback that focuses on improving tasks, processes and student self-regulation is the most effective. Students engaging with feedback can take many forms including formal, informal, formative, summative, interactive, demonstrable, visual, written, verbal and non-verbal.

[What works best update 2020](https://education.nsw.gov.au/about-us/educational-data/cese/publications/research-reports/what-works-best-2020-update) (CESE 2020a)

### Differentiation

Differentiated learning can be enabled by differentiating the teaching approach to content, process, product and the learning environment. For more information on differentiation go to [Differentiating learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/differentiating-learning) and [Differentiation](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation).

When using these resources in the classroom, it is important for teachers to consider the needs of all students in their class, including:

* **Aboriginal and Torres Strait Islander students**. Targeted [strategies](https://education.nsw.gov.au/teaching-and-learning/aec/aboriginal-education-in-nsw-public-schools) can be used to achieve outcomes for Aboriginal students in K-12 and increase knowledge and understanding of Aboriginal histories and cultures. Teachers should utilise students’ Personalised Learning Pathways to support individual student needs and goals.
* **EAL/D learners**. EAL/D learners will require explicit English language support and scaffolding, informed by the [EAL/D enhanced teaching and learning cycle](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald/enhanced-teaching-and-learning-cycle) and the student’s phase on the [EAL/D Learning Progression](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency). In addition, teachers can access information about [supporting EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency) and [literacy and numeracy support specific to EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald).
* **Students with additional learning needs**. Learning adjustments enable students with disability and additional learning and support needs to access syllabus outcomes and content on the same basis as their peers. Teachers can use a range of [adjustments](https://education.nsw.gov.au/teaching-and-learning/disability-learning-and-support/personalised-support-for-learning/adjustments-to-teaching-and-learning) to ensure a personalised approach to student learning. In addition, the [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning) can be used to support the diverse learning needs of students using inclusive teaching and learning strategies. Subject specific curriculum considerations can be found on the [Inclusive Practice hub](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation).
* **High potential and gifted learners**. [Assessing and identifying high potential and gifted learners](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/assess-and-identify#Assessment1) will help teachers decide which students may benefit from extension and additional challenge. [Effective strategies and contributors to achievement](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/evaluate) for high potential and gifted learners help teachers to identify and target areas for growth and improvement. In addition, the [Differentiation Adjustment Tool](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/implement/differentiation-adjustment-strategies) can be used to support the specific learning needs of high potential and gifted students. The [High Potential and Gifted Education Professional Learning and Resource Hub](https://schoolsnsw.sharepoint.com/sites/HPGEHub/SitePages/Home.aspx) supports school leaders and teachers to effectively implement the High Potential and Gifted Education Policy in their unique contexts.

All students need to be challenged and engaged to develop their potential fully. A culture of high expectations needs to be supported by strategies that both challenge and support student learning needs, such as through appropriate curriculum differentiation. (CESE 2020a:6).

### About this resource

All curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance, and effectiveness. For additional support or advice contact the Teaching and Learning Curriculum team by emailing [secondaryteachingandlearning@det.nsw.edu.au](mailto:secondaryteachingandlearning@det.nsw.edu.au).

**Alignment to system priorities and/or needs**:

This resource aligns to the School Excellence Framework elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

This resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 5.1.2, 5.5.2

This resource has been designed to support schools with successful implementation of new curriculum, specifically the NSW Department of Education approved elective course, iSTEM © NSW Department of Education for and on behalf of the Crown in right of the State of New South Wales, 2021.

The resource is produced to assist schools with promoting and implementing the course for the first time. As the course may be taught by teachers from a range of key learning areas, the resource is designed to support teachers from a variety of KLA expertise.

**Department approved elective course**: iSTEM

**Course outcomes**: ST5-2, ST5-6, ST5-8

**Author**: Curriculum Secondary Learners

**Publisher**: State of NSW, Department of Education

**Resource**: Assessment resource

**Related resources**: Further resources to support iSTEM can be found on the Department approved elective courses webpage including course document, sample scope and sequences, assessment materials and other learning sequences.

**Professional Learning**: Join the [STEM secondary statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms) for information regarding professional learning opportunities.

**Universal Design for Learning Tool**: [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning). Support the diverse learning needs of students using inclusive teaching and learning strategies.

**Consulted with**: Aboriginal Outcomes and Partnerships, Inclusion and Wellbeing, and EAL/D.

**Reviewed by**: This resource was reviewed by Curriculum Secondary Learners and by subject matter experts in schools to ensure accuracy of content.

**Creation date**: 21 March 2023

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**Evidence base:**

The range of assessment strategies outlined in the advice encourages ‘a variety of assessment methods each lesson to check for students’ understanding and inform what should be taught next’. (CESE 2020a:22). The assessment strategies outlined are student-centred, providing ‘students with opportunities to reflect on their progress to inform future learning goals’ (CESE 2020a:22).

The assessment advice complies with NESA’s assessment advice, outlined on [NESA’s ACE](https://ace.nesa.nsw.edu.au/) website, NESA official notices and department memorandums. They:

* include statements of school procedures for allocating grades in Year 10
* set out requirements to retain student work samples to support grade allocation as required by NESA for the RoSA.

The assessment strategies outlined provide teachers with important information about whether students learned what was intended. Wiliam (2013) claims ‘the term formative should apply not to the assessment but to the function that the evidence generated by the assessment actually serves’.

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