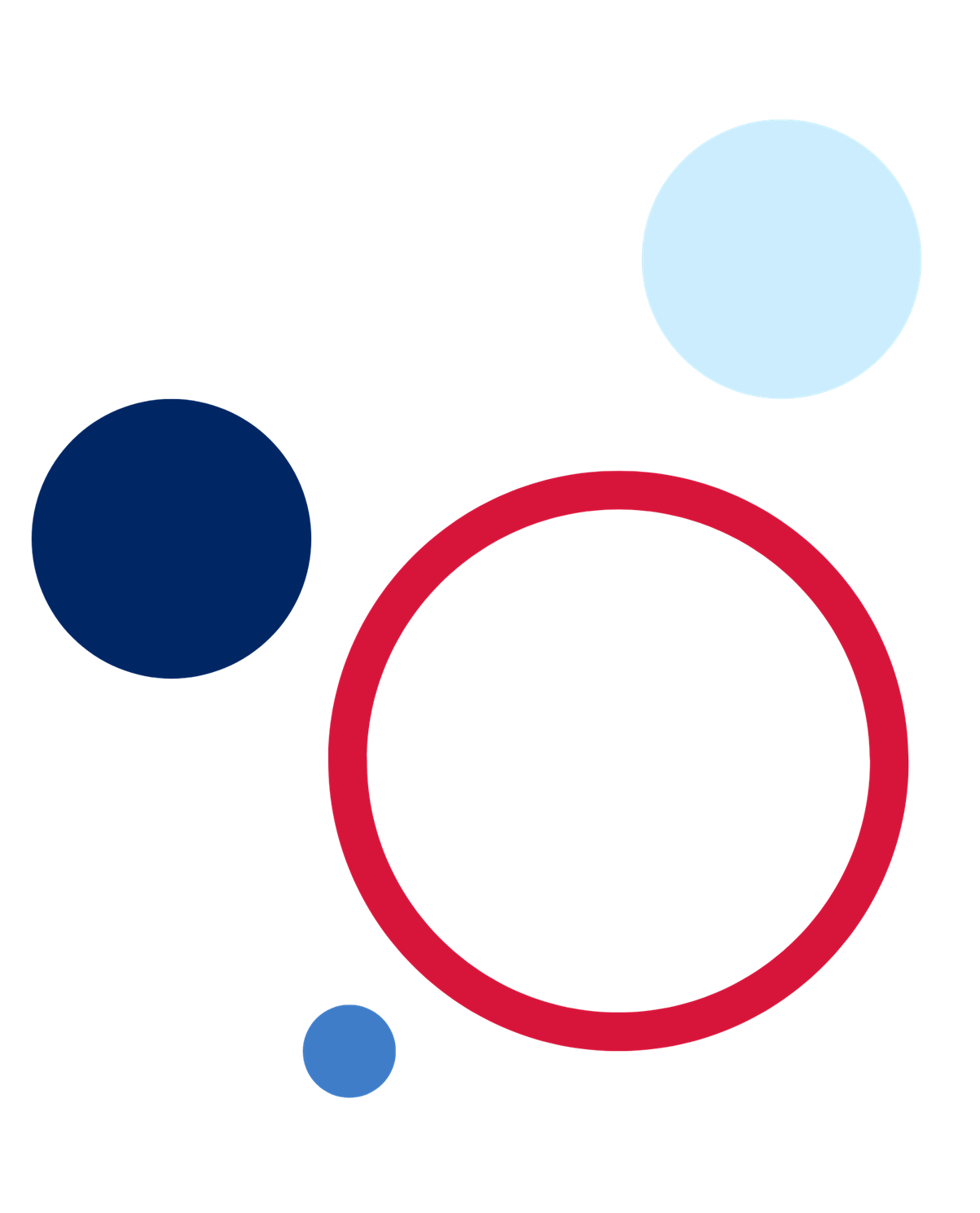
# iSTEM – Design for space: ProtoSat sample assessment package

**Practical task**



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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 for their contexts and their school-based practices. Relevant information should be transferred into the school’s assessment task template.

The Design for space specialised topic focuses on developing knowledge and skills required to develop solutions to space design challenges. In the Design for space: ProtoSat unit, students working in groups follow an engineering design process to design, make and evaluate a 1U weather CubeSat for ground testing using industry-inspired processes. Examples of the deliverables (requirements) of the project are provided in the [Design for space: ProtoSat learning sequence](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-design-for-space-protosat.docx). Criteria for the prototypes can be established with the class as part of the learning around the purpose of prototypes.

### Task

Students apply the engineering design process to sketch initial designs and develop a cardboard prototype for a ProtoSat casing. Students use computer-aided design (CAD) software to refine the design of a case for their prototype CubeSat (ProtoSat) which houses a microcontroller, sensors and power supply and complies with the deliverables (requirements) of the project.

Students will create individual drawings of each part and a combined assembly drawing. Each drawing will be in the form of orthogonal drawings with multiple views using third angle projection. Inclusion of a matching inset isometric projection is optional. Where necessary, drawings should include hidden detail as per AS 1100 specifications.

Based on the CAD designs, students construct a prototype using available fabrication techniques, which may include advanced manufacturing processes, such as laser cutting or 3D printing. Students plan and conduct investigations to test the performance of the design against the requirements definition. After evaluating results from investigations and iterations to the design, students manufacture the modified design to be deployed. The final design is fitted with components and deployed to collect weather data.

### Evidence of learning

Students will demonstrate their proficiency in using an engineering design process and specifically their understanding and appropriate use of various CAD drawing tools to create accurate 3D models of a selected physical object. They will demonstrate this through:

* designing sketches with informative annotations
* constructing at least one prototype of the ProtoSat design from cardboard or agreed material.
* CAD drawings that are complete and satisfy AS 1100 specifications, including:
* a title block, dimensions, notes
* drawings that are to scale and with the proper coordinate system used
* a fabricated ProtoSat design.

### 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 towards 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 2010). It is an interactive process that monitors student learning to provide ongoing feedback that can be used by teachers to improve their teaching and by students to improve their understanding.

### Duration

Time required to complete the practical activities in class is suggested in the [learning sequence](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-design-for-space-protosat.docx) and can be adapted to suit the class context. Prototype design activities begin in week 3 and CAD work begins in week 4. Early versions of prototypes for testing and evaluation may have been built by week 5 with an iterative process of modification occurring through to the end of week 7.

Assessment advice and due dates should be informed by school assessment procedure and assessment schedules.

### Scheduling and weighting

This task is intended to be used towards the end of the topic after the design, prototyping, evaluation and building activities have been completed. It provides the opportunity to evaluate the design thinking and practical skills students have acquired and developed in this unit. Completion of earlier stages in the design process, like design and prototyping, may better align with individual school assessment schedules and teachers may select or adapt parts of the marking rubric to move it further forward or backward depending on the needs of the school. Formative assessment of remaining activities can provide useful data to inform further teaching.

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.

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#/asset4) 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. Teachers should make students aware of the processes being used to assess the safe use of technologies.

### Task details

**Type of task:** design, prototype and construction/fabrication of working ProtoSat

**Format:** practical task

**Weighting:** school-based decision

**Submission:** students work collaboratively to complete task and submit individual prototype designs (sketches and cardboard model) and CAD drawings. A constructed ProtoSat based on the prototype evaluation will be submitted by the group.

**Description:** apply the engineering design process to develop a cardboard prototype for a ProtoSat casing. The prototype needs to match physical dimensions of a 1U CubeSat and demonstrate secure housing of the specified hardware components. Using CAD software, create parts drawings and an assembly drawing of the ProtoSat design. Construct a prototype based on the CAD designs and test against requirements. After evaluating the prototype design, manufacture a final ProtoSat design using available fabrication technologies. Submit CAD drawing files on completion of task and provide your teacher with shared access to your task work folder.

**Outcomes assessed:**

* **ST5-4** works independently and collaboratively to produce practical solutions to real-world scenarios
* **ST5-6** selectsand 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 drawings

**You will need to complete the following:**

* 3D drawings of each of the parts (screws and fasteners optional)
* an assembly of the parts created
* an orthogonal drawing of each of the parts, including an inset isometric projection at a suitable scale.

**Things to check:**

* all drawing files are properly named and stored in an organised folder structure
* 3D drawings and assembly have suitable constraints and mates applied where appropriate
* orthogonal drawings include a title block and appropriate information with a suitable scale selected
* orthogonal drawings are drawn in third angle projection with views correctly aligned to each other
* orthogonal drawings indicate all features of the parts or assembly including all dimensions and symbols according to AS 1100 standard.

**What to submit:**

* exported PDF versions of all orthogonal drawings or in an appropriate format as determined by your teacher
* shared access to all of the relevant CAD files drawn and generated as part of this task.

### Creating your prototype

**You will need to complete the following:**

* produce a prototype while safely using technologies and materials
* construct one additional prototype of your ProtoSat from cardboard or agreed material
* test fit components (can the digital components fit securely within the prototype?)

**Things to check:**

* prototype dimensions match CubeSat specifications or teacher-modified specifications
* prototype design is capable of housing the hardware components in a manner which will allow them to correctly function
* evaluation of prototype demonstrates if design will meet objectives.

**What to submit:**

* at least one prototype of your ProtoSat design constructed from cardboard or agreed material
* documentation demonstrating processes to test design and evaluation findings.

### Creating your ProtoSat

**Your group will need to complete the following:**

* produce a final design of ProtoSat while safely using technologies and materials
* perform a fit and function review (do the digital components fit securely within the ProtoSat?)

**Things to check:**

* dimensions of ProtoSat match CubeSat specifications or teacher-modified specifications
* design is capable of housing the hardware components in a manner which allows them to function correctly
* plans are accurately followed demonstrating quality workmanship
* ProtoSat functions according to objectives and specifications prescribed by teacher.

**What to submit:**

* assembled and functional ProtoSat constructed from agreed material.

## Marking rubric

**Note:** the criteria and outcomes presented in this table are not mandatory for assessing the task. Teachers are encouraged to select 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 |
| Sketching design solutions  ST5-8 | Annotates multiple labelled design solution sketches that demonstrate methodical progression of the planned solution. | Annotates multiple labelled design solution sketches that are appropriate for the planned solution. | Design solution sketches are labelled. | Design solution sketches are missing labels and annotations. | Sketches are incomplete. |
| Cardboard prototype  ST5-4, ST5-8 | Creates cardboard prototypes for the proposed solution which comply with required dimensions and demonstrates multiple solutions to identified constraints. | Creates cardboard prototype(s) for the proposed solution which comply with required dimensions and can be used to test the secure mounting of internal components. | Creates a cardboard prototype which complies with required dimensions and represents a proposed solution. | Creates a cardboard prototype related to the problem. | Creates part of a cardboard prototype related to the problem. |
| Parts drawings  ST5-4, ST5-8 | All individual parts drawings are complete with no errors.  All features are included. | Most individual parts drawings are produced with minimal error.  All features are included. | Some individual parts drawings are produced with minor errors present in either drawing, for example, missing features obscured by view. | At least one part drawing is completed.  Features are not completed or are missing. | At least one part drawing is started. |
| Dimensioning  ST5-4, ST5-8 | All features are correctly dimensioned.  Dimensions are positioned properly according to AS 1100 standard. | All features are dimensioned.  No more than 2 dimensions are incorrectly positioned according to AS 1100 standard. | Most features of all parts drawings are dimensioned.  No more than 2 features are not dimensioned. | Some features of parts drawings are dimensioned.  More than 2 dimensions are missing. | Produces a drawing without applying dimensions. |
| Organisation  ST5-4, ST5-8 | Filenames created using a naming system consistent with industry practice, emphasising their function and design intent.  Saved files are organised in a logical folder structure and match required settings. | Filenames created using a naming system consistent with industry practice.  Saved files are organised in a logical folder structure and match required settings. | Filenames created in a logical manner.  Files are organised and in the correct format.  Saved drawing files match required settings. | Filenames are inconsistently created.  Some drawing files do not have the required settings for AS 1100 standard. | Files are saved with minimal evidence of proper file organisation.  Files are saved without correct settings for AS 1100 standard is shown. |
| Prototype design and construction  ST5-4, ST5-8 | Design meets prototype criteria with additional functions in insightful ways.  Extensive evidence of how prototype was created, discussing lessons learned from previous stages. | Design meets prototype criteria with an additional function.  Prototype is well constructed.  Detailed evidence of how prototype was created, explaining lessons learned from previous stages. | Design meets prototype criteria.  Prototype is constructed with care but may be missing details.  Satisfactory evidence of how prototype was created, describing a lesson learned from a previous stage. | Design meets some prototype criteria.  The prototype is poorly finished or missing details.  Limited evidence of how prototype was created. | The prototype is incomplete. |
| Safely uses fabrication tools and methods  ST5-6 | Demonstrates the safe handling and advanced application of all tools during all practical lessons. | Demonstrates the safe handling and precise application of all tools during all practical lessons. | Demonstrates the safe handling of all required tools during all practical lessons. | Requires additional instruction or demonstration to ensure safe handling and application of tools. | Requires direct instruction when using any tool. |
| Assembly and secure mounting of digital technologies hardware  ST5-4, ST5-8 | Components are assembled independently, safely and correctly demonstrating advanced understanding of how they function and how to configure them.  Additional components are included with justification to augment and improve functionality. | Components are assembled safely and correctly with understanding of how they function and how to configure them.  Additional components are included to improve functionality. | Components are assembled safely and correctly, following demonstration and using diagrams and written instructions. | Components are assembled following instructions with teacher assistance.  Basic understanding of how components work and how to configure them. | Assembly is incomplete or inaccurate. |
| Evaluation and iteration  ST5-4, ST5-8 | Prototype tested in different conditions. Modifications made to optimise performance and aesthetics.  The prototype has been thoroughly evaluated using detailed criteria for assessment of each component of the design.  Used critical thinking in the evaluation and testing of the prototype, discussing alternatives and modifications. | Prototype tested. Various modifications implemented.  The prototype has been evaluated using detailed criteria for assessment of each component of the design.  Exhibited rational thinking in the testing and evaluation of the prototype, explaining required modifications. | Prototype tested and modified where required.  The prototype has been successfully evaluated using clear criteria for assessment.  Testing of the prototype produced results which confirmed design choices or indicated the need for modification. | Prototype tested, no consideration given to modifications.  An evaluation of the prototype has been attempted with simple criteria for assessment developed.  Tested the prototype with irregular performances. | Prototype not tested.  The prototype has not been evaluated. No criteria for evaluation have been developed.  Prototype not sufficiently tested and ideas for future improvements are vague and impractical. |
| Final build  (engineering and workmanship)  ST5-4, ST5-8 | Finished ProtoSat is well engineered and accurately fabricated to design specifications.  Provides mechanical analysis and evidence of empirical testing for structural decisions, choice of materials, and additional technologies selected. | Finished ProtoSat is well-engineered and accurately fabricated to design specifications.  Provides some analysis and convincing arguments for structural decisions, choice of materials, or additional technologies selected. | Finished ProtoSat is engineered and fabricated to design specifications. There are some fabrication deficiencies but is of sufficient quality to deploy.  Demonstrates sound workmanship in the construction of the Protosat.  Evidence of process for structural decisions or selection of materials. | Finished ProtoSat is not fabricated to design specifications nor suitable for deploying.  Demonstrates basic workmanship in the construction of the prototype. | ProtoSat is not complete and demonstrates limited workmanship. |
| Functionality  (fully operational)  ST5-4, ST5-8 | ProtoSat is fully functional with innovative design choices and additional features implemented. All required criteria have been met. | ProtoSat is fully functional with additional features implemented. All required criteria have been met. | ProtoSat is fully functional and meets most criteria and constraints of the project. | ProtoSat is partially functional and meets some criteria and constraints of the project. | ProtoSat does not meet the criteria or constraints of the project. |

## 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 Cooper) 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 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/), or 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 culture. 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/enhanced-teaching-and-learning-cycle).
* **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, [Curriculum planning for every student in every classroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12) 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).
* **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 helps 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 Standards for Teachers](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 © 2021 NSW Department of Education for and on behalf of the Crown in right of the State of New South Wales.

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**: ST5-4, 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 [Teaching and Learning 7-12 statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms) for information regarding professional learning opportunities.

**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**: 3 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 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’.

## References

Britannica, Editors of Encyclopaedia (2023) ‘[isometric drawing](https://www.britannica.com/topic/isometric-drawing#:~:text=Arts%20%26%20Culture-,isometric%20drawing,-Print)’*,* Arts & Culture, Encyclopedia Britannica website accessed 1 April 2023.

CESE (Centre for Education Statistics and Evaluation) (2020a) ‘[What works best: 2020 update](https://education.nsw.gov.au/about-us/educational-data/cese/publications/research-reports/what-works-best-2020-update)’, NSW Department of Education, accessed 25 October 2022.

CESE (Centre for Education Statistics and Evaluation) (2020b) ‘[What works best in practice](https://education.nsw.gov.au/about-us/educational-data/cese/publications/practical-guides-for-educators-/what-works-best-in-practice)’, NSW Department of Education, accessed 25 October 2022.

Cowie B and Bell B (2010) ‘A Model of Formative Assessment in Science Education’, *Assessment in Education: Principles, Policy & Practice,* 6(1):101–116, doi.org/10.1080/09695949993026.

NESA (NSW Education Standards Authority) (2020) [*Nurturing Wonder and Igniting Passion, designs for a new school curriculum: NSW Curriculum Review* [PDF 1.12MB]](https://nswcurriculumreform.nesa.nsw.edu.au/pdfs/phase-3/final-report/NSW_Curriculum_Review_Final_Report.pdf), NESA, accessed 1 May 2023.

Wiliam D (2013) ‘[Assessment: The Bridge between Teaching and Learning](https://www.proquest.com/openview/18ad78ca0b4aab2cb1080027fbb4f8c3/1.pdf?pq-origsite=gscholar&cbl=33274)’, *Voices from the Middle*, 21(2):15–20, <https://doi.org/10.3389/fpsyg.2019.03087>, accessed 2 May 2023.

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