Assessment 2: Lesson Planning

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Introduction

In today's world, sustainability principles are becoming increasingly important in every aspect of human life. The Year 10 Design and Technology course would afford opportunities to explore these concepts while establishing and refining technical and problem-solving skills. In this Sustainable Innovations unit, students will explore the environmental impact of technological developments and how considerate, innovative design might reduce or even reverse negative consequences. The unit also focuses on sustainability not just as an area of academic concern but also as part of practical, real-world problem-solving in which students can be actively involved at both a personal and societal level.

In these four weeks, students will embark on a very critical learning journey in which they can reflect critically on how decisions about design-choice of materials, manufacturing processes, product life cycle-have consequences for both the local and global ecologies. Right at the centre of this unit is the development of understanding about sustainability within technological contexts, while equipping students with the ability to design creative and functional but also environmentally responsible products.

Rational

Apart from that, sustainability within Design and Technology education serves a dual purpose: on one hand, aligning with the general societal goals related to reducing our footprint and thus overpowering towards a more sustainable future; on the other hand, in preparing students as conscious designers who are capable of ethical decision-making in practice. This unit bridges students into the connection of theory to practise by showing them how the Sustainability Principles are applied to real-life problems through the creative design process.

Critical and Creative Thinking in Design

It allows the students to solve complex problems which involve critical analysis and creative thinking by investigating how sustainability intersects with design and technology. For instance, how would a product be designed for disassembly so that its materials can easily be recycled or otherwise reused? How does one select the materials that can maximise durability with minimal environmental impact? These are questions that confront students and require them to go beyond the old design methods by the introduction of innovation into the whole life cycle of the products.

This unit will also help the students reflect on social, ethical, and environmental implications of design. It would thus enable them to understand the work they are engaging in from a broader perspective and further understand how design and technology are key in achieving a sustainable future. It is wishfully fostering a sense of responsibility in order to develop this student body not only as designers and technologists but also as informed, ethical global citizens. Fostering Collaboration and Real-World Application It is important to note that, in design and technology, sustainability is not a solo activity; it calls for collaboration and cooperation. In this unit, learning outcomes have been combined with group work and peer feedback to give students real-life exposure to design environments where collaboration forms the core of solving complex challenges associated with sustainability. Students will be working in teams to design prototypes, share resources, and review each other's ideas; therefore, they will adopt a cooperative approach toward learning. This is the Sustainable Innovations unit, important because, through it, learners come to understand the place of sustainability in design and technology. It therefore equips learners with knowledge, skills, and values to play their part in finding sustainable solutions for the future. It shows how creative, informed design can contribute to resolving some of the key environmental issues of this century and enables students to develop as thoughtful practitioners who can reflect on the broader implications of their work for the rest of the world.

Step 1: Select Suitable Context and Content

The identified school for this learning sequence is Holy Cross College, Ryde, New South Wales. Holy Cross College is referred to as an accomplished school that focuses on a balanced approach towards academic success and personal development. Students attending this school are given access to the most modern facilities of state-of-the-art workshops and ICT resources to develop practical skills in Design and Technology within the usage of latest technologies. Also, the school's attention to innovation along with sustainability was in line with the focus of this unit on exploring the integration of sustainable practices within design processes.

This learning sequence is targeted at Year 10 students, a milestone in their schooling when they will extend prior learning in Design and Technology and consolidate the learning for more specialised independent work in the senior years ahead. The Holy Cross College students in Year 10 would already have a formed base in the properties of materials, basic design processes, and safe workshop practice in previous years, so they could now move into more complex projects about sustainability and technological innovation.

Term 3 is a very appropriate time for students to embark on this project as they finally get to experience the delivery of the learning program. By mid-year, students are ready to take on more advanced concepts, and the focus on sustainability fits well within this time period as it allows them to reflect upon previously learned concepts and allow new knowledge to be taken into real-world problems. Term 3 has the added advantage of providing an opportunity to implement a project-based learning unit that can be used by the engineering students as a practical, cumulative assessment task in furthering their understanding of both the theoretical and practical aspects of sustainability.

The learning sequence shall focus on Design and Technology, focusing on the sustainability of the design. This is something that, with growing environmental degradation, resource scarcity, and questions on responsible consumption, has become highly relevant to the modern world in which we live. In this regard, integrating sustainability into Design and Technology curriculum allows students to understand not just the salient points of design but how those design choices have implications for the environment and society.

The following learning sequence is aligned to the NSW Stage 5 Design and Technology Syllabus and focuses on the following content descriptors and achievement standards:

LS1.1: The student can identify that a process can be used in the development of design solutions. In this unit, students will progress through a sequential design process: from identifying a problem involving sustainability to developing solutions and prototyping. Thus, the process allows students to appreciate the structured approach that has to be undertaken in order to develop appropriate and innovative products.

LS3.1: Students assess designers' work to consider benefits to individual society and environments. Through investigation and study of the practice of contemporary designers whose focus is designing for sustainability, students will be able to ascertain how well-designed products can fulfil not only the needs of an individual but also of communities and their ecosystems.

LS 5.1: Students gather and apply information to develop design solutions. This is a research-based unit. Students will be required to research sustainable materials, case studies in sustainable design, and apply that information in developing innovative solutions. Within this research-based approach, students will ground their designs in practical evidence-based strategies.

In this four-week unit, students will learn about the principles of sustainable design, from material consideration to product lifecycle analysis and environmental impact. Each week will add to the element of complexity for the students as they learn and put into practice the material they are learning. Students will finish the sequence by making a prototype of a sustainable product that responds to a real-life environmental problem.

This will enable students to both design for sustainability and reflect critically on the wider implications of their decisions as designers. Through connecting research, practical work, and collaboration, students will be enabled to take up innovative and ethically responsible engagement with design and technology.

Step 2: Identify Two Focus Students Who Require Adjustments

In this learning sequence, two focus students are identified with diverse needs of adjustments. These represent a range of learning challenges that are significant to the curriculum and context included in Holy Cross College. These adjustments have been developed to ensure these students can access and participate fully in the unit Sustainable Design and Technology and attain learning outcomes comparable to their peers.

Focus Student 1: Ben (ADHD)

Background: Ben is a student in Year 10 who has been diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD). Ben is an enthusiastic and creative learner. Her strengths are in hands-on and visual work. He struggles to focus in extended theoretical lessons and sometimes experiences sensory overload with loud noise or overstimulation.

Ben struggles to follow complex, multi-stepped instructions; he often feels overwhelmed when tasks are not broken down into smaller components. Despite these difficulties, Ben shows high levels of engagement in practical work and enjoys working with design materials.

Learning Needs: Ben requires a well-defined structure and less-distracting environment to learn. He has also listed specific tasks for herself so that he would be able to check on them. Knowledge can be accessed more simply by visual teaching, manipulative tools, and appealing step-by-step instructions. Besides these, accommodations are required so as to help her handle sensory hypersensitivities, especially when noisy tools are used in the workshop or while being put into large group settings.

Adjustments for Ben:

Accommodations in the Workspace: Ben will be granted a quiet, specified workspace within the classroom to lessen the sensory overload. The space will allow her to focus on her practical work without feeling overwhelmed by the noise and/or activity from other students engaged in practical work.

Scaffolding tasks: The tasks will be broken down into smaller steps, and each step visually detailed as to what is expected from the student within it. For example, Ben will be given some scaffolding worksheets in which every step in the design and production process will be stressed during the prototyping process.

Visual and Kinesthetic Learning: Ben will be encouraged to make use of mind maps, diagrams, and design sketches to represent her ideas visually before her prototype is created. Video demonstrations of techniques will also be provided for reinforcement in learning. In this way, Ben can review any steps that need clarification at her own pace. This shall be furthered through one-on-one frequent check-ins where the progress of Ben will be tracked, questions answered, and guidance afforded as needed. In doing so, it will keep her on her toes to ensure that he feels supported throughout the project.

Sensory Considerations: Noise-cancelling headphones will be made available for Ben to use in instances of loud activities in the workshop, such as machinery noises. This is helpful for her in managing sensory sensitivities, while focusing her attention on work.

Focus Student 2: Jackson (Mild Intellectual Disability)

Background: Jackson is a Year 10 student diagnosed with mild cognitive impairment. Mild cognitive impairment, in particular, influences his working speed, comprehension, and ability to follow more complicated instructions.

Jackson works more effectively when tasks are simplified and instructions are provided in clear, straightforward language. He is often given extended time to complete an assignment, and he benefits from repetition along with visual support that may reinforce learning. Jackson demonstrates good motivation and puts in maximum effort at practical tasks while showing less mastery of the theoretical aspects and the more ideational elements in which linking factors of ideas or concepts are required.

Learning needs: Jackson's modifications would be guided by the need for simplified directions and concrete, repetitive learning experiences. Visual aids and concrete examples with manipulatives do help in slowing down lessons to a level he could understand and absorb his lessons. His program modification needs to take into consideration that complexity must not make a task unmanageable while keeping opportunities open for him to show mastery, both of a theoretical and practical nature.

Adjustments for Jackson:

Simplified Instructions: The instructions will be simplified and stated in words that are clear and easy to understand. Jackson will receive written and verbal instructions; however, some will be presented as visual aids such as flowcharts or step-by-step guides that further detail components of each task.

Scaffolding: Jackson will be given scaffolds to help him complete tasks. For example, sentence starters for written reflections, guided research templates, and visual examples of design concepts will be provided. These will ensure he is able to engage with the more theoretical elements of the project without feeling overwhelmed.

Visual Aids and Demonstrations: Jackson will be furthered with the capability to visually see all the major techniques, including selecting materials and prototyping, through videos on Google Classroom. By doing so, he will have the capability to refer back to demonstrations whenever necessary. Actual examples of materials and prototypes will also be used to reinforce his learning for further understanding in these areas.

Extended Time: Jackson will be granted extended time when working on all assignments and assessments. This will allow him to work at a pace that is comfortable for him, ensuring he has sufficient time to process information and produce his best work.

Frequent Repetition: Major concepts and instructions will be repeated several times during a lesson; Jackson will also be allowed to review some tasks before proceeding to others, making sure that he has internalised information before moving on.

Support during group activities: Jackson will be assigned to activities in groups where other children can provide him with extra guidance and support. This will enable him to go through more complex tasks and also participate in collaborative learning experiences without feeling overwhelmed.

Step 3: Design the Outline of a Learning Program

This is a four-week learning program in Year 10 Design and Technology. Behind the program is the sustainability concept in design. Through the process, students will be engaged in research, prototyping, and evaluation activities that establish critical thinking, creativity, and problem-solving skills. The following is an expanded version of the learning program, giving further detail on the curriculum alignment, scaffolded teaching and learning experiences, and resources to cater for diverse student needs.

Alignment with the Curriculum

The program aligns with the Stage 5 Design and Technology Syllabus and includes clear links to the content, descriptors, and achievement standards that follow:

LS1.1: Students can explain that a process can be used to develop design solutions. Through the course, students will use a repetitive process for developing design solutions. This will include identifying a design and sustainability issue of their choice, gathering information about materials and processes, creating preliminary sketches, making prototypes, and testing and improving their designs. This explicit focus on using a formalised process helps students learn the importance of planning, effective and iterative improvement to achieve successful design solution outcomes.

LS 3.1: A student judges a designer's work from the perspective of benefits to individual, society, and environments. As part of their study, students will research several prominent designers and companies that have taken the lead in developing sustainably conscious products. With case studies, they also look at designs that support the benefit for not just the user but environmentally by reducing waste, reserving resources while promoting ethical production of goods.

This will teach students to reflect upon the higher-level implications of their design decisions.

LS5.1: Students use information provided to develop and propose design solutions. Students will research materials and manufacturing processes that are sustainable. The information obtained will be used in designing ideas and solutions for individual products considered sustainable. Such a stage of research is important in providing a basis for the work of students with real-world constraints and possibilities so that their solution space does not become too broad but remains innovative yet feasible.

General Capabilities:

Critical and Creative Thinking: Students will be asked to think critically about various issues such as material waste or product life cycles, and to creatively come up with solutions which reduce the problem. Examples include designing a product at the end of its life which has to be able to be taken apart for recycling which requires the student to balance form, function and environmental impact.

Develop Ethical Awareness: In the discussion on sustainability, students will be exposed to ethical dimensions of design touching on environmental impact due to materials, labour practices, and product durability. They will be asked to justify their decisions in design on ethical grounds.

Information and Communication Technology Capabilities: Students will develop greater proficiency in the use of digital tools, such as CAD software and online research databases, in developing digital prototypes and reporting on findings of research. The products described will be designed and assessed using ICT as a principal tool.

Cross-Curricular Priorities:

Sustainability: This will be the driving theme in the unit, and it will guide all other aspects of the design process. In particular, the learning of the students will be developed on how to apply these sustainable principles to real problems of design, ranging from limiting waste at the production of the product to the selection of eco-friendly materials.

Aboriginal and Torres Strait Islander Histories and Cultures: The students will be taken through indigenous cultural practices on traditional sustainability, such as the management of resources to ensure their conservation, and the harvesting techniques applied to make resources sustainable. Such debates will advance the student's perceptions of sustainability and how ancient practices can be applied to develop modern design.

Scaffolded Sequencing of Teaching, Learning, and Assessment Experiences

This outline details the scaffolded learning experiences over the four-week program. Each week builds on the previous, ensuring students develop a strong understanding of sustainable design through a step-by-step process.

Week 1: Introduction to Sustainable Design

Content:
Week 1 will introduce students to the key concepts of sustainability and the circular economy. Students will learn how sustainable practices might affect a design process in everything from choosing eco-friendly materials to performing lifecycle analysis of a product. Students will be informed about traditional design versus sustainable design with regards to their environmental impact.

Concepts and Skills:
Students will be developing their own ability to think critically about design problems, making an analysis of how a product affects the environment, while learning how to research sustainable materials; hence, illustrating the importance of lifecycle analysis when one is designing a product in order to minimise harm to the environment.

Learning Activities:

- **Direct Instruction:** The concept of sustainability will be introduced by using case studies about sustainable products. Life-cycle stages of a product, from raw material extraction through eventual disposal, should be illustrated through the use of visible aids such as slideshows or videos.
- **Group Brainstorming:** Divide the students into small groups to brainstorm real, existing problems related to sustainability, for example, plastic pollution or renewable energy. Discuss possible design solutions for these different problems.
- **Research Activity:** Students start researching sustainable materials, such as recycled plastics or biodegradable alternatives, and record findings in a research portfolio.

Assessment:
Formative assessment will involve a type of assessment in which teachers monitor the students as they brainstorm in groups. The teacher will observe how well students are able to identify any sustainability problem and possible design solutions. The research portfolio will be reviewed to assess students' understanding of sustainable materials.

Scaffolding:
In order to support diverse learners, the research templates will be scaffolded. Students will use sentence starters and guiding questions to help them organise their research and keep them focused on the key ideas. Students will receive visual examples of the products in order to have a concrete reference.

Week 2: Design Development

Content:
Students make, in the second week, the step from research to design: they make first sketches of sustainable products, considering how their design choices are made about, for example, materials and functionality contribute to sustainability.

Concept and Skills:
Students will be applying design thinking principles, with a focus not only on idea development (sketching) and planning but also on material selection. They will be taught to make ethical decisions about what materials to use and how sustainable practices can be embedded in their designs.

Learning Activities:

- **Design Thinking Workshop:** The students will be taken through a structured design thinking workshop where the teacher guides them in generating ideas, sketching, and planning for their designs.
- **Sketching and Planning:** Each student will create annotated sketches of their product, identifying key features and explaining how those features address sustainability challenges. This may include a redesigned reusable water bottle made from biodegradable plastic.
- **One-on-One Feedback:** The instructor will provide each student with a one-on-one consultation to review their design sketches and offer suggestions for improvement.

Assessment:
This would be a formative assessment through feedback on student drawings and design plans. The instructor will review the clarity of the sketches as well as the students' ability to explain how their designs address sustainability issues.

Scaffolding:
Students will be provided with templates that include areas for sketching and annotations related to sustainability. Sentence starters will help students articulate how their design choices align with sustainability principles. Examples of sustainable product designs will be displayed in the classroom for reference.

Week 3: Prototyping and Material Testing

Content:
In Week 3, the physical design prototypes for the students' design concepts will be worked on. Students will experiment with sustainable materials, assessing functionality and durability through material testing.

Concept and Skills:
Prototype making will train students in using sustainable materials to create models. They will test these materials for properties such as strength, durability, and environmental impact. Students will also learn to document their process and reflect on how their design choices impact the sustainability of their product.

Learning Activities:

- **Prototyping Session:** Using sustainable materials such as recycled paper, bamboo, or biodegradable plastics, students will build prototypes of their designs. At this stage, they will be encouraged to think critically about how the materials chosen affect the overall sustainability of the product.
- **Material Testing:** Students will test their prototypes for durability, functionality, and environmental impact. For example, they may test the tensile strength of a recycled plastic or assess the biodegradability of a certain material.
- **Reflective Journaling:** Students will record their prototyping process in a reflective journal. They should note the issues they faced and describe how they modified the design based on material performance.

Assessment:
The instructor will use formative assessment through observation of students during the prototyping process. Reflective journals should also be reviewed for students' explanations of their design process and the sustainability of their materials.

Scaffolding:
Additional support will be provided through video demonstrations of prototyping techniques, accessible online for students to review at their own pace. The journals, which help students document their process and evaluate the sustainability of materials, will be scaffolded with reflective prompts.

Week 4: Final Product Development and Presentation

Content:
In this final week, the students will further refine their prototypes and present their designs to the class. They will discuss how their products solve a problem associated with sustainability and reflect on the choices they made during the design process.

Concept and Skills:
Learners will develop presentation skills by explaining their design process and reflecting on the sustainability of their products. They will also engage in peer review and self-assessment, providing feedback to their classmates and reflecting on how their own designs could be improved.

Learning Activities:

- **Final Prototyping Session:** Students will finalise their prototypes by making adjustments based on Week 3 feedback and material testing, ensuring their product meets sustainability and functionality standards.
- **Presentations:** Students will present their final products to the class, explaining how their design addresses a specific sustainability challenge, such as reducing plastic waste or conserving water. They will use visual aids, such as slides or models, to support their presentations.
- **Peer Review:** Students will engage in a peer review session where they assess each other's products based on a rubric that includes sustainability, functionality, and design aesthetics.

Assessment:
The summative assessment will be based on the final product, student presentations, and process documentation, such as research portfolios or reflective journals. The teacher will use a rubric to assess students' understanding of sustainability, the quality of their design, and their ability to reflect.

Scaffolding:
Peer review rubrics will guide students in providing constructive feedback. Sentence starters will support students with oral presentations. Simplified presentation guidelines will be provided for students who need extra support, and they will have the option to present their work in various formats, such as pre-recorded videos or visual displays.

Identification of Relevant Resourcing, Including ICTs
A range of resources and ICT tools will be used to support students' learning and ensure that this learning program is accessible to all students.

- **ICT Resources:**
    - **Google Classroom**: Used to distribute assignments, upload instructional materials, and provide feedback. Students will also submit process documentation and reflective journals digitally.
    - **CAD Software**: Students will use Tinkercad or Fusion 360 to create digital prototypes of their designs, allowing them to experiment with digital modelling before constructing physical prototypes.
    - **Online Research Platforms**: Students will research sustainable materials, product life cycle analysis, and contemporary design trends using platforms like Google Scholar.
    - **Video Demonstrations**: Pre-recorded videos of key techniques (e.g., sketching, prototyping, material testing) will be uploaded to Google Classroom for students to review at their own pace.
- **Materials:**
    - **Sustainable Materials**: A variety of sustainable materials, including recycled plastics, biodegradable materials, and renewable resources (e.g., bamboo, cork), will be provided. Students may also bring in materials from home that align with sustainability principles, such as fabric scraps or upcycled objects.
    - **Prototyping Tools**: Workshop tools, including 3D printers, laser cutters, and traditional hand tools, will be available for students to create their prototypes. Safety protocols will be enforced to ensure responsible use.
    - **Process Journals**: Each student will receive both physical and digital process journals to document their research, design development, and reflections on the sustainability of their projects.

Accommodations to Meet Diverse Learners' Needs:

Ben (ADHD): Ben will benefit from visual support, noise-cancelling headphones, and frequent breaks. His tasks will be divided into smaller steps with clear visual instructions and scaffolded worksheets to help him stay on task. Ben will have access to video examples that he can review at his own pace, and he will receive one-on-one support during the prototyping process to ensure he feels confident in his work.

Jackson (Cognitive Impairment): Jackson will receive simplified instructions with visual aids and checklists to help him stay on track. He will be given extra time to complete tasks and will work with a peer during group activities to ensure he understands the steps involved. Scaffolded journals with sentence starters will help Jackson articulate his ideas and document his process effectively.

Lesson Plan 1

Lesson title: Introduction to Sustainable Design **Content Area:** Design and Technology

Teacher Name: Jonathan Crook **Grade/Age/Year Level:** Year 10

Lesson duration: 60 Minutes **Date/time of delivery:** 1st October

LEARNING INTENTIONS *State the intentions/focus for the lesson.*	**LEARNING OUTCOMES/SUCCESS CRITERIA** *At the conclusions of the lesson, learners will know/understand or demonstrate skills/strategies of:*
Understand key terminology of sustainable design, such as the circular economy and product lifecycle. Be able to find design problems that could be resolved through sustainability.	Be able to describe the basic principles of sustainable design. Identify real-world design problems that can be addressed through sustainable practices. Begin researching sustainable materials for future design projects.

CURRICULUM/FRAMEWORK LINKS (specific to your setting/location*) and GENERAL CAPABILITIES (Australian Curriculum) *List the specific strand/area/key-ideas/dimensions relevant to this lesson.*

LS1.1: A student recognises that a process is used to develop design solutions

General Capabilities: Critical and creative thinking, ethical understanding, ICT capability.

Cross-Curricular Priority: Sustainability.

IMPORTANT CONTENT CONNECTION: *Describe the important concepts related to this lesson and connections to past/future content.*

This lesson introduces students to key terms that will be reinforced in future lessons on material selection, design sketching, and prototyping. The content relates to the circular economy and lifecycle analysis, which will be further explored when students begin designing and building sustainable products.

THEORETICAL CONNECTIONS: *Identify the main learning theory/theories underpinning the lesson.*

Constructivism: Students will construct knowledge through active participation in group discussions and brainstorming activities.

Inquiry-Based Learning: Students will investigate sustainable materials through guided inquiry and research.

MATERIALS/RESOURCES. *List the texts, equipment, and other materials to be used by the learners. List the materials, including equipment or technology used by the teacher, in presenting the experiences.*

ICT: Laptops, access to Google Classroom, and a video presentation on sustainability.

Whiteboard and markers.

Learning Activities and Key Questions	**Anticipated Learner Responses and Solution Strategies**	**Teaching Notes (Adaptations/Accommodations for Diverse Learners)**	**Evidence of Learning**	**Timing (min)**
Introduction: The teacher will provide an overview of sustainability in design, introducing the circular economy and product lifecycle through real-world examples. **Key Questions:** What is sustainability? Why is it important in design?	Some students may struggle to connect sustainability to design. Use real-world examples like plastic pollution and renewable energy to clarify.	**Nina (ADHD):** Scaffolded research templates and regular check-ins will help her stay focused. **Jackson (Cognitive Impairment):** Simplified instructions with visual aids will clarify the concepts.	Students will engage through questioning and participation in class discussions.	10 Minutes
Group Brainstorming: In small groups, students will identify environmental problems caused by product design, such as plastic waste or energy consumption. **Key Questions:** What environmental problems could be alleviated by designing products differently?	Some groups may struggle to generate ideas. The teacher will circulate and offer prompts to encourage discussion.	Group roles will be assigned to ensure participation, and additional visual prompts will be provided.	Students will produce a list of design-related environmental problems, which will be recorded on the board.	15 Minutes
Research Task: Students will research sustainable materials and solutions to the	Some students may struggle to identify specific	**Nina**: Will be given a structured, step-by-step research template. **Jackson**: Will work	Completed research templates will show an understanding	20 Minutes

problems they've identified. **Key Questions:** What makes a material sustainable? Where can we find sustainable materials?	materials. The teacher will provide a list of examples to help them get started.	with a simplified research task and receive peer support.	of sustainable materials.	
Class Discussion: Students will share their findings with the class. **Key Questions**: What materials did you discover? How can those materials help solve the issues we discussed?	Some students may struggle to connect research findings to practical solutions. The teacher will provide examples and guide the discussion toward real-world applications.	Encourage peer feedback, and provide sentence starters for students needing support with communication.	Students will contribute to the class discussion, demonstrating an understanding of the research findings.	10 Minutes
Summary and Conclusion: The teacher will review key points from the lesson, demonstrating how sustainability will influence future projects. **Key Questions:** How will you incorporate sustainable materials in your design project?	Some students may need more explanation about applying sustainability in future projects, so the teacher will provide further details and introduce the next lesson.	Make clear connections to future lessons, and give Nina and Jackson extra time for questions if necessary.	Students will articulate their understanding of sustainability and its relevance to their upcoming projects.	5 Minutes

Reflection:

I foresee students engaging well in the introductory concepts of sustainability, mainly group brainstorming and researching. However, I will have to make sure I can provide full support to those students who may struggle with abstract ideas such as relating issues in the environment to the design of products. In my practice going forward, I will make sure students like Nina and Jackson have the appropriate scaffolds to complete the tasks set before them successfully. I anticipate that the research templates and structured activities in this lesson will support all students in meeting the lesson objectives. I am prepared to adjust the pacing or add additional visual supports as needed during the lesson.

Lesson Plan 2

Lesson title: Design Development

Content Area: Design and Technology

Teacher Name: Jonathan Crook

Grade/Age/Year Level: Year 10

Lesson duration: 60 Minutes

Date/time of delivery: 5th October

LEARNING INTENTIONS *State the intentions/focus for the lesson.*	**LEARNING OUTCOMES/SUCCESS CRITERIA** *At the conclusions of the lesson, learners will know/understand or demonstrate skills/strategies of:*
Use design thinking to ideate a sustainable product. Develop initial sketches and annotations for a sustainability design solution.	Produce initial design ideas for a sustainable product through sketching. Annotate their sketches with information on sustainable materials and processes. Reflect on how their designs address environmental challenges.

CURRICULUM/FRAMEWORK LINKS (specific to your setting/location*) and <u>GENERAL CAPABILITIES</u> (Australian Curriculum) *List the specific strand/area/key-ideas/dimensions relevant to this lesson.*

LS1.1: A student recognises that a process is used to develop design solutions.

LS5.1: A student gathers and uses information to generate design solutions.

General Capabilities: Critical thinking, ICT capability, ethical understanding.

Cross-Curricular Priorities: Sustainability.

IMPORTANT CONTENT CONNECTION: *Describe the important <u>concepts</u> related to this lesson and connections to past/future content.*

This lesson builds upon the research from the previous session and prepares students for the prototyping phase. The concepts of design sketching and material selection introduced here will guide students in their hands-on project work.

THEORETICAL CONNECTIONS: *Identify the main <u>learning theory/theories</u> underpinning the lesson.*

Design Thinking: Focus on creativity, iteration, and problem-solving through sketching.

Social Constructivism: Peer feedback plays a key role in refining and improving design ideas.

MATERIALS/RESOURCES. *List the texts, equipment, and other materials to be used by the learners. List the materials, including equipment or technology used by the teacher, in presenting the experiences.*

Sketching materials: Pencils, paper, coloured markers.

Laptops with access to CAD software for digital sketching.

Visual examples of sustainable product designs.

Learning Activities and Key Questions	**Anticipated Learner Responses and Solution Strategies**	**Teaching Notes (Adaptations/Accommodations for Diverse Learners)**	**Evidence of Learning**	**Timing (min)**
Introduction: The teacher will present examples of sustainable design and explain the process of sketching. **Key Questions:** What are the major features of a sustainable product? How can we represent sustainability in design sketches?	Some students may have difficulty understanding how sustainability fits into design. Provide clear examples and use prompts that ask specific questions about material selection and product functionality.	**Nina (ADHD):** Visual aids and clear examples of sustainable designs will help. **Jackson (Cognitive Impairment):** Simplified design sketches and clear, step-by-step instructions will be provided.	Students will engage by participating in the class discussion and asking relevant questions.	10 Minutes
Individual Activity: Students will create initial design sketches for a sustainable product, annotating key features. **Key Questions:** How does your product solve an environmental issue? What materials will you use?	Some students may need more guidance on how to annotate their sketches. The teacher will circulate and provide specific feedback, helping students identify sustainable	**Nina:** Provide a sketch template to help her organise her ideas. **Jackson:** Offer sentence starters for annotations and allow extra time for sketching.	Completed sketches with detailed annotations about the materials and sustainability features of their product.	25 Minutes

	materials and processes.			
Peer Feedback: Students will share their designs with a partner to receive feedback, focusing on sustainability. **Key Questions:** What aspects of this design work well? How could it be improved to enhance sustainability?	Some students may be hesitant to give feedback or unsure how to offer constructive suggestions. A feedback rubric or sentence starters will be provided to guide the process.	**Nina:** Provide structured feedback forms to help her organise her thoughts. **Jackson:** Pair Jackson with a peer who can support him in both giving and receiving feedback.	Students will participate in peer feedback and make notes on how they can improve their designs based on input from their peers.	15 Minutes
Reflection: Students will reflect on the peer feedback they received and plan how to incorporate it into their next design iteration. **Key Questions:** What changes will you make to your design based on the feedback? How can you make your product more sustainable?	Some students may struggle to plan specific changes. The teacher will guide the reflection by providing examples of how feedback can be used to improve designs.	**Nina:** Provide her with a reflective prompt to help process the feedback. **Jackson:** Encourage him to discuss his change plan with the teacher or a peer.	Reflection notes in journals outlining the specific changes students will make to improve their designs.	10 Minutes

Reflection:

I predict students will enjoy working on developing their design sketches, however, they might need further instruction on incorporating sustainability into the design. I predict that given templates for sketches and peer feedback sessions would help them refine their ideas. I will monitor Nina to ensure she stays engaged with the structured tasks and make sure Jackson gets enough peer support during his feedback session.

Lesson Plan 3

Lesson title: Prototyping and Material Testing **Content Area:** Design and Technology

Teacher Name: Jonathan Crook **Grade/Age/Year Level:** Year 10

Lesson duration: 60 Minutes **Date/time of delivery:** 9th October

LEARNING INTENTIONS *State the intentions/focus for the lesson.*	**LEARNING OUTCOMES/SUCCESS CRITERIA** *At the conclusions of the lesson, learners will know/understand or demonstrate skills/strategies of:*
Build a prototype of a sustainable product using researched materials. Test the materials for durability, functionality, and environmental impact.	Create a basic prototype of their sustainable product. Conduct material tests and evaluate their sustainability and functionality. Document their process and reflect on how their material choice impacts sustainability.

CURRICULUM/FRAMEWORK LINKS (specific to your setting/location*) and GENERAL CAPABILITIES (Australian Curriculum) *List the specific strand/area/key-ideas/dimensions relevant to this lesson.*

LS1.1: A student recognises that a process is used to develop design solutions.

LS3.1: A student evaluates the work of designers in terms of the benefits to the individual, society, and environments.

General Capabilities: Critical and creative thinking, ICT capability, ethical understanding.

Cross-Curricular Priorities: Sustainability.

IMPORTANT CONTENT CONNECTION: *Describe the important concepts related to this lesson and connections to past/future content.*

This lesson builds directly from previous lessons where students researched materials and developed design sketches. Prototyping is a critical step before moving on to finalising their designs and testing the product's sustainability.

THEORETICAL CONNECTIONS: *Identify the main learning theory/theories underpinning the lesson.*

Experiential Learning: Students learn through hands-on activities, constructing and testing their designs.

Constructivism: Students extend prior knowledge and build new understandings as they test materials and prototypes.

MATERIALS/RESOURCES. *List the texts, equipment, and other materials to be used by the learners. List the materials, including equipment or technology used by the teacher, in presenting the experiences.*

Sustainable materials for prototyping: recycled paper, biodegradable plastic, bamboo.

Workshop tools: scissors, glue guns, rulers, and 3D printers (if available).

Testing equipment: scales for weight, materials for strength testing.

Process journals for documenting findings and reflections.

Learning Activities and Key Questions	**Anticipated Learner Responses and Solution Strategies**	**Teaching Notes (Adaptations/Accommodations for Diverse Learners)**	**Evidence of Learning**	**Timing (min)**
Introduction: The teacher will introduce prototyping and material testing within the design process. **Key Questions:** Why do we prototype? How does material testing improve your design?	Some students may find it difficult to understand the importance of material testing for sustainability. The teacher will provide real-world examples of failed designs due to poor material choices.	**Nina (ADHD):** Clear instructions for the prototyping process will be provided, along with frequent breaks if needed. **Jackson (Cognitive Impairment):** Step-by-step instructions and peer support will be provided to help during the task.	Students participate in the discussion, showing an understanding of the purpose of prototyping.	10 Minutes
Prototyping Activity: Students begin constructing their prototypes using sustainable materials, focusing on creating a rough model for testing. **Key Questions:** How will your material selection	Some students may struggle with material manipulation or using workshop tools. The teacher will demonstrate key techniques	**Nina:** Provide a quiet workspace and simplified tool instructions. **Jackson:** Peer support will assist with tool use and material handling.	Completed prototypes should align with the original design sketches, emphasising sustainability.	30 Minutes

impact the sustainability of your product?	and provide one-on-one guidance.			
Material Testing: Students will test their prototypes for durability, functionality, and environmental impact (e.g., biodegradability or strength). **Key Questions:** How does the material hold up under stress? How could you make it more sustainable?	Some students may struggle with analysing test results. The teacher will provide sample results and guide students through their own analyses.	**Nina:** Visual aids and step-by-step guidance will be provided during the testing phase. **Jackson:** Simplified instructions and extra time for testing will be offered.	Students successfully conduct material tests and document their findings in their process journals.	15 minutes
Reflection: Students will document their findings in process journals, reflecting on how their material choices affected the sustainability and functionality of their design. **Key Questions:** What changes will you make to improve the sustainability of your product? How will this help address the environmental issue you identified?	Some students may need assistance connecting material performance to sustainability. The teacher will provide prompts and examples to guide their reflections.	**Nina:** Scaffolded reflection prompts will help her think through the process. **Jackson:** Simplified prompts and extra time will be given to complete the task.	Completed reflection entries in journals, including documented test results and planned design improvements .	5 Minutes

Reflection:

I do believe it will be vital to keep students such as Nina and Jackson focused on activities without getting frustrated by the lack of support for their work. Process journals shall be a good means through which capturing of learning and reflection by the students would be effective. I am prepared to make adjustments in timing or the addition of scaffolding, if necessary, during the testing of the materials so all students can complete the activity successfully.

Bibliography

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