At Rosebank College, Year 11 students in Food Technology and Design Technology participate in a unit that focuses on the development of practical and theoretical skills associated with the NSW NESA curriculum. The unit involves essential topics including nutritional analysis, meal planning, design thinking, and prototyping. Students in the classroom work below and beyond the standard, necessitating differentiated instruction. The resources used are customised to meet different learning needs, ensuring engagement with scaffolded tasks and extension opportunities. Learning goals focus on students' capacity to analyse, plan, create, and evaluate, while formative assessments, such as meal planning exercises, case studies, and design challenges, guide students' development. Summative assessments will be focused on practical cooking activities and design evaluations, allowing students to demonstrate their knowledge and abilities.

The resources for the Food Technology and Design Technology lessons were created using pedagogical principles that focus on student engagement, skill development, and academic scaffolding to ensure that all students have access to and succeed in the content. The resources also support constructivism, scaffolding, differentiated instruction, and the development of literacy and numeracy abilities in authentic learning settings (Piaget, 1973; Vygotsky, 1978).

Sequencing and Scaffolding Learning

The activities in each resource were designed to gradually increase students' understanding. For example, in Food Technology lessons, students start with a basic understanding of nutrients and their roles, via worksheets and case studieS and then apply that knowledge to more complicated tasks such as meal planning and practical cooking. The process proceeds in a logical order, with the theoretical understanding gained from the first activities informing the preparation of a balanced meal, followed by reflective practice in the summative practical assignment. This technique is similar to Vygotsky's (1978) notion of the Zone of Proximal Development (ZPD), in which students participate in activities that challenge them slightly beyond their current abilities but are within reach with sufficient supervision.

Similarly, the Design Technology resources follow an established sequence. Students begin by identifying real-world design issues and investigating innovations. Before students begin ideation and prototyping, they acquire essential design concepts. This sequence promotes active problem-solving and critical thinking, in line with the constructivist approach that emphasises hands-on, inquiry-based learning (Piaget, 1973). By gradually developing students' design thinking and technical skills, the classes allow them to go from theoretical to practical knowledge.

Selecting Resources to Support Teaching, Learning, and Assessment Strategies

The resources were carefully chosen in accordance with constructivist approaches to learning, in which students actively build on existing information to create new understanding (Piaget, 1973). Activities such as "Exploring Nutrients Worksheet" and "Researching Design Innovations" allow students to engage in inquiry-based learning, which develops critical thinking and problem-solving abilities. These resources not only increase knowledge but also allow for formative and summative assessment. For example, the Practical Cooking Task allows students to demonstrate their understanding of nutritional meal planning through hands-on experience, whereas Design Technology resources such as prototype creation involve iterative testing, which provides immediate feedback to help students refine their designs. This is consistent with

Black and Wiliams' (1998) findings on the relevance of formative assessment in promoting student learning.

In terms of assessment methodologies, both formative activities such as case studies and summative assessments through the inclusion of practical cooking tasks and design report writing are integrated. These evaluation methods take a balanced approach, measuring not only the end output but also the learning process, consequently promoting both skill growth and content comprehension. The use of reflective tasks, such as the evaluation report in prototype creation, promotes cognitive processing by assisting students in assessing their learning and areas for improvement (Zimmerman 2002).

Developing literacy, numeracy, and digital capabilities

These resources also focus on the development of literacy, numeracy, and digital skills, all of which are necessary for students' success in modern society. Food Technology resources engage in written reports, annotations, and reflection assignments, which allow the students to improve their literacy abilities, particularly in using technical terminology and communicating their thoughts coherently. Activities involving portion sizing, nutritional analysis, and calculating macronutrient distribution in meal plans all help to enhance numeracy skills. This technique promotes the application of mathematical concepts in real-world settings, which aids students' numeracy development (Boaler, 2016). Additionally, students use digital tools in some of the design projects, which promotes digital literacy. For example, using CAD software for prototyping or performing internet research for design breakthroughs prepares students to use tools in both academic and real-world settings.

Differentiation and Adjustments

The resources have been created with differentiation at consideration, allowing students with varying levels of proficiency to engage with the topic. Activities such as the "Case Study Challenge" and the "Food Sources Table" allow students who are performing below grade level to develop core information and gradually expand their understanding. For students who are working above standard, challenge questions and higher-level assignments, such as designing prototypes or analysing design trends, provide an opportunity to expand their knowledge. This method is consistent with Tomlinson's (2001) framework for differentiated instruction, which emphasises offering varying levels of support based on students' readiness, interests, and learning profiles. In addition, modifications are made to accommodate students' various learning styles and demands. Visual learners, for example, will benefit from the "Visual Labelling Activity" and "Nutrient Poster," which allow the learners to correlate food kinds with nutrient groupings. Kinaesthetic learners participate in practical cooking and prototyping activities, where they apply

theoretical knowledge to hands-on projects. These diversified strategies respond to a variety of learning styles, increasing engagement and helping students succeed.

Furthermore, the pedagogical decisions that underlie these resources ensure that students participate in an active learning process in which they can develop knowledge, apply it in meaningful contexts, and reflect on their learning. These materials promote a learning environment that meets the various requirements of all students by sequencing assignments to gradually develop in complexity, providing multiple opportunities for assessment and feedback, and employing differentiated approaches. Furthermore, authentic activities help students acquire literacy, numeracy, and digital abilities, preparing them for both academic success and real-world problem solving in food and design technology.

R1- Exploring Nutrients Worksheet

Subject: Food Technology
Topic: Nutrients and their Functions
Lesson Focus: Introduction to the six essential nutrients

1. ***Watch*** *the class video on nutrients.*
2. ***Complete*** *the activities below. Use the images and word bank to help you.*

1. Match the Nutrient with Its Function

Draw a line, write the matching number next to each one or colour code.

Nutrient	**Function**
Carbohydrates	Builds and repairs body tissues
Protein	Keeps the body hydrated
Fat	Helps with energy storage and warmth
Vitamins	Helps the body use other nutrients and boosts immunity
Minerals	Helps with bone strength and blood formation
Water	Provide quick energy

2. Food Sources – Fill in the Table

Nutrient	**Food Example 1**	**Food example 2**
Carbohydrates		
Protein		
Fat		
Vitamins		
Minerals		
Water		

3. **Fill in the Blanks**

Use the word bank: energy, muscles, bones, immune, hydration, vitamins

- Protein helps build our _____.
- Water is important for _____.
- Fat provides stored _____.
- Calcium and iron are important _____.
- _____ help fight off sickness.
- Carbohydrates give us quick _____.

4. **Visual Labelling Activity**

   Look at the food product samples provided. Label each with the **main nutrient group** it belongs to.

Food	**Nutrient group**
Bread	
Butter	
Chicken	
Salmon	
Pasta	
Grapes	

Extension Question (Challenge)

Why do you think we need a mix of all nutrients instead of just one or two?

Write your answer:

_____

_____

_____

R2 - Nutrient Interrelationships

Subject: Food Technology
Topic: How Nutrients Work Together
Lesson Focus: Understanding how nutrients support each other in the body

1. ***Read*** *each nutrient pair.*
2. ***Complete*** *the tasks below using your class notes and textbook.*
3. ***Discuss*** *your answers with your partner before moving on*

1. Match the Nutrients

Draw a line, write the matching number next to each one or colour code.

Nutrient	Function
Iron	Vitamin C
Calcium	Vitamin D
Sodium	Potassium
Folate (B9)	Vitamin B12

2. Explain the Relationships

"_____ helps _____ by _____."

Iron + Vitamin C:

Calcium + Vitamin D:

Sodium + Potassium:

Folate + Vitamin B12:

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3. **Case study challenge**

Scenario:
Maria is 16 and always feels tired. She has a restrictive diet that is low in red meat, fruits, and vegetables. Her energy levels are often low, and she experiences fatigue that affects her daily activities, particularly during school and physical activities.

Her medical history indicates that she has not had any major illnesses, but her blood work has shown signs of mild anemia. Maria's lifestyle is quite active, as she participates in sports and works part-time.

Questions:

1. **Based on Maria's dietary habits and reported fatigue, which nutrient deficiency is most likely contributing to her tiredness and symptoms? Provide an explanation for why this nutrient might be lacking in her diet.**

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2. **Considering Maria's age, activity level, and the nutrient deficiency identified, which other nutrient could play a crucial role in improving the absorption of the first nutrient? Explain how it works together with the primary nutrient.**

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3. **Suggest two specific foods rich in the first nutrient and explain how they can help address Maria's deficiency. Consider the bioavailability of these foods in your answer.**

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4. **Given Maria's current diet and lifestyle, what recommendations would you provide to improve her overall nutritional status, particularly regarding her energy levels, iron absorption, and overall health? Discuss at least three strategies she could implement.**

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4. **Visual Activity – Nutrient Puzzle Poster**

In groups of 2-3, choose one nutrient pair.

Create a mini poster showing:

1. The two nutrients
2. A food source for each
3. How they work together in the body and their effect
4. Images

Extension – Personal Reflection

Think about your own diet:

Do you eat any foods that help your body absorb nutrients better?

R3 - Day on the plate - Meal Planning

Subject: Food Technology
Topic: Meal Planning and Nutritional Analysis
Lesson Focus: Developing a balanced and culturally appropriate meal plan for a day, considering nutritional needs, food safety, and cultural or dietary preferences.

1. ***Complete*** *the meal planning activity.*
2. ***Present*** *the meals you created to the class providing your reasoning.*

1. **Receive an allocated group or individual *e.g. adolescents, elderly.***

2. **Plan three main meals (breakfast, lunch, and dinner) and two snacks.**
   For each meal:

- List ingredients.
- Identify the key nutrients and health benefits.
- Create a recipe and identify the methods of cookery used.
- Ensure the meal meets the nutritional needs of the assigned individual.
- Consider portion sizes and kj intake.

3. **Present meal plans to the class. You will explain:**

- The rationale behind your meal choices (why specific foods were chosen).
- How the meals align with the nutritional needs of the individual.
- Any challenges you encountered in balancing nutrition and cultural preferences.
- Any recommendations for improving the meal plan.

R4 - Practical Cooking Task (Summative Practical)

Subject: Food Technology
Topic: Nutritional Meal Planning and Practical Cooking
Lesson Focus: Developing and preparing a nutritionally balanced meal that aligns with the Recommended Daily Intake (RDI), followed by a reflective written justification explaining food choices and nutrition alignment.

1. ***Plan*** *a meal according to the guidelines.*
2. ***Create*** *the planned meal.*

1. **Choose a meal (e.g., breakfast, lunch, or dinner) that aligns with the RDI for your chosen individual profile. (From previous lesson).**

- Make sure to incorporate a variety of ingredients to achieve a balance between macronutrients (carbs, proteins, fats) and micronutrients (vitamins, minerals).
- Consider portion sizes, preparation time, and cooking methods (e.g., steaming, roasting, grilling) to retain maximum nutritional value.

2. **Prepare your meal**

- Use appropriate cooking methods.
- Follow food safety guidelines (e.g., washing hands, using clean utensils, storing food correctly).
- Record the cooking process (steps, cooking times, methods used, temperature control).

3. **Present**

- Serve the meal neatly and appropriately.
- Ensure that the meal is visually appealing and demonstrates an understanding of plating and portion control.

R5 - Researching Design Innovations and Trends

Subject: Design technology
Topic: Design Thinking and Innovation
Lesson Focus: Investigating emerging design trends and innovations to understand their impact on product development and user needs.

1. ***Research*** *design innovations or trends*
2. ***Write*** *a report*

1. **Choose two design innovations or trends (e.g., sustainability, smart technologies, biomimicry, or user-centered design).**

2. **Use articles, case studies, and online sources to gather information on each trend.**

3. **Prepare a report on each trend, including:**

- A brief description of the trend.
- Its relevance to current design practices.
- Industries impacted by this trend.

R6 - Identifying and Analyzing Design Problems

Subject: Design technology
Topic: Problem-Based Design
Lesson Focus: Identifying real-world design problems, analysing user needs, and developing clear design briefs to guide the design process.

1. ***Identify** a Design Problem*
2. *Problem **Statement***

1. **Choose a real-world problem related to design (e.g., environmental impact, accessibility, product functionality).**

2. **Conduct research to understand the context of the problem and its implications for users or society.**

3. **Develop a problem statement that clearly defines the issue, who is affected, and what needs to be solved. Include user needs and potential constraints (e.g., budget, materials, time).**

R7 - Concept Development and Ideation

Subject: Design technology
Topic: Creative Design and Ideatio
Lesson Focus: Developing, refining, and visualising creative solutions to identified design problems through sketching and peer feedback.

1. *Sketching and Ideation*
2. *Refinement*

1. **Using your problem statement as a guide, create at least three different design concepts that address the identified problem.**

2. **Use sketches and diagrams to visualize each concept, considering materials, form, function, and user interaction.**

3. **Choose the most viable concept based on functionality, practicality, and user needs.**

4. **Refine the concept by adding details such as dimensions, materials, and any special features.**

R8 - Prototype Development and Testing

Subject: Design technology
Topic: Prototyping and Evaluation
Lesson Focus: Creating and testing functional prototypes to evaluate effectiveness and explore opportunities for design improvement.

1. *Prototype **creation***
2. *Testing*
3. *Evaluation & improvements*

1. **Using available materials (e.g., cardboard, foam, plastic, or digital tools), create a prototype of your chosen design.**

2. **Ensure the prototype reflects the key features and functions outlined in your design concept.**

3. **Test the prototype to evaluate its functionality and user interaction.**

4. **Based on your testing, identify areas where the prototype can be improved.**

5. **Create an evaluation report outlining:**
    - The strengths of the prototype.
    - The weaknesses and areas for improvement.
    - Suggestions for future iterations of the design.

Resource	Annotations
1	**Learning Goal Alignment:** - Supports the NSW Stage 6 Food Technology Syllabus outcome FT11/12-1, which requires students to describe the significance of nutrients in maintaining good health (NESA 2009). **Sequencing and Pedagogy:** - The worksheet progresses from lower-order tasks (matching, fill-in-the-blanks) to higher-order thinking (justifying the necessity for nutrient balance), in accordance with Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). **Modifications:** - Using a word bank and sentence scaffolding can help enhance subject-specific literacy, especially for EAL/D learners.
2	**Higher-Order Thinking:** - Students apply, analyse, and evaluate real-life events, such as Maria's case study, in accordance with Bloom's Taxonomy (Anderson & Krathwohl, 2001). The use of sentence scaffolds promotes clarity in conveying scientific links. **Differentiation:** - The structured sentence starters and collaborative poster activity help students who need assistance, while the open-ended case study and reflection task encourage advanced learners to think critically and independently. **Formative Assessment Opportunities:** - Case study responses, partner conversations, and poster creation give teachers insight into students' comprehension and misconceptions about the topic.
3	**Differentiation/adjustments:** - For individuals below standard the work can be reduced to include guided questions. Students who exceed standard can experiment with different diets or conduct a thorough nutrient analysis. **Formative approach:** - The meal plan presentation is a formative exam in which students demonstrate their ability to justify meal choices based on nutritional needs. This provides fast feedback on their comprehension.
4	**Pedagogical Reasoning & Sequencing:** - Students learn about the RDI and make meal plans before practicing nutritionally sound cooking skills. This scaffolding technique enables students to apply theoretical knowledge in a practical setting, strengthening their understanding of nutrition via hands-on practice and reflection (Biggs & Tang, 2011). **Formative and summative assessment:** - The practical cooking task evaluates students' competence to create a balanced meal and adhere to food safety protocols. The written response is a formative assessment that allows teachers to determine how well students understand the nutritional principles underlying their meal choices and provide suggestions for improvement.
5	**Selection of Pedagogies:** - This activity focuses on inquiry-based learning, with students studying and analysing design ideas or trends. The activity develops critical thinking and problem-solving by allowing students to choose and investigate trends such as sustainability or smart technology, requiring them to not only grasp the trends but also evaluate their relevance and application to existing design processes. This corresponds to higher-order cognitive skills as defined by Bloom's Taxonomy (Anderson & Krathwohl, 2001), as students analyse and synthesise information to create a well-informed report.

6	**Links to & alignment with the syllabus/curriculum:** - This project is consistent with the NSW NESA Design and Technology Stage 6 Syllabus, particularly the Design Process and Problem-Solving objectives (NSW Education Standards Authority [NESA], 2017, p. 18). By challenging students to identify real-world problems and perform user requirements and constraints research, the activity directly supports the syllabus goal of students using design thinking to produce innovative solutions (NESA, 2017, p. 20). In addition, producing a problem statement and design brief enhances the understanding of the design process as specified in the curriculum, which requires them to clearly define an issue while taking into account user wants and restrictions (NESA, 2017, p. 22).
7	**Pedagogical Reasoning and Sequencing:** - The practice begins with sketching and ideation, fostering divergent thinking as students produce multiple design possibilities. This fosters creativity and innovation. The second stage, concept refinement, encourages higher-order thinking by having students assess their ideas based on usefulness, materials, and user demands. The incorporation of peer input improves critical thinking and reflection. This evolution is consistent with Bloom's Taxonomy (Anderson & Krathwohl, 2001), which promotes analytical and evaluating skills.
8	**Summative approaches:** - The evaluation report provides a summative assessment in which students critically evaluate the positive and negative aspects of their prototype. This report involves higher-order thinking in terms of analysis, reflection, and the creation of future design iterations, and directly assesses the student's capacity to evaluate and improve designs. The summative evaluation report is also consistent with the syllabus requirements for design evaluation and reflection on the design process (NSW NESA, 2017, p. 25). **Planning for the development of literacy, numeracy, and digital skills:** - This resource develops literacy through the written evaluation report activity using technical design terms. When designing prototypes, exact measurements and scaling are used to demonstrate numeracy. The use of digital tools, such as CAD software, improves digital literacy and prepares students for modern design methods. These skills are required for effective communication and technological design in the sector.

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