Computing Technology Stage 5 (Year 9 or 10) – sample program of learning

Modelling networks and social connections

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# About this resource

## Purpose of resource

The resource is a sample program of learning for teaching the Modelling networks and social connections focus area in Stage 5 during the Computing Technology 7–10 course.

## Target audience

This resource can be used by teachers to support effective syllabus implementation of Computing Technology 7–10.

## When and how to use

This resource is designed for implementing over 20 weeks or a semester of learning on Modelling networks and social connections. The resource can be adapted and contextualised to the school setting. Adjustments can be made to the program of learning to suit students in the teaching and learning cycle.

# Rationale

The NSW Department of Education publishes a range of curriculum support materials, including samples of lesson sequences, scope and sequences, assessment tasks, examinations, student and teacher resource booklets, and curriculum planning and curriculum evaluation templates. The samples are not exhaustive and do not represent the only way to complete or engage in each of these processes. Curriculum design and implementation is a dynamic and contextually-specific process. While the mandatory components of syllabus implementation must be met by all schools, it is important that the approach taken by teachers is reflective of their needs and faculty or school processes.

NSW Education Standards Authority (NESA) defines [programming](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/programming) as ‘the process of selecting and sequencing learning experiences which enable students to engage with syllabus outcomes and develop subject specific skills and knowledge’ (NESA 2022a). A program is developed collaboratively within a faculty. It differs from a unit in important ways, as outlined by NESA on their [Advice on units](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/programming/advice-on-units) page. A unit is a contextually-specific plan for the intended teaching and learning for a particular class for a particular period. The organisation of the content in a unit is flexible and it may vary according to the school, the teacher, the class and the learning space. They should be working documents that reflect the thoughtful planning and reflection that takes place during the teaching and learning cycle. There are mandatory components of programming and unit development and this template provides one option for the delivery of these requirements. The NESA and department guidelines that have influenced this template are elaborated upon at the end of the document.

This resource has been developed to assist teachers in NSW Department of Education schools to create learning that is contextualised to their classroom. It can be used as a basis for the teacher’s own program, assessment, or scope and sequence, or be used as an example of how the new curriculum could be implemented. The resource has suggested timeframes that may need to be adjusted by the teacher to meet the needs of their students.

# Overview

**Description:** this program of learning focuses on the concepts and technologies involved in connecting people and systems, with an emphasis on understanding how these systems improve communication, productivity and access to information. Students will explore the fundamentals of computer networks, cybersecurity, the role of databases and smart home technologies in modern computing. They will also examine the social, ethical, and legal implications of these technologies, particularly in the context of social media and data privacy. The program includes both theoretical understanding and practical application, with students working on a project to design and implement a smart home model, alongside developing skills in data collection and database management.

During Weeks 1 to 4, students will gain foundational knowledge of systems, networking, and the impacts of social platforms, learning how to differentiate between functional and non-functional requirements, and exploring the principles of cybersecurity and network hardware. They will also study the architecture of smart home networks and Google’s database techniques for managing smart device data.

During Weeks 5 to 9, students will deepen their understanding of social networks, creating sociograms to represent relationships and engaging with the perspectives of Aboriginal and/or Torres Strait Islander kinship connections. They will also examine responsible practices for interacting with social networks.

During Weeks 10 to 15, students will apply their knowledge by designing, constructing, and testing a functional smart home model, integrating automated functionalities, and developing a deeper understanding of network management.

During Weeks 16 to 18, students will focus on data collection, privacy and ethics, learning how to create and manage a relational database, model entities and relationships, and use SQL to query and analyse data.

During Weeks 19 to 20, students will research career opportunities in computing technology, focusing on roles that connect people and systems, and reflect on the social and ethical responsibilities associated with these technologies.

**Duration:** this program of learning is designed to be completed over a period of approximately 20 weeks in 60-minute lesson sequences but can be adapted to suit the school context.

**Explicit teaching:** learning intentions and success criteria are provided for some lessons. These are most effective when contextualised to meet the needs of students in the class. The examples provided in this document are generalised to demonstrate how learning intentions and success criteria can be created.

# Outcomes

A student:

* uses computing technologies and data safely and responsibly **CTLS-SAF-01**
* recognises the processes used to design and produce computing solutions **CTLS-DPM-01**
* demonstrates skills to manage computing projects using collaborative work practices **CTLS-COL-01**
* explores the evolution and innovations in computing technology **CTLS-EVL-01**
* uses data in everyday contexts **CTLS-DAT-01**
* recognises that data can be represented in different forms **CTLS-DAT-02**

[Computing Technology 7–10 Syllabus](https://curriculum.nsw.edu.au/learning-areas/tas/computing-technology-7-10-2022/overview) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2022.

**Prior to planning for teaching and learning, please consider the following**:

**Engagement**

* How will I provide authentic, relevant learning opportunities for students to personally connect with lesson content?
* How will I support every student to grow in independence, confidence and self-regulation?
* How will I facilitate every student to have high expectations for themselves?
* How will I identify and provide the support each student needs to sustain their learning efforts?

**Representation**

* What are some different ways I can present content to enable every student to access and understand it?
* How will I identify and address language and/or cultural considerations that may limit access to content for students?
* How will I make lesson content and learning materials more accessible?
* How will I plan learning experiences that are relevant and challenging for the full range of students in the classroom?

**Expression**

* How will I provide multiple ways for students to respond and express what they know?
* What tools and resources can students use to demonstrate their understanding?
* How will I know every student has understood the concepts and language presented in each lesson?
* How will I monitor if every student has achieved the learning outcomes and learning growth?

# Lesson sequence and details

## Weeks 1–2

Table 1 – Weeks 1–2 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * describe the purpose of connecting people and systems | **Learning intention**  Students will understand the importance of systems connecting people and how these systems improve communication, productivity and access to information.  **Success criteria**  **I can:**   * describe why systems need to connect people and how they benefit communication and productivity * describe the purpose, benefits and impact of a specific system that connects people and systems (for example, school portal, online shopping).   **Teaching and learning activities**  Teacher introduces the learning sequence and gives an overview of the semester outlining the sequence of activities and assessment.  Teacher introduces the concept of modelling networks and social connections.  Teacher leads a [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) on why systems need to connect people.  **Activity 1:** students [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) different systems they interact with daily.  **Activity 2:** students explain how these systems improve communication, productivity and access to information.  **Activity 3:** students choose one system (for example, a school portal or an online shopping site) and research how it connects people and systems. They should identify its purpose, benefits and impact on users' daily lives. Students create an infographic highlighting the key points. | Students demonstrate an understanding of how various systems improve communication and productivity.  Students complete a research task with key points about the selected system’s purpose, benefits and impact, presented through either a group presentation or infographic.  Students develop the ability to explain how the system they researched connects people and systems, using relevant examples. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide structured research templates with guiding questions to help focus on identifying purpose, benefits and impact.  Encourage more in-depth analysis of how systems integrate multiple technologies and how they enhance user experience. Allow these students to explore more complex systems.  Provide graphic organisers for notetaking during research and encourage the use of visual aids.  Break tasks into manageable steps with clear instructions. Provide extra time for research and presentation. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * describe inputs, storage, processes and outputs in connecting people and systems | **Learning intention**  Students will understand the concepts of inputs, storage, processes and outputs in systems, and how these components work together to connect people and systems.  **Success criteria**  **I can:**   * identify and explain the role of inputs, storage, processes, and outputs in a system * contribute to creating a flow diagram that breaks down how data moves through a popular system.   **Teaching and learning activities**  Teacher introduces the concept input, output and process and outlines the definitions.  **Activity 4:** teacher leads a [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) to connect different input, storage and output methods, ensuring students think about cloud storage, servers and so on.  **Activity 5:** students create a flow diagram of a popular system showing input, storage, processing and output.  **Activity 6:** in small groups, students choose a system and map out the inputs, processes, storage and outputs. Students present their diagram | Students actively participate in building the interactive diagram of a system (for example, a messaging app), demonstrating understanding of inputs, storage, processes, and outputs.  Students complete a group presentation with a flow diagram of the chosen system, highlighting the role of each component (input, process, storage and output) and how they work together to connect users.  Students explain each part of the system's flow and answer questions about how data moves within the system during the group presentation. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide sentence starters and key terms to guide understanding of each system component.  Use colour-coded sections for each component (inputs, storage, processes and outputs) in the interactive diagram and allow students to draw or create digital diagrams.  Scaffold the task by providing partially completed flow diagrams or templates for students to fill in during the system mapping activity. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * **specify the functional requirements of a networked solution, including stating the purpose of a solution, describing use cases and developing test cases of input and expected outputs** * **specify the non-functional requirements of a networked solution** | **Learning intention**  Students will understand and differentiate between functional and non-functional requirements, as well as define use cases and test cases.  **Success criteria**  **I can:**   * define functional requirements and non-functional requirements and explain the difference between them * explain the purpose of use cases and test cases in software development * work collaboratively to identify functional and non-functional requirements in real-world scenarios.   **Teaching and learning activities**  **Teacher leads the reading of** [functional and non-functional requirements](https://www.altexsoft.com/blog/business/functional-and-non-functional-requirements-specification-and-types/#:~:text=Functional%20requirements%20define%20what%20a,also%20known%20as%20quality%20attributes.) and as a class, watch [non-functional requirements (9:28)](https://www.youtube.com/watch?v=fc-5HJPBZMQ&t=40s).  **Activity 7:** **students are to define functional requirements and non-functional requirements, use cases and test cases.**  **Activity 8:** **students work in small groups to identify the functional and non-functional requirements of the scenarios provided.** | Students can recall definitions of functional and non-functional requirements, as well as use cases and test cases, reflecting accurate understanding and differentiation between these concepts.  Students work in small groups assessing functional and non-functional requirements in the provided scenarios with clear and logical reasoning.  Students actively participate in small group discussions, with contributions demonstrating a grasp of both types of requirements and their relevance to the given scenarios. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide clear definitions, examples, and visual aids to support understanding of functional and non-functional requirements.  Challenge students to identify potential edge cases in the scenarios, where functional or non-functional requirements may conflict, and suggest ways to resolve these conflicts.  Use group discussions to explore examples of requirements.  Break tasks into smaller steps and provide templates or partially filled-in worksheets to scaffold their understanding of functional and non-functional requirements. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * evaluate the social impacts and ethical and legal responsibilities in connecting people and systems * define a real-world problem or need that can be solved by connecting people and systems, including breaking it down into manageable parts and describing the users of the solution | **Learning intention**  Students will understand how networking systems and social platforms can address real-world needs, as well as the social, ethical and legal impacts associated with these platforms.  **Success criteria**  **I can:**   * identify and describe examples of networking systems and social platforms that impact communication, productivity and information sharing * analyse the social impacts of a social platform, including both positive and negative effects on communication and collaboration * evaluate ethical issues related to user data, privacy, transparency and bias within a social platform * explain the legal responsibilities of social platforms, including relevant data protection regulations and privacy laws.   **Teaching and learning activities**  **Teacher leads discussion on the ways networking systems and social platforms help solve real-world problems in professional and social contexts.**  **Activity 9: students take note on discussion of platforms.**  **Activity 10: students complete a** [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645) **and** [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) **real-world problems that can occur related to networking and social connections.**  **Activity 11: students work in small groups to create a solution to a networking-related problem and document their response.**  **Teacher leads discussion on the positive and negative impacts of social platforms and networking systems.**  **Activity 12: students research the impacts of an assigned social networking or social platform.** | Students engage in the initial class discussion and small group brainstorming session to demonstrate understanding of real-world networking issues.  Students complete visual representations (chart or concept map) that detail the selected problem, objectives, user types and steps for connectivity.  Students participate in group research demonstrating how their solutions connect users and address the selected networking problem. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide a research template with guiding questions for students who may need additional support.  Allow students to choose between presenting their research in an infographic format, as a written report, or as a presentation, accommodating different learning styles.  Organise groups to ensure a mix of skills, allowing students to support one another through collaboration and shared expertise. |  |

## Weeks 3–4

Table 2 – Weeks 3–4 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * calculate node degree and paths between nodes and explain their meaning * investigate how hardware and software are used to manage, control and secure the movement of, and access to, data in networked digital systems * apply features of graph theory to model computer networks * calculate node degree and paths between nodes and explain their meaning | **Learning intention**  Students will gain foundational knowledge of computer networks and apply this understanding to analyse different types of networks.  **Success criteria**  **I can:**   * describe the fundamental concepts of computer networks and explain how devices connect within a network * identify the components and functionality of different network types in practical scenarios * analyse a case study and answer questions that demonstrate my understanding of network types, components and protocols.   **Teaching and learning activities**  **Activity 13:** students research and complete the questions relating to understanding the fundamental concepts of computer networks before moving into wired, wireless and mobile networks.  **Activity 14:** students select a real-world social network (for example, a school, a sports team, or a popular social media platform) and identify key people (nodes) and their connections (edges).  **Activity 15:** students draw a graph to represent the network visually and discuss how the structure of each network affects communication or relationships (for example, a centralised versus decentralised network).  **Activity 16:** students imagine they are setting up a small home network with a computer, smartphone and a printer. Describe the possible connections between these nodes and propose a suitable topology for this network.  As a class, read the case study on modernising the power of a smart gird.  **Activity 17:** students answer a set of comprehension questions. | Students complete research notes on fundamental network concepts and definitions.  Students answers to comprehension questions show understanding of wired, wireless and mobile networks.  Student responses to the case study questions apply knowledge of networking concepts, such as the function of nodes, protocols and types of connections. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide structured notes or graphic organisers for students who may need help organising information on network fundamentals.  For students who need extra support, offer small-group discussions to reinforce key concepts before independent work.  Use videos or diagrams to visually explain network types and components, benefiting students who learn best through visual representations.  Break down the activity into smaller steps, providing checkpoints for students who benefit from gradual progression and feedback. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  **CT5-DAT-02**  Students:   * specify what data is collected, who owns it, and how it will be protected, considering privacy and cybersecurity, including when interpreting data | **Learning intention**  Students will understand the fundamental principles of cybersecurity, including monitoring techniques, tools and practices used to protect networks from external threats.  **Success criteria**  **I can:**   * explain how experts monitor networks for security threats * identify and describe various tools used in cybersecurity * demonstrate knowledge of the techniques and concepts applied to keep networks secure * outline the roles of cybersecurity professionals in protecting network integrity.   **Teaching and learning activities**  **Activity 18:** students will complete the Grok Learning course on Modelling and securing networks. | Students gain a certificate of completion from the Grok Academy *Modelling and Securing Networks* course, demonstrating engagement with all modules and topics.  Students responses to quizzes or assessments in the Grok Academy course, showing understanding of core cybersecurity principles and tools. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  For students needing extra help, provide summary notes or flashcards of key concepts from the course, such as common tools and techniques in cybersecurity.  Conduct a small-group discussion or question and answer session to review complex topics, such as specific tools used for network security monitoring.  Pair students to work through challenging modules together, supporting collaborative learning and understanding of more technical aspects. |  |
| **Outcome**  **CT5-EVL-01**  **CT5-COL-01**  **CT5-SAF-01**  **Content**  Students:   * describe common network hardware for wired, wireless and mobile networks | **Learning intention**  Students will understand the purpose and function of common network hardware, including routers, switches, access points, network cables and mobile network towers, in establishing and maintaining a connected network.  **Success criteria**  I can:   * identify key network hardware components and explain their roles in network connectivity * distinguish between wired and wireless network elements and explain how each is used in a network * create a network map that accurately represents a home or school network, showing both wired and wireless connections and labelling each component.   **Teaching and learning activities**  As a class, watch [The Internet: Wires, Cables & Wifi](https://youtu.be/ZhEf7e4kopM) (6:41).  **Activity 19:** students research and complete the table on different network hardware, including the purpose and providing an image.  **Activity 20:** s**tudents will work in groups to** create a network map that shows how devices are connected within a home or school. Students include both wired and wireless elements for a realistic setup, answering the questions after they have completed the network. | Students create and submit a labelled network map showing an accurate setup of a home or school network, including wired and wireless components.  Students write a brief description of the purpose of each network component in their map, demonstrating their understanding of how these elements contribute to network connectivity.  Students complete reflection questions on the differences between wired and wireless connections and why specific devices might benefit from a wired connection, showing their understanding of network stability and device preferences. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide labelled images or physical examples of network hardware (or pictures if physical examples are unavailable) to help visual learners recognise components and understand their roles in a network.  For students needing extra support, offer a scaffolded worksheet with key network terms and simplified definitions.  Arrange students into mixed-ability groups, allowing stronger students to assist peers in identifying components and understanding their functions, fostering collaborative learning. |  |
| **Outcome**  **CT5-EVL-01**  **CT5-COL-01**  **CT5-SAF-01**  **Content**  Students:   * describe common network security vulnerabilities and the mitigation strategies | **Learning intention**  Students will understand common network vulnerabilities and their potential impacts. They will learn how to implement basic network security strategies, including the use of strong passwords, encryption and malware protection.  **Success criteria**  I can:   * **define common network vulnerabilities (for example, weak passwords, unencrypted data, malware, unsecured Wi-Fi) and explain how they can compromise security** * **explain basic network security strategies (for example, using strong passwords, enabling encryption, using firewalls and antivirus programs) to mitigate these vulnerabilities** * **research real-world examples of incidents where vulnerabilities were exploited.**   **Teaching and learning activities**  **Activity 21:** students research and complete the table about common network vulnerabilities like weak passwords, unencrypted data, malware and unsecured Wi-Fi networks, providing appropriate mitigation strategies.  **Activity 22:** students will be divided into groups, each focusing on a specific vulnerability. They will research examples of incidents where these vulnerabilities were exploited (for example, data breaches, malware attacks) and present their findings to the class.  **Activity 22:** students will apply what they've learned by designing a network security plan for a hypothetical small business or school with information provided on 5 scenarios. They are provided with potential threats and outline mitigation strategies to secure the network guided by the objective and based on their research. | Students' understanding of their assigned vulnerability and its real-world impact is seen in their group presentation.  Students submit a detailed ‘network security plan’ that outlines potential threats for a hypothetical business or school network and includes mitigation strategies for each identified risk. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  For students who need extra support, provide templates or guiding questions to help focus their research on real-world incidents.  Provide diagrams or flowcharts that illustrate the different vulnerabilities and mitigation strategies, helping visual learners better understand the concepts.  Group students based on their strengths and weaknesses. Pair stronger students with those who may need additional support, allowing them to collaborate and support each other in the research and presentation process. |  |
| **CT5-EVL-01**  **CT5-COL-01**  **CT5-SAF-01**  Students:   * plan and manage a project that connects people and systems using an iterative approach, including access control, privacy and cybersecurity * create a network of connected devices to model the Internet of Things (IoT) | **Learning intention**  To understand the architecture of smart home networks and the role of network management in connecting devices effectively.  **Success criteria**  **I can:**   * explain the role of a network architect in designing systems that connect smart home devices and ensure seamless communication * identify and describe various smart home devices, their functions, and how they communicate within a smart home network * apply iterative project management concepts, such as Agile, sprints, and feedback loops, to the design and management of smart home networks * create a clear and informative network diagram that illustrates the connections and communication protocols between selected smart home devices and a smart hub.   **Teaching and learning activities**  Students will engage in a comprehensive exploration of smart home network architecture. The lesson begins with a class reading about the role of a network architect in [What does a network architect do?](https://www.careerexplorer.com/careers/network-architect/). This will lead into a discussion on how they design systems that connect people and devices.  As a class, watch [What is a Smart Home or Smart Building?](https://youtu.be/IC0mkHh7MaA?si=Tbo70zmXFoKbKOwG) (1:30) to gain a foundational understanding of various smart home devices, such as smart lights, thermostats, security cameras, smart door locks, smart doorbells and smart appliances.  **Activity 23:** students will define each device, its functionality, and communication methods within a smart home network.  Next, students will learn about iterative project management in network design, focusing on Agile methodologies, sprints and feedback loops. They will discuss important concepts such as authentication, authorisation, firewalls, encryption, and common threats to smart home networks, fostering an understanding of security measures.  **Activity 24:** students explain Agile, sprint and feedback loop in relation to network project management:  **Activity 25:** students complete a[Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645) activity.   * **Think** about how you would define the following in your own words: authentication and authorisation. * **Pair** with the person next to you. How do your definitions differ? * **Share** and report your definitions to the class.   Students discuss the importance of access control in smart home networks.  **Activity 26:** students research and answer the following questions:   * Define firewalls and explain their importance in protecting networks. * Define encryption and explain its role in securing data transmission. * Describe common threats to smart home networks and suggest how they can be mitigated.   **Activity 27:** smart home network diagram.  As a practical application, students will create a smart home network diagram using an online tool or by hand. They will select at least 5 different smart home devices and a smart hub, illustrating their connections, communication protocols and additional relevant features.  This hands-on activity will reinforce their understanding of how smart home devices interact within a network and apply the concepts learned throughout the lesson. | Students actively engage in discussions about the role of a network architect and the design of smart home systems, demonstrating understanding of key concepts.  Students complete definitions for various smart home devices, including their functions and communication methods, showcasing comprehension of how these devices operate within a network.  Students explain iterative project management concepts such as agile, sprints, and feedback loops, indicating knowledge of how these methodologies apply to network design.  Students present well-researched answers to questions about firewalls, encryption and common threats to smart home networks, reflecting understanding of security measures.  Students provide a clear and informative network diagram that effectively illustrates the connections between selected smart home devices, the smart hub, and communication protocols used, demonstrating the practical application of learning.  Students participate in the [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645) activity, discussing the importance of authentication and authorisation in smart home networks, indicating comprehension of access control issues. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide tiered tasks that allow students to choose the complexity of their smart home network diagram, with options ranging from basic connections for beginners to more intricate designs that include multiple communication protocols for advanced learners.  Use digital tools with built-in templates and guided prompts for students who may struggle with visual organisation, allowing them to create their network diagrams with support while still engaging with the content.  Implement collaborative learning groups enables students to work together to discuss and define smart home devices, facilitating peer support and deeper understanding for those who may need additional assistance. |  |
| **CT5-EVL-01**  **CT5-COL-01**  **CT5-SAF-01**  Students:   * **filter, sort and limit database queries using SELECT, WHERE, ORDER BY and LIMIT clauses** | **Learning intention**  To understand how to use database query techniques to manage and analyse data.  **Success criteria**  I can:   * describe how devices collect and store data in cloud databases * identify the purpose of SQL clauses such as SELECT, WHERE, ORDER BY and LIMIT * explain how SQL queries are used to generate insights from data * apply SQL queries to solve practical scenarios related to data analysis.   **Teaching and learning activities**  This Google Nest case study introduces students to the role of database query techniques in managing and analysing data collected by devices.  Students explore how SQL is used to filter, sort and retrieve data to generate actionable insights and improve user experiences.  Through a mix of theoretical questions, practical applications and hands-on SQL query exercises, students will deepen their understanding of database management and its real-world applications.  **Activity 28:** students completequestions.  **Activity 29:** students completefill in the blanks.  **Activity 30:** students completetrue or false.  **Activity 31:** students completethepractical application scenario where they imagine they are a data analyst.  Students write an SQL query to find the average energy usage during a specific month.  This activity promotes analytical thinking and demonstrates the relevance of database skills in modern technology solutions. | Student understanding is reflected in accurate responses to the comprehension questions, where they explain data collection, storage, and SQL-based analysis processes. Successful completion of fill-in-the-blank and true or false activities indicates their grasp of specific SQL clauses and their functions.  Students showcase practical application skills by designing and explaining SQL queries for real-world scenarios, linking theoretical knowledge to practical use.  Students’ meaningful contributions to discussions or reflections further highlight their ability to analyse the role of database queries in smart home technologies. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide scaffolded SQL query examples. Offer simplified SQL examples and step-by-step guides for students who need additional support, while encouraging advanced learners to create more complex queries using multiple clauses.  Incorporate flowcharts or diagrams to visually explain how data flows through Google Nest systems and provide access to database simulation tools for learners to experiment with writing and running SQL queries.  Modify comprehension and practical tasks by offering tiered questions, simpler for those who need extra guidance and more challenging, multi-step scenarios for advanced learners to deepen their analytical skills. |  |

## Weeks 5–9

Table 3 – Weeks 5–9 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * represent real-world social networks visually as a graph * calculate node degree and paths between nodes and explain their meaning * represent real-world social networks visually as a graph * evaluate the development of a sociogram model | **Learning intention**  Students will understand the structure and dynamics of social networks, create a sociogram to represent their own relationships and identify responsible practices for engaging with social networks.  **Success criteria**  **I can:**   * define what a social network is and identify its key components * create a sociogram that accurately reflects my social relationships * list 3 tips for using social networks responsibly and explain why each is important.   **Teaching and learning activities**  Teacher leads a [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) on what a social network is, exploring key components such as entities (individuals or groups), relationships (connections between entities), and events (occurrences within the network).  **Activity 32:** students describe a social network, entities, relationships and events.  Teacher introduces students to the concept of a sociogram as a visual representation of relationships within a social network.  **Activity 33:** students use EdrawMax, an online tool or paper in creating a sociogram that represents their own social network  **Activity 34:** students examine the sociogram created in the previous activity and calculate the node degree and paths between nodes and explain their meaning.  **Activity 35:** studentsmodel a school computer network. They represent the network as a graph and analyse the graph to examine the degree of nodes and shortest path for data transfer.  **Activity 36:** students [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) and list 3 tips for using social networks responsibly.  The teacher can facilitate a discussion on the importance of each tip and its implications for personal safety and community respect. | Students participate in class discussions, demonstrating understanding of social networks.  Students complete sociograms that show the relationships within their own social network.  Students can write or verbally explain the 3 tips for responsible use of social networks and the reasoning behind each. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide guided questions to help them identify their social relationships and the entities involved. Offer templates for the sociogram to simplify the process.  Encourage them to explore more complex social networks, such as those found in professional or online communities. They could also analyse the impact of social networks on society.  Allow the use of visual aids, such as images or videos, to support understanding of social networks.  Provide options for demonstrating understanding (for example, oral presentation, visual report) to cater to different learning styles. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * explore network and social connections considering the perspectives of diverse groups, including Aboriginal and Torres Strait Islander Peoples, culturally and linguistically diverse people, people of different ages and gender, and people with disability | **Learning intention**  To explore and understand the diverse perspectives of Aboriginal and/or Torres Strait Islander kinship connections and their significance in shaping relationships and responsibilities within First Nations communities.  **Success criteria**  **I can:**   * identify and explain the key themes of kinship and relationships in Aboriginal and/or Torres Strait Islander stories * analyse how characters in Aboriginal and/or Torres Strait Islander narratives demonstrate their interconnectedness and responsibilities to one another * create an original story or visual representation that reflects the importance of kinship and community in Aboriginal culture.   **Teaching and learning activities**  Students will explore Aboriginal and/or Torres Strait Islander kinship connections and their significance in First Nations communities through a variety of engaging activities. The lesson begins with a discussion on the concept of kinship, highlighting its role in defining relationships, responsibilities and resource sharing within Aboriginal and/or Torres Strait Islander cultures.  **Activity 37:** understanding kinship through storytelling.  Students watch [Tiddalik the Frog (6:07)](https://www.youtube.com/watch?v=bs-qUWomHtM&t=367s) and read how the [Awabakal](https://awabakallanguage.org.au/tiddalik-the-greedy-frog) people connect to the story.  They answer comprehension questions to deepen their understanding of the characters and themes related to kinship.  **Activity 38:** students will complete a cloze passage to reinforce key vocabulary related to kinship and community.  **Activity 39:** research task – kinship storytelling  Students choose one of 3 research tasks: conducting a story analysis of their chosen Aboriginal and/or Torres Strait Islander narrative, creating their own original kinship story that reflects the themes of interconnectedness and support, or developing a visual representation that illustrates key scenes and relationships from an Aboriginal and/or Torres Strait Islander story.  Students will engage in discussions, collaborate with peers, and reflect on the cultural significance of kinship in Aboriginal and/or Torres Strait Islander communities.  Students will have gained a deeper appreciation for the complexities of Aboriginal and/or Torres Strait Islander kinship systems and the importance of storytelling in preserving cultural values. | Students' responses to questions about the characters, conflicts, and themes in the selected Aboriginal and/or Torres Strait Islander stories will indicate their ability to analyse and interpret kinship relationships.  Students' filled-in cloze passages reflect their grasp of key vocabulary related to kinship, community and relationships.  Student research tasks, whether through a story analysis, original kinship story, or visual representation, will showcase the students’ ability to apply their understanding of kinship themes, demonstrate creativity, and articulate the cultural significance of Aboriginal and/or Torres Strait Islander narratives.  Student participation in class discussions and the insights shared during reflections will provide additional evidence of students’ engagement with the material and their ability to articulate their learning. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide structured support for students who may struggle with complex concepts. For example, during the reading of Aboriginal and/or Torres Strait Islander stories, offer guided reading sessions where you pause to discuss key themes, characters and vocabulary. Use graphic organisers to help students outline the relationships and responsibilities depicted in the stories, making it easier for them to engage with the content.  The story can be changed to a story from the local Aboriginal and/or Torres Strait Islander lands you are teaching on.  For students who prefer speaking, use small group discussions [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645) activities to allow students to express their ideas in a less intimidating setting before sharing with the whole class.  For students who prefer writing, allow them to jot down their thoughts or responses to discussion prompts before sharing verbally, giving them time to organise their ideas. |  |

## Weeks 10–15

Table 4 – Weeks 10–15 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-EVL-01**  **CT5-COL-01**  **CT5-SAF-01**  **CT5-DAT-01**  **CT5-DAT-02**  Students:   * plan and manage a project that connects people and systems using an iterative approach, including access control, privacy and cybersecurity * generate alternative designs and evaluate them against the requirements to select a preferred design * create a computer network between multiple devices and describe how nodes are connected * create a network of connected devices to model the Internet of Things (IoT) * implement a solution that connects people and systems using the preferred design * create interactive solutions for sharing information online using a visualisation library * represent, store and transmit data to facilitate computation, including selecting appropriate data types, understanding the limitations of data types and structuring data systematically * model entities, events and relationships within a network * create a record of project development demonstrating iterative design and evaluation * select and use specialist terminology in context | **Learning intention**  Students will design, construct, and test a smart home model showcasing automated functionalities.  **Success criteria**  I can:   * identify and explain automated features in smart home technologies * design a network diagram and labelled sketch for my smart home model * create and test code for microcontrollers to operate sensors and actuators * demonstrate my smart home model and reflect on the process.   **Teaching and learning activities**  Students work in class on Assessment task 1. The assessment task has a scaffold which is replicated in the teacher support resource.  If you are using the example Smart Home kit shown in the Teacher Support Resource, lessons on using micro:bit and Microsoft MakeCode can run adjacent to the goals outlined below in Weeks 10 to 14.  **Week 10**  Research existing smart home technologies and [brainstorm](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542?clearCache=3d32c820-442f-7d68-d3ca-b2add7a710e8) ideas for automated functions and their purposes.  **Week 11**  Draft project requirements, define automated functions and sketch the physical and network designs.  **Week 12**  Research and list necessary components, then prototype the network using simulation software.  **Week 13–14**  Build the physical model, write and test code for the microcontroller and connect components.  **Week 15**  Test and refine the model, prepare a demonstration and write reflections on the process and challenges. | Students complete sketches, network diagrams and equipment lists.  Students develop functional prototypes in simulation software.  Students create working physical smart home models tested and demonstrated.  Students create reflective documentation addressing challenges and solutions. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide scaffolded templates for network diagrams and project documentation to assist students with limited prior knowledge.  Offer extension activities, such as incorporating additional sensors or advanced coding challenges, for students who complete tasks early.  Pair students for peer support, ensuring those with more experience mentor others during coding and construction tasks. |  |

## Weeks 16–18

Table 5 – Weeks 16–18 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-SAF-01**  **CT5-DAT-01**  **CT5-DPM-01**  **CT5-DAT-02**  Students:   * model entities, events and relationships within a network * model the relationships between entities and events using relational data * access datasets and collect data from users or the environment considering privacy and personally identifying information (PII) * validate data is correct and investigate the impact of invalid data * analyse data to make decisions and generate reports using a database * filter, sort and limit database queries using SELECT, WHERE, ORDER BY and LIMIT clauses * load, insert and update data in a database * visualise data to identify trends, patterns, relationships and outliers using a range of tools | **Learning intention**  Students will understand the methods of data collection, the importance of privacy and ethics in data gathering, and how to create and manage a database using collected data.  **Success criteria**  **I can:**   * discuss various methods of data collection, and the ethical considerations involved * validate collected data to ensure accuracy and check for duplicates * understand the basics of databases and relational databases through instructional videos * create a flat file database using my collected data and perform tasks such as creating forms, queries and reports.   **Teaching and learning activities**  Teacher leads a discussion on methods of data collection, focusing on the importance of privacy and personally identifiable information (PII). Students should explore ethical considerations when collecting data.  **Activity 40:** describe methods of data collection and the importance of privacy and PII and ethical considerations.  **Activity 41:** students design a survey to gather information from their peers, such as favourite subjects or extracurricular activities, ensuring privacy is maintained. Using tools like Google Forms, they will collect and validate the data, checking for accuracy and duplicates.  As a class watch [Database Tutorial for Beginners (5:31)](https://www.youtube.com/watch?v=wR0jg0eQsZA) and [Relational Databases (3:48)](https://www.youtube.com/watch?v=oN3jBRGnPO4).  These instructional videos on databases and relational databases will prepare for the next steps.  **Activity 42:** students design a flat file database.  Teacher to lead students in learning how to create a flat file database using their collected data, either in Microsoft Excel or a relational database software like Microsoft Access or MySQL. If software other than Excel is used, students will create forms, queries and reports based on their data. | Student participation in class discussions reflects understanding of data collection methods and ethics.  Students create a survey design and collect data demonstrating adherence to privacy considerations.  Students validate a dataset showing accurate data with no duplicates.  Students create a flat file database with appropriate forms, queries and reports. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide guided templates for survey design and data validation. Offer step-by-step instructions for database creation and validation techniques.  Encourage them to explore more complex survey questions and data analysis techniques. They could also implement additional database features, such as relationships between tables or advanced queries.  Use visual aids and collaborative group work throughout the project. Allow students to present their findings in various formats (for example, presentations, posters) to accommodate different learning styles and preferences. |  |
| **CT5-SAF-01**  **CT5-DAT-01**  Students:   * **model entities, events and relationships within a network** * **model the relationships between entities and events using relational data** * **access datasets and collect data from users or the environment considering privacy and personally identifying information (PII)** * **validate data** is correct and investigate the impact of invalid data * **analyse data to make decisions and generate reports using a database** * **filter, sort and limit database queries using SELECT, WHERE, ORDER BY and LIMIT clauses** * **load, insert and update data in a database** * **visualise data to identify trends, patterns, relationships and outliers using a range of tools** | **Learning intention**  Students will understand how to create a relational database, model entities and relationships, and use SQL to query and analyse data.  **Success criteria**  **I can:**   * identify and define key entities and their relationships within a chosen topic * create a relational database and populate it with relevant data * write and execute SQL queries to extract and analyse information from the database * validate data for accuracy and generate meaningful reports based on my analysis.   **Teaching and learning activities**  **Activity 43:** creating a relational database.  Students will create a relational database on a chosen topic (for example, movies and actors, sports teams). They will identify entities, model relationships.  Using database software, students will define tables, enter sample data, and perform SQL queries (SELECT, JOIN, COUNT) to analyse the data. They will validate data accuracy, generate reports and appropriate forms and queries. | Students create a relational database with defined entities and relationships.  Students successfully create an execution of SQL queries with accurate results.  Students generate database reports summarising data analysis and insights.  Students present to the class their solution, demonstrating understanding of the database and findings. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide templates for the database structure and guided examples of SQL queries. Offer additional one-on-one support during data entry and querying.  Encourage exploration of complex queries (for example, nested queries, aggregations) and additional entities to enhance their database. They can also be tasked with creating a user interface for data entry or visualisation.  Allow for collaborative group work and the use of visual aids. Provide options for presenting findings, such as posters or digital presentations, to cater to different learning styles. |  |

## Weeks 19–20

Table 6 – Weeks 19–20 lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **CT5-EVL-01**  Students:   * **explore careers in connecting people and systems** | **Learning intention**  Students will research various careers related to connecting people and systems, collecting relevant information to understand job requirements, responsibilities, and prospects in the field of computing technology.  **Success criteria**  **I can:**   * identify and describe various careers related to connecting people and systems * gather and record information from employment websites about job titles, descriptions, training requirements, personal attributes, duties and average income * present my findings clearly and accurately in the provided tables * virtually explore a datacentre and the career opportunities.   **Teaching and learning activities**  **Activity 44:** students are to research and fill in the tables for various careers.  **As a class, watch** [Cloudcraft (0:30)](https://www.youtube.com/watch?v=CWVDWJdMHwQ)**.**  **Activity 45: students complete a series of missions in** [Cloudcraft](https://education.minecraft.net/en-us/lessons/cloudcraft) **from Minecraft Education.**  The missions are themed around the following areas:   * technician * architect * engineering * security * recycling.   Upon starting a mission students will be debriefed through an animation explaining the problem each team needs help solving. After the scene is over, the player is teleported to the employee that needs help fixing the problem. That employee will tell the player about the task they need help with. | Students accurately complete the tables, ensuring they have gathered sufficient information about each career and demonstrate understanding of the various roles.  Students contribute during discussions about careers, with the ability to articulate what they’ve learned about connecting people and systems.  Students interact in Cloudcraft missions to examine the different roles required for datacentres. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide a template with guiding questions or prompts for each table entry to help focus their research.  Incorporate videos or visual resources that explain the roles in a more engaging manner. |  |
| **CT5-EVL-01**  Students:   * evaluate the social impacts and ethical and legal responsibilities in connecting people and systems | **Learning intention**  **Students will understand the social impacts and ethical and legal responsibilities associated with connecting people and systems, particularly in the context of social media.**  **Success criteria**  **I can:**   * **explain the social impact of social media on society** * **identify ethical and legal responsibilities when using social media** * **analyse the implications of recent social media policies, such as the Australian social media ban.**   **Teaching and learning activities**  **Teacher leads a discussion on social media guiding students to think about positive and negative effects social media has on lives** **and introduce the c**ase study on social media.  **Teacher introduces the *Online Safety Amendment (Social Media Minimum Age) Bill 2024*.**  **Students complete research on the Australian social media ban. Once they have substantial research, break students into groups to discuss findings and further their understanding.**  **Activity 46:** **students write 4** [PEEL paragraphs](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/625) **addressing the provided questions:**   * Outline social connectivity and how social media connects people but can also lead to isolation. * What are the social impacts of the social media ban? * What ethical responsibilities do users have while using social media? * What legal implications arise from actions taken on social media? | Students demonstrate an understanding of the social impacts of social media.  Students demonstrate an ability to identify ethical and legal responsibilities of social media use.  Students demonstrate analysis of current events related to social media policies.  Students demonstrate writing skills in summarising and communicating ideas effectively. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.  Provide varied reading materials at different levels of complexity regarding social media and its impacts.  Allow students to choose between writing an essay or creating a video presentation to express their understanding.  Offer options for the final submission, such as a poster, infographic or digital storytelling project.  Pair students for collaborative research and discussion to support those who may struggle with independent work. |  |

# Overall program evaluation

Collating ongoing evaluations and reflecting on the strengths and areas for development within the program creates opportunities to enhance student outcomes. The following prompts can be used to support your evaluation of the program:

* Did the program assist all students to improve in their learning?
* How could the sequencing of the program be improved?
* What did the student evaluations of the program indicate? How can these be actioned to improve the program?
* The strategies and resources that were most effective for student learning were …
* Teaching strategies and resources that would benefit from review and refinement are …

## Capturing student voice when evaluating a program

Student voice is useful in the evaluation process for programs. The statements below could be useful as a starting point when asking students to provide feedback on their learning experiences. These statements are derived from some of the themes from [What works best 2020 update](https://education.nsw.gov.au/about-us/education-data-and-research/cese/publications/research-reports/what-works-best-2020-update) (CESE 2020a) and could be useful in teacher reflection on how these themes could be incorporated into a teaching program. The statements could also prompt student reflection on their metacognitive processes while learning.

**Please rate how much you agree with these statements:**

* My teacher had confidence that I could achieve and improve in my learning. (CESE 2020a Chapter 1: High expectations)
* I had a clear idea of what I was learning and why. (CESE 2020a Chapter 2: Explicit teaching)
* I used the feedback provided to improve my performance. (CESE 2020a Chapter 3: Effective feedback)
* I understood the feedback on the assessment task. (CESE 2020a Chapter 3: Effective feedback)
* I was able to predict the marks I achieved in the assessment tasks. (CESE 2020a Chapter 5: Assessment)
* The activities in the unit prepared me for the assessment task. (CESE 2020a Chapter 5: Assessment)
* I found the activities in the lessons interesting to me. (CESE 2020a Chapter 7: Wellbeing)
* I made valuable contributions to the class during this unit. (CESE 2020a Chapter 7: Wellbeing)
* I ask questions in class when I don’t understand yet. (CESE 2020a Chapter 7: Wellbeing)

**Optional open-ended prompts:**

* The lessons and/or activities that I most enjoyed were when we … because …
* When the learning was difficult, the strategy I used was …
* If I was giving advice to a student who was starting this unit I would tell them to …
* If I was giving advice to a teacher who was teaching this unit I would tell them to …

# Support and alignment

**Resource evaluation and support**: 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, or to provide feedback, contact the Technological and applied studies (TAS) curriculum team by emailing [TAS@det.nsw.edu.au](mailto:TAS@det.nsw.edu.au).

**Differentiation:** further advice to support Aboriginal and Torres Strait Islander students, EALD students, students with a disability and/or additional needs and High Potential and gifted students can be found on the [Planning, programming and assessing 7–12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage. This includes the [Inclusion and differentiation advice 7–10](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12/inclusion-and-differentiation-advice-7-10) webpage.

**Assessment**: further advice to support formative assessment is available on the [Planning, programming and assessing 7–12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage. This includes the [Classroom assessment advice 7–10](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12/classroom-assessment-advice-7-10-). For summative assessment tasks, the [Assessment task advice 7–10](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12/assessment-task-advice-7-10) webpage is available.

**Consulted with**: Curriculum and Reform and subject matter experts

**Alignment to system priorities and/or needs**: [School excellence](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468).

**Alignment to the School Excellence Framework**: this resource supports the [School excellence](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468) elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

**Alignment to Australian Professional Teaching Standards**: this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 3.2.2, 3.3.2.

**Creation date:** 2025

# Evidence base

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