Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE TEACHING AND LEARNING OUTLINE

TECHNOLOGIES

DIGITAL TECHNOLOGIES

YEAR 7

2020/6258v4

This document is an introduction to planning a teaching and learning outline with syllabus content for Year 7 Digital Technologies. It provides suggested sequencing and timing for teaching the syllabus content. For further details on curriculum requirements and available options, teachers should refer to the School Curriculum and Standards Authority's (the Authority's):

- *Policy Standards for Pre-primary to Year 10: Teaching, Assessing and Reporting*
- Table 1: *Western Australian Curriculum and Assessment Outline*: curriculum requirements and available options.

Schools may choose to teach the syllabus content for two hours per week for a semester, **or** one hour per week for the year. Sample plans provide a range of possible learning experiences from which assessment should be drawn. This *Year 7 Sample Teaching and Learning Outline* provides teachers with possible learning experiences over 18 weeks (two hours per week) and unpacks the syllabus content to assist teachers in their understanding. Teachers may choose from the **Suggested teaching and learning experiences** that suit the context of the school.

A presentation (*Western Australian Curriculum Technologies Presentation*), which unpacks the process to develop this plan, is available on the Presentations page of the Authority website (https://k10outline.scsa.wa.edu.au/home/resources/presentations).

Year 7 Syllabus Content – Digital Technologies

Content	Description
Digital systems	Different types of networks, including wired, wireless and mobile networks Hardware components of a network
Representation of data	Digital systems represent text, image and audio data
Collecting, managing and analysing data	Explore how to acquire data from a range of digital sources Create information using relevant software, and create data to model objects and/or events
Digital implementation	Design the user experience of a digital system Create digital solutions that include a user interface where choices can be made Create and communicate information collaboratively online, taking into account social contexts
Investigating and defining	Define and break down a given task, identifying the purpose Consider components/resources to develop solutions, identifying constraints
Designing	Design, develop, review and communicate design ideas, plans and processes within a given context, using a range of techniques, appropriate technical terms and technology Follow a plan designed to solve a problem, using a sequence of steps
Producing and implementing	Safely make solutions using a range of components, equipment and techniques
Evaluating	Independently apply given contextual criteria to evaluate design processes and solutions
Collaborating and managing	Work independently, and collaboratively when required, to plan, develop and communicate ideas and information, using management processes

Year Level Description

In Year 7, learning in digital technologies focuses on further developing understanding and skills in computational thinking, such as decomposing problems and engaging students with a wider range of information systems as they broaden their experiences and involvement in national, regional and global activities.

Students have opportunities to create a range of solutions, such as interactive web applications or simulations.

Students explore the properties of networked systems. They acquire data from a range of digital systems. Students use data to model objects and events. They further develop their understanding of the vital role that data plays in their lives.

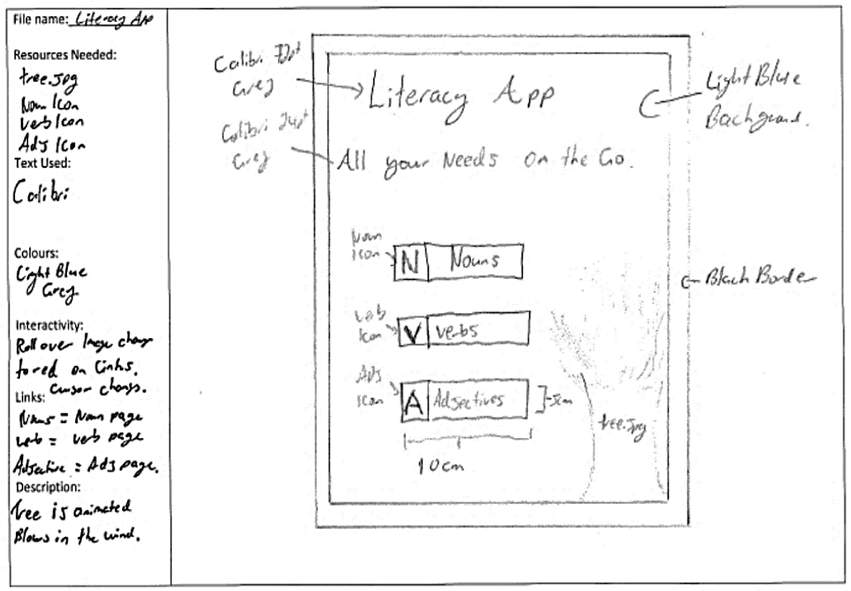
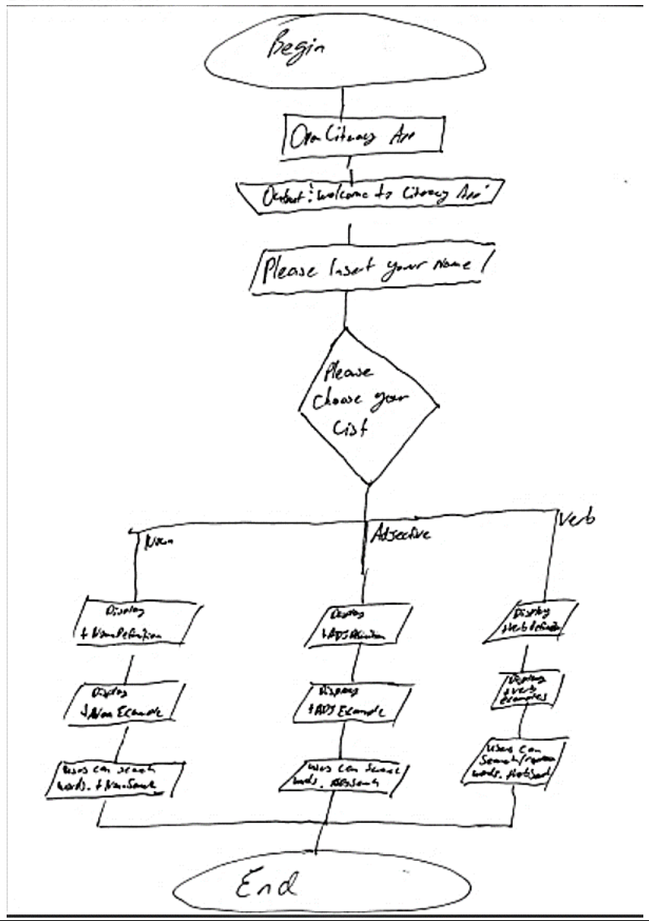
Students are provided with further opportunities to develop abstractions, identifying common elements, while decomposing apparently different problems and systems to define requirements; and recognise that abstractions hide irrelevant details for particular purposes. When defining problems, students identify the key elements of the problems and the factors and constraints at play. They design increasingly complex algorithms that allow data to be manipulated automatically.

Students predict and evaluate their developed and existing solutions, considering time, tasks, data and the safe and sustainable use of information systems.

Students plan and manage individual and team projects with some autonomy. They consider ways of managing the exchange of ideas, tasks and files and feedback. When communicating and collaborating online, students develop an understanding of different social contexts; for example, acknowledging cultural practices and meeting legal obligations.

Year 7 Learning Area: Technologies – Digital Technologies			
Year 7 Achievement Standard At Standard, students identify types of networks, including wired, wireless and mobile networks and the hardware components of a network. They identify ways digital systems represent text, image and audio data. Students use a range of digital sources to explore how to acquire data. They create information using relevant software, and creates data to model objects and/or events. Students create digital solutions considering the user experience of a digital system that allows for choices to be made within a user interface. They work collaboratively online to create and communicate information, with consideration for social contexts. In digital technologies, students develop solutions and identify the purpose for a given digital task by considering constraints and components/resources. Students use a range of techniques, appropriate digital technical terms and technologies to design, develop, review and communicate design ideas, plans and processes. They follow sequenced steps to a problem-solving plan. Students apply safe procedures to make solutions, using a range of components, equipment and techniques. They apply given contextual criteria to independently evaluate design processes and solutions. Students work independently, and collaboratively, to plan, develop and communicate ideas and information, when using management processes.			
Weeks	**Syllabus content**	**Content unpacked**	**Suggested teaching and learning experiences**
1–3	**Digital systems** Different types of networks, including wired, wireless and mobile networks Hardware components of a network	• Networks refer to the interconnections of hardware device that send and receive data in both Local Area Networks (LANs) and Wide Area Networks (WANs). • LANs are defined as networks that stretch over small geographical locations, such as a school or hospital network. • WANs are defined as networks that connect over large geographical locations, such as bank branches or the internet. • Mobile networks, such as 4G, 5G are cellular networks that are used to stretch large distances allowing freedom of movement or mobility of a device. • Wi-fi (Wireless Fidelity) is a radio frequency that is short range, with lowered physical security, low speeds with flexibility and mobility. Both connections are intangible, cannot be touched. • Wired networks are tangible and require cables, such as copper Ethernet cables and fibre optic cables. Mobility is lowered, cost of installation is increased, security and speeds are higher. Categories of copper Ethernet cables denote the speed and bandwidth in which they can transfer data. Max data speed of Cat 5 is 1GB and Cat 6 10GBs. • Transmission speed refers to how quickly the data travels from one place to another through the communication medium. • Bandwidth refers to frequency and the amount of data that can travel at the same time. • Network hardware – servers, switches, routers, modems, Integrated Service Routers (ISR), Network Interface Cards (NICs). ▪ A server is a computer with large storage space that sits centrally on a network to manage network operations and connected devices. ▪ Switches are used to extend ports allowing for multiple devices to connect to one device, such as a server. ▪ Routers are smart switches that direct traffic around a network choosing the most efficient path for packets to follow. ▪ Modems modulate and demodulate analog and digital signals to take advantage of cable mediums that use analog signals. ▪ Integrated Service Routers (ISRs) are convergent devices that are found in most home networks. ISRs combine both wired and wireless routing functions, modems, firewalls, basics of switches etc. ▪ Network Interface Cards (NICs) can be either wired or wireless or both. NICs are used to communicate and connect a device to a network. Without a NIC, a device is unable to connect to the network.	• Explain networks, LANs and WANs. • Explain the differences and similarities between wireless and wired connections. • Use sorting exercise and/or group work, debate, expert groups etc. to discuss the advantages and disadvantages of wireless and wired connections. • Mobile networks versus wi-fi – how do they work? Research distances, transmission speeds etc. • Hardware components: bring physical examples into class to label and show basic connection, take class on mini-incursion to school's server room and explain the interconnected parts. • Class discussion on how network hardware impacts on speed, reliability and security of data transmission. • Draw and annotate the differences between analog and digital symbols. Explain why we need to convert them to allow them to communicate. • Students use a pre-existing floorplan to design both a wired and wireless home network and draw, annotate and explain the network devices used for each floorplan. Compare the two network solutions and develop a Plus, Minus and Interesting (PMI) table of each network.

Weeks	Syllabus content	Content unpacked	Suggested teaching and learning experiences
4–5	**Representation of data** Digital systems represent text, image and audio data	• All data is represented as binary [zeros (0), ones (1)]. This is due to all computers using a Central Processing Unit and mathematical algorithms as the core function. • All types of data (text, image, audio etc.) are converted to binary for processing. • One binary digit is a bit of data. Eight bits equals one byte. • Images are broken down into small squares called pixels. Each representing a colour. Colour is a data point of binary digits. Pixels of colours are represented in red, green, blue, for example, RGB (130,184, 84). The mix creates the shade and/or colour. • Resolution refers to the quality of an image in dots per inch (DPI) – the higher the resolution, the higher quality image and the larger the file size. • In Digital Technologies, data refers to the discrete representation of information using number codes. Data may include characters (alphabetic letters, numbers and symbols), images, sounds and/or instructions that, when represented by number codes, can be manipulated, stored and communicated by digital systems. For example, characters may be represented using ASCII code or images may be represented by a bitmap of numbers representing each 'dot' or pixel.	• Explain binary in zeros (0) and ones (1). Activity suggestions may include: ▪ light switches on/off ▪ torch pulses on/off Morse code. • Use playing cards to show patterns of zeros (0) and ones (1). • Collectively create a progression table for bits, bytes, kilobyte (KB), megabyte (MB), gigabyte (GB), terabyte (TB), petabyte (PB). • Students pick a favourite colour and convert it to binary. Use a web search or maths. Use this data to map students' favourite and least favourite colour types. • Teacher provides an image in a high-resolution file format, such as TIFF. Students use software to compress the image into smaller file formats and tabulate the results, e.g. file size, resolution etc. • Draw a digital and an anolog sound wave. Use binary to explain the differences. • Teacher uses a collection of world maps that are in black and white. Students are required to convert binary code to the colours needed to complete the maps, so they are colour coded as per the binary representation of colour.
6–7	**Collecting, managing and analysing data** Explore how to acquire data from a range of digital sources Create information using relevant software, and create data to model objects and/or events **Evaluating** Independently apply given contextual criteria to evaluate design processes and solutions	• Students gather data from a variety of sources, including creating and conducting an online survey, journal articles, observations and trusted websites. • Students must be able to reference and evaluate digital sources for accuracy of information. • Data modelling includes graphs and charts. • Analyse data to understand what the data is showing and what future trends are emerging. • Use spreadsheet application skills, such as sorting, filtering, charting, formulas, formatting, as required. • Evaluating is measuring performance against established criteria. Estimating nature, quality, ability, extent or significance to make a judgement determining a value. Students can make changes to designs throughout based on design effectiveness.	• Students create a basic online survey of five questions based on a topic of interest to gather results. • Gather a variety of 'big data' data sets from sources, such as the Australian Bureau of Statistics (ABS), data.gov.au etc. • Using spreadsheet applications, students graph data, analyse and comment on emerging trends. • Alternative activity: School Curriculum and Standards Authority Movie sound effects – The folly of Foley (https://k10outline.scsa.wa.edu.au/home/assessment/assessment-activities/year7).
8–11	**Designing** Design, develop, review and communicate design ideas, plans and processes within a given context, using a range of techniques, appropriate technical terms and technology Follow a plan designed to solve a problem, using a sequence of steps **Investigating and defining** Define and break down a given task, identifying the purpose Consider components/resources to	• Designs in Digital Technologies include storyboards, structure charts, flowcharts, algorithms, pseudocode, network diagrams, wire-frames etc. • User experience of a digital system refers to the useability and accessibility of a website, game, app etc. • Useability refers to how easy the website or app is to navigate, find information, use of sitemaps and a logical sequence of buttons. • Accessibility is having built in features for ease of use for people with disabilities. These include having image to text tags, increasing text size buttons, not designing with red/green for colour blindness etc. • Sequence of steps refers to the order of a program. This must be logical to avoid any logic errors. • Branching is a term that refers to having more than one intended outcome. • The digital solution must have choices. These are called selection. The three types of selection are: ▪ one-way selection (if-then) ▪ two-way selection (if-then-else) ▪ multiway selection (CASE). • Students need to define a problem and break it down into small manageable chunks. The purpose of their creation must be the focus of every part of the creation.	• Students are to learn the difference between accessibility and inclusivity in design. • Compare and contrast two example to show accessibility and inclusivity. • Students are given a broad topic to consider, i.e. developing an app for learning literacy or numeracy for students with disabilities or from non-English speaking backgrounds. Brainstorm ideas in groups. • Students can develop criteria collaboratively to evaluate the inclusiveness and accessibility features of an app or website. Students storyboard the home screen of an app, with accessibility and inclusivity features included. • Students' apps are peer evaluated against accessibility and inclusivity criteria, students change designs to increase these features based on feedback. • Students create a flowchart of how their app works. Diagrammatically represent the sequence of options when particular buttons are selected. • Create a time plan (Gantt chart) to guide this process. • Students make a list of what they need to create the app, including hardware and software. • Students create a flowchart of their app. • Students ask for feedback from other class members. • Alternative activity: School Curriculum and Standards Authority Stop motion movie (https://k10outline.scsa.wa.edu.au/home/assessment/assessment-activities/year7).

Weeks	Syllabus content	Content unpacked	Suggested teaching and learning experiences
	develop solutions, identifying constraints **Collaborating and managing** Work independently, and collaboratively when required, to plan, develop and communicate ideas and information when using management processes	• Students need to reflect on personal progress as well as collaborative ideas between students. • A user interface is defined as the characteristics of the boundary between users and a computer system, or the manner in which users interact with computer hardware or software. In software, this usually comprises of fields for text and number entry, mouse pointers, buttons and other graphical elements. • Storyboards are a graphical representation of the user interface. This example shows design elements, such as colour, navigation and useability of the design. Annotations must be explicit and detailed. Storyboard Template 	Basic flowchart: 
12–16	**Digital implementation** Design the user experience of a digital system Create digital solutions that include a user interface where choices can be made **Producing and implementing** Safely make solutions using a range of components, equipment and techniques **Evaluating** Independently apply given contextual criteria to	• The digital solution must have choices. These are called selection. The three types of selection are: ▪ one-way selection (if-then) ▪ two-way selection (if-then-else) ▪ multiway selection (CASE). • Digital implementation could be in the form of a website, game, app or even a non-linear PowerPoint presentation where two options can be used, for example, a quiz. • Skills to teach prior to activities include: ▪ how to open the chosen app creation program and emulator, if required ▪ set-up logins and passwords for students ▪ familiarise with the types of blocks to code ▪ declaration of variables – data assigned to a value that changes based on parameters ▪ identifying constants – data assigned to a value that doesn't change ▪ set input and output types ▪ logic controls • control structures with a focus on two-way and multiway selection.	• Software could include MIT App Inventor™. Complete tutorials before starting to create your own: ▪ MIT App Inventor Beginner Tutorial (https://appinventor.mit.edu/explore/ai2/beginner-videos) ▪ MIT App Inventor PaintPot Tutorials (https://appinventor.mit.edu/explore/ai2/paintpot-part1) • Students are to create a prototype of their designs from weeks 8–11. This can simply be the intended homepage with two or three links included if time is an issue. Students need to track progress against a time plan (developed in weeks 8–11) to evaluate their progress. Can be completed in a journal style. • Alternative activity: School Curriculum and Standards Authority Quiz me (https://k10outline.scsa.wa.edu.au/home/assessment/assessment-activities/year7).

Weeks	Syllabus content	Content unpacked	Suggested teaching and learning experiences
	evaluate design processes and solutions		
17–18	**Digital implementation** Create and communicate information collaboratively online, taking into account social contexts	• Communicating collaboratively online refers to the creation of blogs, shared Google™ document, Connect™, virtual meetings etc. • Social contexts refers to what is considered right and wrong in cyberspace, what abbreviations mean, the use of emojis, the use of language, acronyms and humour, social customs of Aboriginal and Torres Strait Islander Peoples etc.	• Students are to set-up a blog on a topic of their choice in regards to technology (hardware definitions, collection of cool websites etc.) for other students to collaboratively add to and comment on. This blog should be comprehensive and set to a theme of students' or teacher's choice. This can be a data source for future analysation of data or in a cross-curricula environment.

Note: the above Teaching and Learning Outline is based on two hours per week for 18 weeks for a total of 36 hours.