Enterprise Computing Stage 6 (Year 12) – sample program of learning

Data science

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# About this resource

## Purpose of resource

The resource is a sample program of learning for teaching Data science in Year 12 during the Enterprise Computing 11–12 course.

## Target audience

This resource can be used by school teachers to support effective syllabus implementation of Enterprise Computing 11–12.

## When and how to use

This resource is designed for implementing over 10 weeks or for a term of learning on Data science. 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.

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 2022). 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 addresses that students will develop a fundamental understanding of the area of Data science.

The lessons and sequences in this program of learning are designed to allow students to develop the knowledge and skills to use datasets and relational databases.

Weeks 1 to 4 see students understand collecting, storing and analysing data. Students assess the quality of data while analysing the types of data required to support the production of meaningful information. They develop their skills in analysing, processing and presenting data using software tools that are commonly used in enterprises.

Students investigate social and ethical issues associated with collecting, securing, using and visualising data. They also explore patterns that may emerge as a result of processing and analysing data.

Weeks 5 to 10 see students learn about Data science through practical activities to support the development of skills.

The learning experiences, projects and tasks may highlight opportunities for students to incorporate data science into their Enterprise Computing project.

**Duration**: this program of learning is designed to be completed over a period of approximately 10 weeks in 60-minute lesson sequences but can be adapted to suit the school context.

**Explicit teaching**: suggested learning intentions and success criteria are available for some lessons provided. Learning intentions and success criteria are most effective when they are 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 could be created.

# Outcomes

A student:

* explains how systems meet the needs of a range of enterprises **EC-12-01**
* explains the function of data and information within enterprise computing systems **EC-12-02**
* explains and evaluates how data is safely and securely collected, stored and manipulated when developing enterprise computing systems **EC-12-03**
* explains how data is used in enterprise computing systems **EC-12-04**
* applies tools and resources to analyse complex datasets **EC-12-05**
* analyses how innovative technologies have influenced enterprise computing systems **EC-12-06**
* explains the social, ethical and legal implications of the application of enterprise computing systems on the individual, society and the environment **EC-12-07**
* justifies the selection and use of tools and resources to design and develop an enterprise computing system **EC-12-08**
* evaluates the effectiveness of an enterprise computing system **EC-12-10**
* communicates an enterprise computing solution to a specific audience **EC-12-12**

[Enterprise Computing 11–12 Syllabus](https://curriculum.nsw.edu.au/syllabuses/enterprise-computing-11-12-2022) © 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

## Week 1

Table 1 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-02****EC-12-04****Content**Students:* explore the difference between quantitative and qualitative data
* determine which data types are used to represent quantitative and qualitative data
* explore nominal, ordinal, interval and ratio levels of measurement applied to data.
 | **Learning intention**Understand collecting, storing, and analysing data.**Success criteria*** I can explain the difference between quantitative and qualitative data.
* I can determine which data types are used to represent quantitative and qualitative data.
* I can explain nominal, ordinal, interval and ratio levels of measurement applied to data.

**Teaching and learning activity**Introduce the topic of Data science specifically understanding collecting, storing and analysing data.Explain the intent of activities and the key glossary terms for the unit as well as remind students of the NESA glossary of words that pertain to the unit.As a class watch [A day in the life of a Data Analyst (13:33)](https://www.youtube.com/watch?v=uSTtLpstV-o) and [Data Analysis Roles (2:34)](https://www.youtube.com/watch?v=NLwPEZVIrKQ). Discuss how data science, data analysis and data engineer roles overlap and converge under Data science.Discuss the Assessment task that students will complete towards the end of the term.Explain quantitative and qualitative data and how it can be expressed and represented**Activity 1:** identify examples of quantitative data. Students complete a [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645?clearCache=f018aec5-a63f-4aa1-e5fe-a3bd56f18d48) activity to encourage conversation.**Activity 2:** identify examples of qualitative data. Students complete a [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645?clearCache=f018aec5-a63f-4aa1-e5fe-a3bd56f18d48) activity to encourage conversation.As a class watch [Qualitative vs Quantitative vs Mixed Methods Research (1:40 -7:00)](https://www.youtube.com/watch?v=hECPeKv5tPM).**Activity 3:** define quantitative and qualitative data. Students complete the following questions:* Define the term quantitative data and outline what is it used for.
* Define the term qualitative data and outline what it is used for.
* Identify data types used to represent quantitative data.
* Identify data types used to represent qualitative data.
* Explain the difference between qualitative and quantitative data.

As a class watch [Nominal, Ordinal, Interval & Ratio Data (10:54)](https://www.youtube.com/watch?v=5Yh-9xdJzAs).Explore nominal, ordinal, interval and ratio levels of measurement applied to data **Activity 4:** students provide a description on nominal, ordinal, interval and ratio level of measurement applied to data. | Students demonstrate making factual observations from the videos.Students participate in Think, Pair, Share activities, correctly identifying examples of quantitative and qualitative data, demonstrating their understanding of the differences between the 2.Students define quantitative and qualitative data, list data types used to represent each, and explain the differences, showing their comprehension of key concepts.Students correctly identify data types used to represent quantitative and qualitative data, indicating their ability to distinguish between different data types.Students engage in discussions about the levels of measurement, illustrating their understanding of nominal, ordinal, interval and ratio levels.Students provide accurate descriptions of nominal, ordinal, interval and ratio levels of measurement, applying these concepts to data examples. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Teach key vocabulary and concepts prior to viewing videos, provide a transcript, and use closed captions when viewing.Students may complete a Think, Pair, Share activity to encourage conversation.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.

To increase prior learning and check for understanding students can complete [Grok Academy – Data Analytics](https://groklearning.com/course/dt-applied-data-analytics/). Extension: students complete the 3 hour course created by the Institute of Applied Technology - [Introduction to Data Analytics](https://store.training.tafensw.edu.au/product/introduction-to-data-analytics/). |  |
| **Outcomes****EC-12-01****EC-12-05****Content**Students:* investigate data sampling, including manual and computerised methods of active and passive data collection
* assess the relevance, accuracy, validity and reliability of primary and secondary data.
 | **Learning intention**Understand collecting, storing and analysing data.**Success criteria*** I can investigate data sampling, including manual and computerised methods of active and passive data collection.
* I can assess the relevance, accuracy, validity and reliability of primary and secondary data.

**Teaching and learning activity**As a class discuss data sampling, including manual and computerised methods of active and passive data collection. **Activity 5:** categorising methods of data collectionStudents consider:* jersey design
* election votes
* Census data
* social media likes.

**Activity 6:** individually or in small groups investigate and list the advantages of using computerised methods of collection.Teacher-led discussion explaining the key terms of relevance, accuracy, validity and reliability.Discuss the relevance, accuracy, validity and reliability of primary and secondary data.Discuss the advantages and disadvantages of primary and secondary data.**Activity 7:** assessing primary and secondary datasetsStudents look at the following datasets and assess the accuracy, validity and reliabilityof both pieces of data. * The [Australia 2021 Census - All persons QuickStats](https://www.abs.gov.au/census/find-census-data/quickstats/2021/AUS) – Australian Bureau of Statistics
* [Demographics of Australia](https://en.wikipedia.org/wiki/Demographics_of_Australia) – Wikipedia.

Students complete a table, following these steps:1. Identify which dataset is the primary data and which is the secondary data.
2. Now that you have decided which is primary data and which is secondary data, complete the table below. Assess the relevance, accuracy, validity and reliability of each of these pieces of data.

**Activity 8:** NSW Public schools master dataset. Students use a dataset to examine:* Filters, sort, formulas and functions
* useful data on their school
* What else could we learn by integrating other sources of data?

For this activity use the CSV or comma separated values version of this document as it will easily open in Google Sheets or Microsoft Excel for analysis.1. Visit the [Master dataset: NSW government school locations and student enrolment numbers.](https://data.nsw.gov.au/data/dataset/nsw-education-nsw-public-schools-master-dataset/resource/2464b669-1d48-439e-9e7c-cb8a229f5462?inner_span=True)
2. Download the [CSV](https://data.nsw.gov.au/data/dataset/78c10ea3-8d04-4c9c-b255-bbf8547e37e7/resource/3e6d5f6a-055c-440d-a690-fc0537c31095/download/master_dataset.csv) file.
3. Check the meaning of each field using the [data dictionary](https://data.nsw.gov.au/data/dataset/nsw-education-nsw-public-schools-master-dataset/resource/2464b669-1d48-439e-9e7c-cb8a229f5462?inner_span=True) which you can download.

**Activity 9:** for 5 minutes, each participant extracts (using sorting/filtering/formulas) relevant information about their school.**Activity 10:** explore the [Atlas of Living Australia](https://biocache.ala.org.au/explore/your-area#-33.8601|151.2101|12|ALL_SPECIES).Teacher demonstrates searching the school's location, and discusses the available data including the use of selectable filters within the table to highlight specific groups or specific species and so on. As a class discuss what types of analysis is possible.Students explore a location of their choice and undertake some data analysis techniques they have explored and share with the class any insights they were able to determine from the analysis of the dataset. **Activity 11:** treasure hunt design. Students design and develop their own data treasure hunt using fun, beginner-friendly datasets using either [FiveThirtyEight](https://data.fivethirtyeight.com/) or [Kaggle.](https://www.kaggle.com/rtatman/fun-beginner-friendly-datasets#Categorical-(Suitable-for-barchart/chi-squared)) Students answer the following questions:* What are the fields?
* What type of data is in the dataset?
* What questions could be asked of this data?
* What is interesting about this data?
* How can the data be searched and sorted to reveal answers to these questions?
 | Students categorise different data collection scenarios, showing their understanding of various sampling methods.Students list and explain the advantages of using computerised data collection methods, demonstrating comprehension of efficiency, accuracy and integration benefits.Students engage in discussions and activities assessing data, illustrating their grasp of relevance, accuracy, validity and reliability.Students accurately compare primary and secondary datasets, showing their ability to assess data quality.Students use filters, sorts, formulas and functions to extract and analyse data from the NSW public schools dataset, demonstrating practical data handling skills.Students explore and analyse data from the Atlas of Living Australia, sharing insights and showcasing their ability to interpret complex datasets.Students design and execute a data treasure hunt, formulating questions and analysing data from beginner-friendly datasets, highlighting their creativity and analytical skills. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |

## Week 2

Table 2 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-08****EC-12-05****Content**Students:* investigate how informatics supports the development of a deeper understanding of data
* interpret and present data using graphs, infographics, dashboards, reports, network diagrams and maps
* investigate structured and unstructured datasets.
 | **Learning intention**Investigate ways of analysing data including presentation.**Success criteria*** I can investigate how informatics supports the development of a deeper understanding of data.
* I can interpret and present data using graphs, infographics, dashboards, reports, network diagrams and maps.
* I can explain structured and unstructured datasets.

**Teaching and learning activity**As a class watch this video outlining [Informatics (2:22)](https://www.youtube.com/watch?v=eBDUXd-ttJQ) and discuss how informatics supports the development of a deeper understanding of data.**Activity 12:** informatics in medicineStudents examine how data-driven approaches in medicine improve patient outcomes, and what are some potential risks associated with relying heavily on data.Students discuss the ethical implications of using big data in healthcare. How can privacy concerns be balanced with the benefits of personalised medicine?**Activity 13:** scenario – informatics in healthcare Students watch the following video on [Informatics in healthcare (2:46)](https://www.youtube.com/watch?v=qphAzLkYfyI).Students research and investigate the development and impact of informatics in healthcare, making notes or a short presentationTeacher-led discussion on how data can be interpreted and presented using graphs, infographics, dashboards, reports, network diagrams and maps.Discuss the significance of visual data representation in effectively communicating complex information.Discuss the strengths and limitations of different visual tools for presenting data.**Activity 14**: data visualisation challenge. Students work in small groups to examine how to visualise data.Teacher-led discussion on structured and unstructured datasets. As a class watch [structured vs unstructured data (1:36)](https://www.youtube.com/watch?v=lsR8P1LLf2w).**Activity 15:** investigating structured and unstructured datasetsStudents investigate and identify what structured and unstructured datasets are used at school. | Students use key terms correctly when discussing and writing about analysing data.Students demonstrate their understanding of how informatics supports deeper data analysis by participating in discussions and presenting their research findings.Students show their ability to interpret and present data using different visual tools through group activities and presentations.Students explain the differences between structured and unstructured datasets and identify examples used in their school, showcasing their comprehension through discussions and investigative activities. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Students collect examples of:* graphs
* infographics
* dashboards
* reports
* network Diagrams
* maps.

In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |
| **Outcomes****EC-12-07****EC-12-11****Content**Students:* explore the use of likes, emoticons and memes as forms of alternative data as sources of feedback
* examine the impact of errors, uncertainty and limitations in data

Including:* data sources
* raw data versus processed data
* data bias.
 | **Learning intention**Investigate ways of analysing data including alternate sources of feedback and the impact of errors, uncertainty and limitations in data.**Success criteria*** I can explore the use of likes, emoticons and memes as forms of alternative data as sources of feedback.
* I can examine the impact of errors, uncertainty and limitations in data.
* I can explain errors that can occur in data sources, raw data versus processed data, and data bias.

**Teaching and learning activity****Teacher-led discussion on the use of likes, emoticons and memes as forms of alternative data as sources of feedback.****Activity 16**: investigate which software uses likes, emoticons and memes as forms of feedback.Examine the impact of errors, uncertainty and limitations in data.Teacher-led discussion on the key terms:* errors
* uncertainty
* limitations.

Discuss ways in which data can be collected:* surveys and questionnaires
* observations
* interviews
* experiments
* existing sources
* social media and online platforms.

Discuss the issues affecting the quality of data and data sources:* data collection method
* sample size
* data quality
* data timeliness.

Explain the key term ‘raw data versus processed data’.**Activity 17:** understanding raw data and processed dataSplit students into small groups and have them discuss some raw data they have worked with or will work with for their assessment task. Ask them to talk about any mistakes or problems in the raw data and how they could fix them to make the data easier to understand.Teacher-led discussion on the term data bias and the different types including:* sampling bias
* selection bias
* confirmation bias
* data quality bias.

As a class watch [Sampling Methods and Bias with Surveys (11:45)](https://www.youtube.com/watch?v=Rf-fIpB4D50).**Activity 18:** quizStudents answer questions on data bias. | Students participate in discussions about likes, emoticons and memes as alternative data sources.Students investigate and identify software that uses these forms of feedback, showing their understanding of alternative data sources.Students engage in discussions about errors, uncertainty and limitations in data, demonstrating their understanding of these concepts.Students discuss various data collection methods and issues affecting data quality, indicating their comprehension of the methods and potential issues.Students discuss raw and processed data, identifying problems and solutions, showing their practical understanding of data handling.Students participate in discussions about different types of data bias.Students watch the video on sampling methods and bias, and complete the quiz on data bias, demonstrating their understanding of data bias.Students participate in discussions about potential sources of data bias, demonstrating their ability to identify different types of biases.Students explain the differences between sampling bias and selection bias, and how confirmation bias impacts data interpretation, showing their understanding of these concepts.Students suggest measures to mitigate data bias, showing their understanding of strategies to improve data collection and analysis.Students identify potential sources of bias in social media surveys, illustrating their awareness of the unique challenges in this context.Students apply the importance of using multiple data sources and conducting thorough data quality checks, demonstrating their understanding of best practices in data analysis.Students discuss raw and processed data, identifying problems and solutions, showing their practical understanding of data handling.Students present their findings on raw data and how they addressed issues to make it more understandable.Students participate in discussions about different types of data bias, showing their understanding of these concepts.Students watch the video on sampling methods and bias, and complete the quiz on data bias, demonstrating their understanding of data bias. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Review key concepts and vocabulary before viewing video. Use closed captions and provide the transcript. Pause video to assess student understanding at appropriate points. |  |
| **Outcomes****EC-12-07****EC-12-10****Content**Students:* explain how blockchain technology is used to manage and verify data

Including:* online voting
* online identities
* tracking items of value
* recordkeeping.
 | **Learning intention**Examine blockchain technology features.**Success criteria*** I can explain how blockchain technology is used to manage and verify data.
* I can explain blockchain features such as online voting, online identities, tracking items of value and recordkeeping.

**Teaching and learning activity**Teacher-led discussion on how blockchain technology is used to manage and verify data.As a class watch the video on [blockchain (7:02)](https://www.youtube.com/watch?v=yubzJw0uiE4) to understand how blockchain technology works. Teacher-led discussion on blockchain in reference to online voting, online identities, tracking items of value and recordkeeping.Students explore the [Vote Australia website](https://www.voteaustralia.org.au/blockchain_voting) on blockchain voting.**Activity 19:** exploring blockchain technology in voting systems.Students work through steps to write a report on how blockchain voting works.  | Students participate in discussions about how blockchain technology is used to manage and verify data, demonstrating their understanding.Students watch the blockchain video and participate in follow-up discussions, showing their comprehension of how blockchain works.Students provide a clear definition of blockchain technology and its fundamental characteristics. They can explain how blockchain applies to the concept of voting and its potential impact on traditional voting systems.Students research and summarise the potential benefits of implementing blockchain in voting systems, identifying key advantages such as enhanced security, transparency and integrity in the voting process.Students describe how blockchain technology ensures security and transparency in the context of voting, discussing specific features like decentralisation, cryptographic verification and immutability of records. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Review key concepts and vocabulary before viewing video. Use closed captions and provide the transcript. Pause video to assess student understanding at appropriate points. |  |

## Week 3

Table 3 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-03****EC-12-10****Content**Students:* examine software features that affect the privacy and security of data

Including:* autofill
* public or private connections
* checkbox
* terms of agreement
* explore the use of big data and data warehousing, considering volume, variety and velocity
* explore the risks and benefits of data mining.
 | **Learning intention**Examine issues when collecting and storing data in software features and when data warehousing or data mining.**Success criteria*** I can explain software features that affect the privacy and security of data.
* I can explain the use of big data and data warehousing, considering volume, variety and velocity.
* I can explain the risks and benefits of data mining.

**Teaching and learning activity**Teacher-led discussion on software features that affect the privacy and security of data, including:* autofill
* public or private connections
* checkbox
* terms of agreement.

**Activity 20:** reflect on privacy and security of data.Students explain from their experience what software features are most used to increase your privacy and security of data.As a class watch [Big data is better data (15:42)](https://www.ted.com/talks/kenneth_cukier_big_data_is_better_data). Teacher-led discussion on how big data refers to large and complex datasets that can't be processed and analysed by traditional data processing systems.Students learn about data warehousing, volume, variety and velocity, adding to their glossary of terms.As a class watch the video about [data mining (6:52)](https://www.youtube.com/watch?v=7rs0i-9nOjo) and discuss the benefits and risks of data mining. | Students actively engage in the teacher-led discussion, demonstrating their understanding of how features like autofill, public/private connections, checkboxes and terms of agreement impact data privacy and security.Students provide examples from their own experiences, explaining which software features they use to enhance their privacy and security (for example use of VPNs, disabling autofill, carefully reading terms of service).During discussions, students ask questions and make connections between software features and real-life scenarios, indicating their grasp of privacy and security issues.Students accurately define and add terms such as volume, variety, velocity and data warehousing to their glossary, showing their comprehension of these key concepts.Students demonstrate understanding of big data concepts by discussing the challenges and advantages of handling large datasets after watching the video. Their contributions reflect an awareness of the limitations of traditional data processing systems.Students actively participate in the discussion on data mining, identifying both its potential benefits and risks.Student use critical thinking by considering the trade-offs between the benefits of data use and the potential for misuse or privacy violations.Students demonstrate their ability to apply the concepts learned by discussing how these issues relate to their personal and academic lives, providing evidence of a deeper understanding. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Review key concepts and vocabulary before viewing video. Use closed captions and provide the transcript. Pause video to assess student understanding at appropriate points. |  |
| **Outcomes****EC-12-09****EC-12-07****Content**Students:* analyse the impact of data scale

Including:* volume of raw data
* storage
* real-time and continuous streaming
* opportunities for machine learning (ML)
* changes in human behaviour
* ethical implications, including digital footprints.
 | **Learning intention**Examine issues when analysing the impact of data scale.**Success criteria*** I can analyse the volume of raw data.
* I can analyse storage.
* I can analyse the use of real-time and continuous streaming.
* I can analyse the opportunities for machine learning (ML).
* I can analyse the changes in human behaviour.
* I can analyse ethical implications, including digital footprints.

**Teaching and learning activity**Teacher-led discussion on analysing the impact of data scale, including:* volume of raw data
* storage
* real-time and continuous streaming
* opportunities for ML
* changes in human behaviour
* ethical implications, including digital footprints.

**Activity 21:** smart agriculture and data management scenario.As a class read [Artificial intelligence (AI), machine learning and deep learning: what can they do for agriculture?](https://www.csiro.au/en/news/all/articles/2022/february/artificial-intelligence-ai-machine-learning-and-deep-learning-in-agriculture) Discuss as a class how technology has impacted agriculture. Students work in small groups to discuss the questions posed by the scenario. Answers are shared together as a class guided by the teacher. Students make notes of answers to questions. | Students provide analysis of how large volumes of data are generated and the challenges of handling such data. They should be able to discuss the impact of data volume on storage, processing and decision-making.Students analyse how real-time and continuous data streaming affects the decision-making process.Students identify and analyse how ML in the scenario can be applied to agricultural data to enhance efficiency, optimise resources and make predictions.Students analyse in the scenario how the introduction of Agritech affects human behaviour on the farm. This includes changes in job roles, decision-making processes and interactions with technology.Students discuss ethical concerns related to data collection and use, including privacy issues and data security. They propose ways to address these concerns. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |
| **Outcomes****EC-12-04****EC-12-08** **EC-12-10****Content**Students:* evaluate the effectiveness of different methods for data storage

Including:* local storage
* cloud storage
* portable storage media
* data warehouses.
 | **Learning intention**Examine issues when evaluating the effectiveness of different methods for data storage.**Success criteria*** I can evaluate the use of local storage.
* I can evaluate the use of cloud storage.
* I can evaluate the use of portable storage media.
* I can evaluate the use of data warehouses.

**Teaching and learning activity**Teacher-led discussion on the effectiveness of different methods for data storage, including:* local storage
* cloud storage
* portable storage media
* data warehouses.

**Activity 22:** data storage scenarioAs a class read the scenario about EduTech Solutions with the view to making a recommendation for what data storage solution would best meet their needs. | Students provide a detailed evaluation of local storage solutions, considering aspects such as cost, scalability, access, speed and security.Students discuss the strengths and weaknesses of using local storage in the context of the scenario.Students analyse cloud storage solutions, focusing on factors such as cost-efficiency, scalability, accessibility and security. Students evaluate portable storage media considering aspects such as portability, capacity, cost and security. Students assess how well these options meet the needs of the scenario.Students analyse the use of data warehouses, considering their ability to handle large volumes of data, provide support for complex queries and integrate with other systems. They discuss how well data warehouses address the needs presented in the scenario. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |

## Week 4

Table 4 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-02****EC-12-03** **EC-12-04****EC-12-07****Content**Students:* investigate the ethical use of data for social or enterprise research purposes
* explore social, ethical and legal issues associated with using data

Including:* bias
* accuracy of the collected data
* metadata
* copyright and acknowledgement of source data
* intellectual property and respect for ownership, including Indigenous Cultural and Intellectual Property (ICIP)
* permissions, rights and privacy of individuals, including cultural responsibility
* security.
 | **Learning intention**Understand data quality in relation to Data science and its effects.**Success criteria*** I can investigate the ethical use of data for social or enterprise research purposes.
* I can explore social, ethical and legal issues associated with using data.

**Teaching and learning activity**Teacher-led discussion on the considerations when examining the ethical use of data including:* privacy
* consent
* data security
* transparency
* responsibility
* data accuracy
* confidentiality.

**Activity 23:** SmartCity Data Analytics Project scenarioAs a class discuss the scenario including the background and ethical issues of privacy and consent.Small group discussion questions:1. What are the ethical implications of collecting data without explicit consent?
2. How can the project ensure transparency and obtain informed consent from citizens?
3. What measures can be taken to protect citizens' privacy and ensure data security?

Teacher-led discussion on social, ethical and legal issues associated with using data including the following key points.* Bias: ensure diverse, representative datasets to avoid discrimination.
* Accuracy: validate and clean data regularly for reliable outcomes.
* Metadata: use metadata to enhance transparency and data quality.
* Copyright: properly cite sources and adhere to licensing agreements.
* Intellectual Property: respect ICIP and obtain necessary consents.
* Permissions and Privacy: comply with privacy laws and respect cultural values.
* Security: implement strong security measures to protect data.

**Activity 24:** HealthTrack Solutions scenario.Students work through the scenario to uncover social, ethical and legal issues and investigate the ethical use of data for social or enterprise research purposes. | Students demonstrate an understanding of ethical considerations in data use, focusing on privacy, consent, data security, transparency, responsibility and data accuracy.Students identify and analyse various social, ethical and legal issues associated with data usage. They discuss issues such as bias, accuracy, metadata, copyright, intellectual property, permissions, privacy and security.Participation in the discussion shows that students understand the key ethical considerations related to data use.Active engagement in discussing the scenario and answering questions should reveal students’ understanding of ethical implications, transparency and privacy concerns.Students discuss and analyse issues such as bias, accuracy, metadata, copyright, intellectual property, permissions, privacy and security.Students work through the scenario to identify and analyse social, ethical and legal issues related to data use. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.Message abundancy may be useful when introducing new terminology. The word is spoken, written on the board and represented by visuals.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |
| **Outcomes****EC-12-03****EC-12-07****Content**Students:* investigate the legal issues surrounding data collection and handling

Including:* legislation
* authorities responsible for data protection
* data sovereignty of Aboriginal and Torres Strait Islander Peoples.
 | **Learning intention**Investigate the legal issues surrounding data collection and handling.**Success criteria*** I can explain what legislation is.
* I can identify and describe authorities responsible for data protection.
* I can explain the data sovereignty of Aboriginal and Torres Strait Islander Peoples.

**Teaching and learning activity****Teacher-led discussion on *Privacy Act 1988* and the 13** Australian Privacy Principles (APPs) and the Notifiable Data Breaches (NDB) scheme.**Activity 25:** Australian Privacy PrinciplesStudents read about the [13 Australian Privacy Principles](https://www.oaic.gov.au/privacy/australian-privacy-principles/australian-privacy-principles-quick-reference) and outline the purpose of the 13 principles.Teacher-led discussion on the Office of the Australian Information Commissioner ([OAIC](https://www.oaic.gov.au/)) who is the key authority responsible for overseeing data protection laws. The OAIC enforces the Privacy Act, investigates complaints, and provides guidelines and resources to ensure compliance with data protection laws.**Activity 26:** summary of legal issuesStudents summarise the legal issues surrounding data collection and handling. | Students can define what legislation is and explain its role in regulating data collection and handling. Students understand the relevance of legislation in the context of data protection.Student participation in discussion demonstrates they understand the Privacy Act, the 13 Australian Privacy Principles, and the NDB scheme.Students identify key authorities responsible for data protection, such as the Office of the Australian Information Commissioner (OAIC), and describe their roles and responsibilities.Students explain the concept of data sovereignty and its significance for Aboriginal and Torres Strait Islander Peoples. They should understand how data sovereignty impacts data collection and handling practices in relation to Indigenous communities.Students provide a summary of the legal issues surrounding data collection and handling, integrating information from previous activities. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning. |  |
| **Outcomes****EC-12-06****EC-12-07****Content**Students:* **investigate the influence of** curated **and communicated data on social behaviour**

**Including:*** data literacy
* timeframes
* signals impacting on behaviour
* data swamps
* educating users.
 | **Learning intention**Investigate the influence of curated and communicated data on social behaviour.**Success criteria*** I can explain what data literacy is and its importance in interpreting and responding to data.
* I can analyse how different timeframes and types of data signals impact individual and social behaviour.
* I can define what a data swamp is and describe how it differs from a well-curated data environment.
* I can identify and describe effective strategies for educating users about data and improving data literacy.

**Teaching and learning activity**Teacher-led discussion on **the influence of** curated **and communicated data on social behaviour including:*** data literacy
* timeframes
* signals impacting on behaviour
* data swamps
* educating users

**Activity 27:** reflect on the influence of curated and communicated data on social behaviour.Students [Think, Pair, Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645?clearCache=f018aec5-a63f-4aa1-e5fe-a3bd56f18d48) about their experience working with a dataset in previous activities or for Assessment task 1.Students are guided in small group discussion using the following questions as stimulus for thinking. * How can analysing data over both short-term and long-term periods provide a more comprehensive understanding of social behaviour trends?
* What types of signals (for example social media trends, news reports) most significantly influence social behaviour, and why?
* What are the key practices for maintaining clean, well-documented data to avoid creating a data swamp, and why are they important?
* Why is it important to teach ethical considerations, such as privacy and data protection, when educating users about data literacy and communication?
 | Students clearly define data literacy and explain its significance in interpreting and responding to data.Students analyse how different timeframes (short-term versus long-term) and types of data signals (for example social media trends, news reports) affect individual and social behaviour.Students define what a data swamp is and explain how it differs from a well-curated data environment.Students identify and describe effective strategies for educating users about data and improving data literacy.Participation in the discussion demonstrates that students understand the key concepts related to the influence of curated and communicated data on social behaviour.Active participation in the Think, Pair, Share and small group discussions should reveal students’ understanding of how data analysis, signals and data management practices influence social behaviour. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning. |  |

## Weeks 5 and 6

Table 5 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcome****EC-12-05****Content**Students:* summarise data using a spreadsheet
* collate information using spreadsheet analysis features, including charts, statistical analysis and what-if modelling.
 | **Learning intention**Use a spreadsheet to summarise data and use analysis features for presenting data.**Success criteria*** I can summarise data using a spreadsheet.
* I can collate information using charts.
* I can collate information using statistical analysis.
* I can collate information using what-if modelling.

**Teaching and learning activity**Teacher-led discussion on how spreadsheets and databases provide us with powerful tools to collate, organise, process and present data.**Activity 28:** summarise data using the CSIRO spreadsheet.Spreadsheets use rows and columns to organise data and can be searched, sorted, calculated and summarised to present meaningful information.To investigate the power of spreadsheets students will be utilising a dataset from the [CSIRO website](https://www.csiro.au/en/education/Resources/Educational-datasets/Income-Inequality) and follow step-by-step instructions and screenshots to summarise data.**Activity 29:** collate information using the CSIRO spreadsheet.Students continue to use the dataset on Income Inequality in Australian Regions from the [CSIRO website](https://www.csiro.au/en/education/Resources/Educational-datasets/Income-Inequality) to follow step-by-step instructions to create charts, statistical analysis and what-if modelling.Students discuss what they have learnt to develop a more sophisticated what-if analysis for their spreadsheet. | Students effectively use a spreadsheet to summarise data from the CSIRO dataset.Students create and interpret charts based on the CSIRO dataset.Students apply statistical analysis features in the spreadsheet to the CSIRO dataset.Students use what-if modelling features in the spreadsheet to explore different scenarios.Students apply the learning to the Data Hack High activity and their Assessment task 1. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.

Students watch [Excel: What-if Analysis (3:27)](https://www.youtube.com/watch?v=STTYxT6iFio) for a slightly more advanced example. |  |
| **Outcome****EC-12-05****Content**Students:* filter, group and sort data in a spreadsheet to process and display information

Including:* linking multiple sheets to extract data and create summaries
* applying conditional formatting
* making data comparisons
* designing forms and reports.
 | **Learning intention**Filter, group and sort data in a spreadsheet to process and display information.**Success criteria*** I can link multiple sheets to extract data and create summaries.
* I can apply conditional formatting.
* I can make data comparisons.
* I can design forms and reports.

**Teaching and learning activity**The teacher demonstrates how to filter, group and sort data in a spreadsheet to process and display information.Students continue to work with the CSIRO spreadsheet. **Activity 30:** filter, group and sort data in a spreadsheet.Students follow steps and screenshots to filter, group and sort data in a spreadsheet including:* linking multiple sheets to extract data and create summaries
* applying conditional formatting
* making data comparisons
* designing forms and reports.
 | Students demonstrate the ability to link data across multiple sheets within a spreadsheet to extract and summarise information.Students apply conditional formatting rules to highlight key data points or trends in their spreadsheet.Students compare data within the spreadsheet to identify trends, differences or similarities.Students design and create forms and reports using spreadsheet tools to present data effectively.Students follow instructions to filter, group and sort data in the CSIRO spreadsheet, applying the specified techniques effectively.Students’ completion of Assessment task 1 demonstrates the effective use of spreadsheet features to filter, group, sort data, link multiple sheets, apply conditional formatting, make data comparisons, and design forms 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. |  |
| **Outcomes****EC-12-02****EC-12-05****EC-12-08****Content**Students:* apply spreadsheet analysis features to develop a data dashboard

Including:* graphs
* pivot tables and slicers.
 | **Learning intention**Apply spreadsheet analysis features to develop a data dashboard.**Success criteria*** I can use graphs effectively in spreadsheet analysis.
* I can use pivot tables and slicers in spreadsheet analysis.

**Teaching and learning activity**The teacher demonstrates how to apply spreadsheet analysis features to develop a data dashboard.**Activity 31:** apply spreadsheet analysis features.Students follow steps and screenshots to apply spreadsheet analysis features.**Activity 32:** building the dashboardStudents follow steps and screenshots to build a dashboard.**Activity 33:** graphsStudents follow steps and screenshots to create graphs.**Activity 34:** pivot tablesStudents follow steps and screenshots to create a pivot table.**Activity 35:** slicersStudents follow steps and screenshots to create slicers. | Students create graphs using the spreadsheet software, demonstrating their ability to visually represent data. This includes creating various types of graphs (for example bar, line and pie) that accurately depict the data and help in analysing trends and patterns.Students develop pivot tables to summarise and analyse large datasets that effectively group, aggregate and present data in a structured manner, allowing for detailed data analysis.Students incorporate slicers into their pivot tables or data dashboards to filter and interact with the data that enables users to easily manipulate and view specific subsets of data.Students follow steps to build a comprehensive data dashboard that integrates graphs, pivot tables, and slicers. Students create a dashboard that provides a clear, interactive overview of the data, allowing users to analyse and interpret information effectively.Students apply these features to organise, analyse and present data which is evident in their Assessment task 1. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning. |  |
| **Outcomes****EC-12-02****EC-12-05****EC-12-08****EC-12-10****Content**Students:* filter, group and sort data in a spreadsheet to process and display information

Including:* linking multiple sheets to extract data and create summaries
* applying conditional formatting
* making data comparisons
* designing forms and reports
* apply spreadsheet analysis features to develop a data dashboard

Including:* graphs
* pivot tables and slicers
* develop a flat-file database
* apply computational thinking to design a relational database with appropriate user views

Including:* develop a data dictionary
* linking tables via key fields
* sort and search data, including using structured query language (SQL)
* using forms and reports.
 | **Learning intention**Develop flat-file and relational databases.**Success criteria*** I can develop a flat-file database.
* I can apply computational thinking to design a relational database with appropriate user views.
* I can develop a data dictionary.
* I can link tables via key fields.
* I can sort and search data, including using structured query language (SQL).
* I can use forms.

**Teaching and learning activity****Activity 36:** develop a data dictionary.Develop a data dictionary based on the schema provided. The Games entity is modelled, and students continue the data dictionary for the Publishers and Developers.**Activity 37:** develop a database.Students follow the steps and screenshots to develop a database.**Activity 38:** develop a query using SQL.Students follow the steps and screenshots to develop a query using SQL.**Activity 39:** use Microsoft Access to create simple reports.Students follow the steps and screenshots to use Microsoft Access to create simple reports.**Activity 40:** create and use a Switchboard.Students follow the steps and screenshots to create and use a Switchboard.**Activity 41:** Data Hack HighUsing the **Data Hack High PowerPoint** resource published with the Teacher Support Resource, students are able to work in small groups and choose a challenge to compete.The challenges have been created using various industry datasets. Students are guided to analyse and deduce a data story from the variety of datasets.**Note:** The datasets are **saved in the files section** of the [TAS Statewide Staffroom](https://teams.microsoft.com/l/team/19%3Acd41312b69a14cd38a7c429ffd90493a%40thread.tacv2/conversations?groupId=cd5a04e1-7742-47dd-b141-9519486d9e00&tenantId=05a0e69a-418a-47c1-9c25-9387261bf991). | Students develop a flat-file database demonstrating their understanding of basic database design principles.Students apply computational thinking to design a relational database.Students develop a database schema that incorporates multiple tables, appropriate relationships between tables, and user views.Students demonstrate the logical organisation of data and the creation of tables with key fields that define relationships.Students create a data dictionary for the given schema including data types, constraints and relationships, showing their ability to document and organise database information effectively.Students link tables using primary and foreign keys and create relationships between tables, allowing data to be integrated and queried across multiple tables.Students develop and execute SQL queries and demonstrate the ability to write SQL statements to sort and search data, demonstrating their understanding of SQL syntax and functionality.Students create and use forms in Microsoft Access demonstrating the creation of user-friendly forms for data entry and retrieval.Students create and utilise a Switchboard in Microsoft Access demonstrating the development of a navigation interface that allows users to access various parts of the database efficiently.Students participate in the **Data Hack High** challenge and demonstrate their ability to analyse industry datasets, develop insights and present a data story, demonstrating their practical application of database and data analysis skills. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning. |  |

## Weeks 7 to 9

Table 6 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-02****EC-12-04****EC-12-05****Content****Students:*** develop a flat-file database
* apply computational thinking to design a relational database with appropriate user views

Including:* develop a data dictionary
* linking tables via key fields
* sort and search data, including using structured query language (SQL)
* using forms and reports.
 | **Learning intention**Develop a data science product with documentation.**Success criteria*** I can analyse a large dataset and develop a spreadsheet, relational database, and data dashboard, with the aim of ascertaining specific historic and current data.
* I can choose an appropriate dataset to create a spreadsheet, relational database, and a data dashboard, that contains current and historic data.
* I can complete identifying and defining.
* I can complete research and planning.
* I can complete producing and implementing.
* I can complete testing and evaluating.

**Teaching and learning activity**Teacher-led discussion about Assessment task 1. Students work individually or in pairs to complete the assessment. The teacher decides if the task is done individually or in a small group.The teacher checks and monitors student progress throughout the production processes.**Identifying and defining**Students identify, download and acknowledge a valid data source to create a spreadsheet, relational database and data dashboard.Students seek the teacher’s approval to use the dataset.Once students source a dataset, they analyse the information using a variety of data analysis tools such as:* filtering data using pivot tables, creating charts, or applying conditional formatting
* using the [analyse data](https://support.microsoft.com/en-au/office/analyze-data-in-excel-3223aab8-f543-4fda-85ed-76bb0295ffc4#:~:text=Analyze%20Data%20in%20Excel%20empowers,summaries%2C%20trends%2C%20and%20patterns.) tool in Excel to analyse trends, patterns and create summaries
* using the [Analysis ToolPak](https://support.microsoft.com/en-au/office/use-the-analysis-toolpak-to-perform-complex-data-analysis-6c67ccf0-f4a9-487c-8dec-bdb5a2cefab6) in Excel to perform complex data analysis
* using what-if analysis to explore various results.

**Researching and planning**Students investigate the origin of their sourced dataset and document the answers to the following questions. * What is the source?
* Is it reliable? How do you know?
* Explain how these data sources are valid and relevant.
* Investigate other reliable data sources that could correlate your data.
* Explain how the data collected can be stored safely and securely and evaluate how safely and securely you stored the data in your information system.

**Producing and implementing**Students analyse data to tell a relevant and compelling story.Students use a variety of tools to analyse their chosen dataset. This could include spreadsheets, databases, or analysis tool like [Gapminder](https://www.gapminder.org/tools-offline/). Students analyse the data and document the answer to the following question. * What story does the data tell?

Students use both qualitative and quantitative data analysis.Students explain the most significant results from their chosen dataset.Students evaluate limits or uncertainties in their chosen dataset. These could include sample size, data quality, timeliness or bias.Students analyse historical trends in their chosen dataset.**Develop a spreadsheet**Students create a spreadsheet, following the ‘steps to success’ of Assessment task 1.The spreadsheet should include the following features to demonstrate that students can:* enter text, numeric values and formulas
* copy cells using both absolute and relative referencing
* fill down and across
* use built-in and user determined formulas
* print all or parts of a spreadsheet
* import data from a variety of sources
* export spreadsheet data in a variety of formats
* manipulate rows and columns of a spreadsheet and apply a variety of formats
* record, run and edit macro routines to automate processing
* sort selected areas of the spreadsheet
* configure page layouts and manipulate page breaks
* work with data across multiple sheets
* apply conditional formatting to display information.

**Develop a database**Students create a relational database that best displays their findings. Students demonstrate they can:* create a relational database
* use relational operators
* use logical operators
* sort data using multiple fields to specify the sequence
* design forms and reports
* implement and display a schema
* import and export data
* apply security to the database.

**Testing and evaluating**Students evaluate the effectiveness of their spreadsheet, database and data dashboard.Students’ self and peer assess the success of the product.**Students can showcase their findings to the class in a showcase.** | Students can explain why the chosen dataset is suitable and how it meets the criteria for their project.Students provide detailed answers to questions about the data source, and its reliability and relevance. They should also investigate additional data sources and describe how they ensure the data is stored securely.Students use appropriate tools to analyse and present data. They should create a compelling narrative from their analysis and document significant results, limitations and historical trends.Students create a well-functioning spreadsheet demonstrating their ability to:* enter and format data, use formulas, and apply both absolute and relative referencing
* perform data manipulation, including copying, filling, and sorting
* import and export data, use macros, and apply conditional formatting.

Students create a functional relational database and data dashboard that includes:* linking tables via key fields, using relational and logical operators, and sorting data
* designing forms and reports, implementing a schema, and applying security measures.

Students assess the effectiveness of their spreadsheet, database, and data dashboard through self and peer evaluations.Students present their work in a showcase to the class for peer and teacher feedback.  | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning. |  |

## Week 10

Table 7 – lesson sequence and details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Outcomes and content | Teaching and learning activities | Evidence of learning | Differentiation and adjustments | Registration and evaluation notes |
| **Outcomes****EC-12-02****EC-12-05****EC-12-06****EC-12-10****Content**Students:* explore how machine learning and statistical modelling are used in data analytics to analyse big data, and as a prediction tool.
 | **Learning intention**Analyse big data.**Success criteria*** I can explore how machine learning (ML) and statistical modelling are used in data analytics to analyse big data, and as a prediction tool.

**Teaching and learning activity****Activity 42:** predicting customer behaviour scenarioStudents in small groups work through a scenario to gain a comprehensive understanding of how ML and statistical modelling are used in data analytics to analyse big data and make predictions, along with the practical and ethical considerations involved in this process. | Students can discuss the practical implications of using ML and statistical modelling in data analytics, including how these methods can be used effectively in real-world scenarios.Students can address ethical considerations, such as data privacy, bias in models and the responsible use of predictive analytics.In their group work, students can demonstrate collaboration by dividing tasks related to data analysis, discussing findings, and presenting their results coherently.Students show evidence of using appropriate analytical tools and techniques, and effectively communicate their conclusions. | Suggested adjusted activities. This section is also for use in school when making adjustments to support all students to achieve in their learning.In creating or selecting scenarios, consider students’ own experiences and use of visuals.Ensure all students understand both technical and culturally-based terms.Include multiple opportunities to respond and discuss, for example:* verbally
* individually
* partner turn and talk
* non-verbally
* gesture
* response cards.
 |  |

# 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 2020b) 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 2020b Chapter 1: High expectations)
* I had a clear idea of what I was learning and why. (CESE 2020b Chapter 2: Explicit teaching)
* I used the feedback provided to improve my performance. (CESE 2020b Chapter 3: Effective feedback)
* I understood the feedback on the assessment task. (CESE 2020b Chapter 3: Effective feedback)
* I was able to predict the marks I achieved in the assessment tasks. (CESE 2020b Chapter 5: Assessment)
* The activities in the unit prepared me for the assessment task. (CESE 2020b Chapter 5: Assessment)
* I found the activities in the lessons interesting to me. (CESE 2020b Chapter 7: Wellbeing)
* I made valuable contributions to the class during this unit. (CESE 2020b Chapter 7: Wellbeing)
* I ask questions in class when I don’t understand yet. (CESE 2020b 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 contact the TAS curriculum team by emailing TAS@det.nsw.edu.au.

**Differentiation:** further advice to support Aboriginal and Torres Strait Islander students, EAL/D 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 7–10 advice](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 Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468)

**Alignment to the School Excellence Framework**: this resource supports the [School Excellence Framework](https://education.nsw.gov.au/inside-the-department/directory-a-z/strategic-school-improvement/school-excellence-framework) elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

**Alignment to Australian Professional Standards for Teachers**: 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:** 2024

# Evidence base

[Enterprise Computing 11–12 Syllabus](https://curriculum.nsw.edu.au/learning-areas/tas/enterprise-computing-11-12-2022/overview) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2022.

AITSL (Australian Institute for Teaching and School Leadership Limited) (n.d.) [*Learning intentions and success criteria* [PDF 251 KB]](https://www.aitsl.edu.au/docs/default-source/feedback/aitsl-learning-intentions-and-success-criteria-strategy.pdf?sfvrsn=382dec3c_2#:~:text=Learning%20Intentions%20are%20descriptions%20of,providing%20feedback%20and%20assessing%20achievement.), AITSL, accessed 31 July 2024.

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