National Unit Specification

General information

Unit title: Data Citizenship (SCQF level 4)

Unit code: J890 44

Superclass: CB

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Source: Scottish Qualifications Authority

Version: 01

Unit purpose

The purpose of this unit is to introduce learners to the impact of data on society, how data can be used and misused, and the steps we can take to use data responsibly. This unit will help learners become responsible citizens who participate in the decisions that affect people and society.

This is a **non-specialist** unit, suitable for all learners. It is particularly suitable for learners who are being introduced to the fields of data literacy and data science for the first time. No previous experience is required but a familiarity with computers is desirable. The themes in this unit follow on from outcomes and benchmarks in Digital Literacy and Numeracy at SCQF levels 3 and 4 in the broad general education phase of the Scottish curriculum.

Data has an increasing importance in our everyday lives, with all aspects of society impacted and influenced by the use of data. This unit will introduce learners to how data is used in different settings such as in the community, in education, sports and leisure, music and entertainment.

Learners will consider how their personal data is used and shared by different organisations. They will also learn about how they can secure their data using strong passwords, password management tools and anti-virus software.

National Unit Specification: General information (continued)

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It will introduce learners to data literacy concepts to enable them to read, describe and interpret different types of basic data visualisations so that they can identify patterns or trends, as well as evaluating the quality of the data and data visualisations.

Learners will also consider Artificial Intelligence (AI) tools that make use of large amounts of data (such as Generative AI and Machine Learning) and will evaluate the quality of the output of some of these tools.

On completion of this unit, learners will have a basic knowledge of the growing importance of data in society, how data can be used and misused, and their rights and responsibilities regarding data. They will be able to interpret and evaluate different types of data visualisations in order to draw conclusions.

Learners may wish to progress to the unit J890 45 - Data Citizenship at SCQF level 5 or expand their data literacy with J8LW 44 Data Science unit at SCQF level 4. Completing the Data Citizenship and the Data Science units at SCQF level 4 will allow them to be awarded the National Progression Award in Data Science at SCQF level 4.

Learners could also progress onto other STEM qualifications such as the National Progression Award in Cyber Security (at SCQF level 4 or 5) or the Applications of Mathematics course at National 4 or 5.

Outcomes

On successful completion of the unit the learner will be able to:

1. State the use of data in society.
2. State data literacy concepts.
3. Interpret simple data

Credit points and level

1 National Unit credit at Scottish Credit and Qualifications Framework (SCQF) level 4: (6 SCQF credit points at SCQF level 4).

Recommended entry to the unit

Entry is at the discretion of the centre. No previous knowledge or experience is required. Basic number and computer skills are assumed.

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this unit specification.

There is no automatic certification of Core Skills or Core Skill components in this unit.

Context for delivery

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

For example, if this unit is delivered as part of the National Progression Award in Data Science at SCQF level 4 there is some overlap with the other unit within this award (J8LW 44 Data Science) and there will be opportunities to contextualise and integrate teaching, learning and assessment across component units.

The unit may be of interest to learners who want to further develop their Information and Communication Technology (ICT) and computing skills, perhaps progressing their learning from cyber security or computer science. The unit may also be of interest to learners who wish to gain numeracy skills within a real-world setting.

Additionally, it may interest learners who are studying an area such as geography, health care, sports, or science and they wish to gain additional data literacy skills to support their studies in these other curricular areas.

This unit can be delivered stand-alone or as part of another course. For example, the Data Citizenship unit could be delivered as part of the National Progression Award in Data Science, in a digital literacy course or an additional unit in a social studies course. A wide range of examples and data visualisations can be used from a range of contexts such as business, entertainment, sports, science, health. Alternatively, the examples, case studies and visualisations can be selected from a specific context when the unit is delivered within a different course or by a subject specialist, such as delivering a land use and satellite data examples within a Geography course or using health and medical examples when delivering within a health and social care context.

More information about delivery of the unit is available in the group award specification, which can be found SQA's website SQA Home Page (www.sqa.org.uk).

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Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website:
SQA Assessment Arrangements (www.sqa.org.uk/assessmentarrangements).

National Unit Specification: Statement of standards

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Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

State the use of data in society.

Performance criteria

(a) State how data is used and misused, and its impact on individuals, organisations, and society.
(b) State the ways your personal data may be used and shared.
(c) State simple methods of keeping data secure.

Outcome 2

State data literacy concepts.

Performance criteria

(a) State the benefits of high-quality data.
(b) State types of data visualisations.
(c) State ways in which data visualisations can be interpreted and misinterpreted.

Outcome 3

Interpret simple data.

Performance criteria

(a) Interpret simple data visualisations to identify patterns and trends.
(b) Describe data visualisations in terms of quality.
(c) Describe data generated by AI tools in terms of quality.
(d) Draw conclusions from data and communicate findings.

National Unit Specification: Statement of standards (continued)

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Evidence requirements for this unit

Evidence is required to demonstrate that learners have achieved all outcomes and performance criteria.

Learner must provide **knowledge** and **product** evidence.

The **knowledge evidence** relates to outcome 1 and outcome 2. The knowledge evidence may be written or oral or a combination of these. Evidence can be gathered in an 'open book' situation, with learners able to refer to their notes or online resources if necessary.

Evidence can be in the form of short answer text or oral (bullet points or short paragraph, depending on the performance criterion), a poster, presentation, audio file, informal short video, or similar creative work. This can be as part of small group work, with each group member contributing to a larger piece of work such as a presentation with one slide per learner, or each group member writing bullet point notes that need to be included in a short video segment. An audience for this work could be given to the learners, such as teaching Primary children how their personal data is used by different people, or helping relatives or friends keep personal data safe.

The amount of evidence may be the minimum required to infer competence across both outcomes. For example, in outcome 1, only the most common ways of personal data being shared need be described (performance criterion (b)); and only the main data security methods need to be stated (such as password management, anti-virus software and encryption) (performance criterion (c)). In outcome 2, only 2 or 3 benefits of high-quality data need to be stated (performance criterion (a)).

The **product evidence** relates to outcome 3. Learners must interpret (performance criterion a), describe (performance criterion b) and draw conclusions from (performance criterion d) at least two supplied visualisations, which vary in terms of their presentation and information content. The evidence for performance criterion (c) must take the form of describing at least one output of a generative AI tool (which may be textual or visual) in terms of relevance and accuracy.

The evidence must be produced by the learner with limited assistance. It may be produced in lightly controlled, open book conditions, over an extended period of time, at times and places at the discretion of the learner. Evidence can be gathered in an 'open book' situation, with learners able to refer to their notes or online sources if necessary. The amount of evidence may be the minimum required to infer competence across the outcome.

National Unit Specification: Statement of standards (continued)

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The SCQF level of this unit (level 4) provides additional context on the nature of the required evidence and the associated standards. Appropriate level descriptors should be used when making judgements about the evidence.

When evidence is produced in loosely controlled conditions it must be authenticated. The guide to assessment provides further advice on methods of authentication.

The support notes section of this specification provides specific examples of instruments of assessment that will generate the required evidence.

National Unit Support Notes

Unit title: Data Citizenship (SCQF level 4)

Unit support notes are offered as guidance and are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit

This is a mandatory unit for NPA Data Science at level 4. On successful completion, it will allow progression to Digital Citizenship at SCQF level 5. There is an emphasis on both the development of practical skills as well as gaining relevant knowledge and understanding.

Please note that the following guidance, relating to specific outcomes, does not seek to explain each performance criterion. It seeks to clarify the statement of standards where it is potentially ambiguous. It also focuses on non-apparent teaching and learning issues that may be over-looked, or not emphasised, during unit delivery. As such, it is not representative of the relative importance of each outcome or performance criterion.

Knowledge	Skills
• **How data is used and misused and impact on individuals, organisations and society:** • Role of data in decision-making in areas like home, community, sport. • Give examples of success stories from use of data, and examples of data disasters. • **Ways personal data may be used and shared:** • Types of personal data and sensitive personal data. • What data is shared, and with whom; risks and benefits of sharing online; how long will personal data stay online and how can it be deleted.	• **Interpret simple data visualisations to identify patterns and trends:** • Read a selection of different chart types, such as: frequency tables, dot plots, bar charts, pie charts, line graphs, stacked and grouped bar charts, and treemaps. • Describe the displayed data: state what was measured; be quantitative; use descriptive vocabulary; be consistent with the data as shown. • **Evaluate data visualisations in terms of quality:**

National Unit Support Notes (continued)

Unit title: Data Citizenship (SCQF level 4)

Knowledge	Skills
• **Simple methods of securing data:** Strong Passwords; Password managers; Encryption; Preventing viruses and malware. • **Benefits of high-quality data:** Improved customer experience; reduced risk; competitive advantage; increased revenue. • **Types of data visualisations:** Anatomy of graphs: Data (dots or bars), scales and coordinates (detailed along the x-axis and y-axis), and annotations (such as title and axis labels). • Format / appearance of a selection of different chart types, such as: frequency tables, dot plots, bar charts, pie charts, line graphs, stacked and grouped bar charts, bubble plots and treemaps. • **Ways data visualisations can be interpreted and misinterpreted.** Read plots (identify the name of the plot, interpret the axes, identifying information, look for trends). • Identify factors in misleading graphs, such as proportions not adding up to 100%, axes not starting at zero, missing data points, too many colours or segments.	• Evaluate a data visualisation: Axes visible, labelled and scaled correctly; units are given; Data plotted accurately; Legend present, if required; Graph is overall neat and legible; Title or caption present. • **Evaluate data generated by AI tools in terms of quality:** Use AI tools such as Generative AI tools to generate text, images, video, sound, music or other content. Evaluate the output in terms of quality. • **Draw conclusions from data and communicate findings:** • A claim is made about what the graph shows in response to the question / issue and the claim is consistent with the graph as drawn / shown; The reasoning used to arrive at the claim is explained and is logical; the reasoning explains how the evidence (data) support the claim and what the evidence means in terms of the question / issue. • Communicate findings: Present findings with an audience in mind (such as peers, family, school management, or community) with a purpose, such as to inform or persuade.

Outcome 1: State the use of data in society.

This outcome is based on the current use of data in society. This includes the use of data for social benefit, the ethical (and unethical) use of data, such as the use of false or deliberately misleading data.

A variety of real examples can be used to illustrate why data is used, but also the limitations and effect it can have on decision making in society, and the impact on individuals. The role of data in decision-making in areas like home, community, sport could be discussed. Learners could study examples of success stories from use of data, and examples of data disasters.

National Unit Support Notes (continued)

Unit title: Data Citizenship (SCQF level 4)

Learners should think about the data they generate in regard to personal data sharing and privacy. This could include discussion of types of personal data and sensitive personal data, what data is shared, and with whom; risks and benefits of sharing online; how long will personal data stay online and how can it be deleted. Other contemporary issues could be discussed if topical, such as location tracking, digital surveillance, or facial recognition.

It is hoped that learners will get a balanced view of the use of data in society, that although privacy and security can impact on individuals, there are many examples of data being used for social good and impacting positively on individuals and communities.

Strategies for keeping personal data secure might include methods such as strong passwords, password managers, using encryption, preventing viruses and malware by using anti-virus software, and physical security.

There are lessons are available online at NPA Data Science Lessons Overview Learn Data Science (https://dataschools.education/learndata) covering some of the topics in this unit as well as in the Data Science unit (J8LW 44) such as data security, data misuse, and data quality. The lessons come with PowerPoint presentations, lesson plans, activities in a choice of format (either Excel workbook or interactive Python notebook).

There is a Trello board of teaching resources on data and data security available at Data Science resources and links.

Outcome 2: State data literacy concepts.

This outcome is centred around basic data literacy. This would include areas such as how to use data, when not to use different sources of data, strategies for securing personal data, and different ways to visualise data.

The benefits of quality data should be explored, perhaps looking at case studies in different contexts, for example improved customer experience in business; reduced risk in healthcare; competitive advantage from accurate insights in sports; increased revenue in music ticket sales; higher staff productivity in industry. This could include learning to avoid the use of poor quality data, such as data that is out of date, inaccurate, incomplete, or gathered from a small sample size.

Learners should recognise that visualisations can represent different types of data and be able to justify why certain visualisations are more suitable than others for given scenarios. Learners will extract meaning from graphs and charts, including discussion about which visualisations are best for which purpose. The aspects of different types of visualisations might include the anatomy of graphs: Data (dots or bars), scales and coordinates (detailed along the x-axis and y-axis), and annotations (such as title and axis labels).

National Unit Support Notes (continued)

Unit title: Data Citizenship (SCQF level 4)

Data visualisations that could be explored include frequency tables, dot plots, bar charts, pie charts, line graphs, stacked and grouped bar charts, bubble plots and treemaps. Not all of these need to be covered by learners, and other types of visualisations may be explored too, if suitable.

Learners should be able to interpret what different types of visualisations show as well as the limitations and possible misinterpretations. For example, the use of graphs where the axis does not begin at zero, proportions not adding up to 100%, missing data points, too many colours or segments. Factfulness 'dramatic instincts'(Gapminder) could be used to help identify misleading aspects.

There is a Trello board of suitable data visualisation available at Data Visualisation Examples grouped by visualisation type and complexity. There is also a Trello board of 'Bad Graphs' available at Bad Graphs grouped by visualisation type and complexity. These are collated by Data Education in Schools (Data Education in Schools) and contributions from educators and learners are welcomed.

Outcome 3: Interpret simple data.

This outcome is based around applying learner's knowledge of, and competency in, basic data literacy from outcome 2.

Interpret data visualisations:

Data visualisations that could be interpreted include frequency tables, dot plots, bar charts, pie charts, line graphs, stacked and grouped bar charts, and tree maps. Learners should describe the displayed data by stating what was measured in the visualisation. Learners should be able to read several different types of visualisations (for example, identify the name of the visualisation, interpret the axes, identifying information, look for trends). Encourage learners to be quantitative, to use descriptive vocabulary, and to be consistent with the data as shown.

When interpreting a visualisation, learners might comment on some of the following: the axes are visible, labelled and scaled correctly; units of measurement are given; the data is plotted accurately; there is a legend present, if required; the graph is overall neat; and there is a title or caption.

The 'I notice, I wonder, What's going on in this graph' approach (What's going on in this graph) could be taken when interpreting visualisations. This can be as part of small group discussions, such as a regular lesson starter task. Individual learners can be assessed on occasions that they are contributing sufficiently (such as commenting at each stage of the 'I notice, I wonder' process).

National Unit Support Notes (continued)

Unit title: Data Citizenship (SCQF level 4)

When evaluating graphs in terms of quality for performance criterion (b), the visualisations selected can be good quality graphs or 'bad graphs' where learners might have more to discuss about the poor data quality and misleading nature of the visualisations.

Describe data generated by AI tools:

Care should be taken to ensure the Generative AI tool selected is suitable for the age of learners taking this unit, based on the terms of use of the service. For example, OpenAI (who provide DALL-E and Chat-GPT) have a minimum age of 13 to use their tools, and people under 18 years old must have parent or legal guardian's permission to use the services (https://openai.com/policies/terms-of-use).

Suggested tools include:

Images: Image creator (which uses DALL-E).

Chat: Chat (which uses GPT-4).

These may be available to learners using their educational Microsoft / GLOW accounts, although this depends on individual local authorities, colleges and centres allowing this functionality.

Generative AI tools are in an early stage of development yet are now commonly being used in industry and by individuals. One aspect of these systems is that there is little transparency about how they have been trained. As a result, there is a chance that unsuitable or upsetting content might be generated. It is advised that centres and educators discuss child protection and online safety with learners, and procedures to follow if learners encounter material online that upset or concern them.

An alternative to using AI tools 'live', or if learners do not have access to Generative AI tools, then text or art created using AI tools could be supplied to the learners, along with the prompts used to create the results.

Draw conclusions and communicate findings:

If this unit is being delivered concurrently with the Data Citizenship unit at SCQF level 5, then performance criterion (d) at SCQF level 4 matches with the data gathering activity at SCQF level 5. At SCQF level 4 learners are not expected to gather their own data, but it is hoped that the topic of the visualisation chosen would be relevant to the learners' interests and environment. The visualisation might be on a topic such as food eaten at breaktime, amount of exercise taken during the week, method of travelling to school.

National Unit Support Notes (continued)

Unit title: Data Citizenship (SCQF level 4)

Learners should then draw conclusions about the information in the visualisation and present their findings. Learners can present their views in oral or written form, as a document, poster, presentation, audio file, informal short video, or similar creative work. Learners should present findings with an audience in mind (such as peers, family, school management, or community) and with a purpose, such as to inform or persuade.

Guidance on approaches to delivery of this unit

The following distribution of time is suggested.

Outcome 1: 10 hours.
Outcome 2: 10 hours.
Outcome 3: 20 hours.

With regards to the order of teaching the three outcomes, it is suggested that some of outcomes 2 and 3 could be delivered together. This is to allow learners the opportunity to firstly learn about a type of data visualisation, then demonstrate their ability to interpret examples of that type of visualisation. Learners can then learn about other types of data visualisations before again moving onto applying these skills in outcome 3.

Guidance on approaches to assessment of this unit

The following are suggestions only. There may be other methods that would be more suitable to learners and the type of learner assessment activities will vary depending on the resources available.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

The product evidence could be assessed through the observation of learner's activity throughout the duration of the unit and recorded in an appropriate manner, such as on an observation checklist. Such as checklist would include a brief description of the task carried out by the learner.

National Unit Support Notes (continued)

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An alternative approach to assessment could involve the use of a portfolio, which would contain knowledge and product evidence. If this approach is taken, evidence for all performance criteria would be required. The portfolio would include all of the evidence necessary to satisfy every performance criterion. Valid artefacts would include screenshots, digital photographs, audio and video recordings, annotated presentation slides, posters, etcetera. Some form of authentication would be required, such as a statement signed and dated by learner and assessor.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at SQA e-Assessment. (www.sqa.org.uk/Guide to best practice.pdf).

Opportunities for developing Core and other essential skills

Learners will be provided with ample opportunity to develop the following Core Skills:

Information and Communication Technology (ICT): The unit provides the opportunity to use ICT and further develop digital literacy skills while exploring data and interpreting data visualisations. Depending on the types of visualisations explored, learners may have the opportunity to handle numerical and graphical information.

Communication: Learners will develop and practice both oral and written communication throughout this unit via individual and group exercises.

Numeracy: Through interpretation of data, learners will have several opportunities to develop numeracy skills throughout this unit.

Problem Solving: The type of activities, assignments, and assessment experienced throughout this unit will require learners to apply critical thinking, plan, organise and review and evaluate both their results and the work of others.

Opportunities within this unit to develop broader skills in the areas of enterprise, employability, sustainable development and citizenship.

- Teamwork and collaboration skills.
- Communication skills.
- Problem-solving skills.
- Locating information skills.
- Observation skills.

History of changes to unit

Version	Description of change	Date

Unit template: February 2024

General information for learners

Unit title: Data Citizenship (SCQF level 4)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This unit will introduce you to the world of data. The unit is about developing your data citizenship skills that are useful in life and society. You will develop your knowledge of how to interpret data, as well as exploring how data is used in the world you live in today. It is not necessary for you to have studied data citizenship before.

Data has an increasing importance in our everyday lives, and data is used in all aspects of our society. Data can be used by organisations to increase performance and profit. Football clubs and sports teams now use data to get the best out of their players. Musicians use data to find out how their tracks are performing in different parts of the world and being shared on different social networks. Data can also be misused by organisations, such as influencing people about important topics such as climate change or the spread of diseases.

In outcome 1 you will find out about how data is used in different places such as in the community, in education, sports and leisure, music and entertainment. You will learn how data is used and how it can benefit society. You will also find out about how companies have misused data and about data disasters.

You will learn about how data about you is used and shared by different organisations, and how you can gain some control over how they use your data. You will find out how to protect your own data using tools like password management apps and anti-virus software.

In outcome 2 you will gain a range of skills in interpreting data visualisations such as graphs and charts, and how these are used for positive and negative effects. You will also learn how to spot when people are trying to mislead or confuse you with ‘bad graphs’.

In outcome 3 you will demonstrate what you have learned about different types of data visualisations by interpreting and evaluating different types of graphs. You will also evaluate how well Generative AI tools use data to make new text or images.

General information for learners (continued)

Unit title: Data Citizenship (SCQF level 4)

The unit covers the following knowledge and skills:

Knowledge	Skills
• How data is used and misused and impact on individuals, organisations and society. • Ways personal data may be used and shared. • Simple methods of securing data. • Benefits of high-quality data. • Types of data visualisations. • Ways data visualisations can be interpreted and misinterpreted.	• Interpret simple data visualisations to identify patterns and trends. • Evaluate data visualisations in terms of quality. • Evaluate data generated by AI tools in terms of quality. • Draw conclusions from data and communicate findings.

You can be assessed in a variety of ways such as writing short answers to questions, making a poster or presentation, speaking to answer questions, making a short video or audio recording or working in a group with other learners.