Identifying opportunities to build data literacy in Years 7–10 Mathematics

P–10 Australian Curriculum

Key messages

All high school graduates will, as members of society, be presented with data-based claims throughout their lives. Therefore, they must be able to examine these claims and be intelligent consumers of studies, capable of reasoning critically and questioning the implementation of the statistical investigation process in those studies (National Council of Teachers of Mathematics 2018).

Students in Years 7–10 Mathematics work with increasingly complex data concepts that underpin the data literacy required to be intelligent consumers and producers of data.

This factsheet focuses on:

- the data collection and analysis cycle
- data literacy opportunities within the Australian Curriculum: Mathematics
- key teaching and learning strategies for engaging students in data literacy.

Data collection and analysis cycle

The data collection and analysis cycle is adapted from Siemon et al. (2015) and may be used during any type of systematic investigation.

The complete data collection and analysis cycle begins with developing a question of interest for exploration. Students then collect data in the form of observations and/or measurements to attempt to answer the question posed. This data is then represented in a form that allows analysis and interpretation, e.g. visualising and looking for patterns in data. Students may draw conclusions to attempt to answer the original question and/or raise further questions for subsequent investigation.
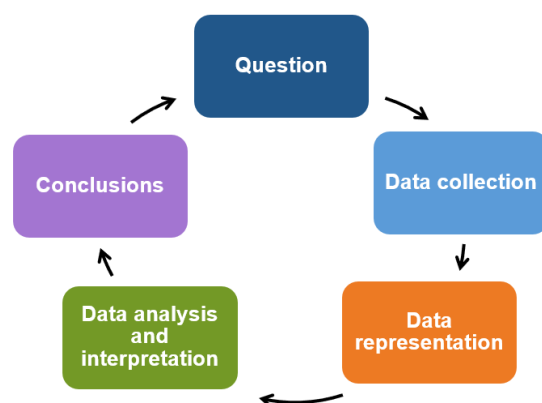
Students may be involved in the complete cycle or with select aspects as they engage in a unit of work involving data.

Data literacy opportunities — Australian Curriculum: Mathematics

An achievement standard states what students should know and be able to do at the end of a specific year. The standards provide explicit opportunities for students to employ their data literacy understanding and skills.

In Years 7–10, the sub-strand Data representation and interpretation includes explicit opportunities for students to:

- focus on data collection techniques
- describe and interpret data
- effectively represent data.

Implicit opportunities also occur in curriculum content where students require data literacies to understand and engage with that content. For example, in Year 9 the concept of 'simple interest' provides many opportunities for students to read and interpret tables and graphs associated with a bank's loan rate.

Strategies for building data literacy

Two key teaching and learning strategies for engaging students in data literacy are examining false claims and using directed activities related to text.

Examining false claims

One strategy to enhance students' skills in comparing data collection and representation techniques is examining false claims made in the media. This is a great hook to spark students' interest, particularly if you choose examples that are relevant for your school context. Students could examine false claims that are based on:

- purposeful and biased sampling

- inaccurate or purposefully misleading representation of data.

Once students have experience with these underlying considerations, they could create their own false claim or non-example by deliberately using poor data collection or representation techniques. Through this process, students develop a deeper understanding of how to select appropriate techniques. They are also more likely to employ critical thinking in the future as they encounter claims in the media and on social media.

Directed activities related to text

Directed activities related to texts (DARTs) are activities designed to encourage critical analysis of representations. They may be used to get students to interact with any text, including visual text commonly used in mathematics. DARTs are employed as a strategy for enhancing understanding of conventions and improving data comprehension, e.g.

- reconstruction activities, where students complete information that has been intentionally omitted from a graphical representation (title, labels, key, frequencies) and discuss their decisions

- questioning activities, which encourage a more critical examination of the data, its source and the type of questions that could be answered by the data. Students can consider

  - Who wanted this data, and why did they want it?

  - Where was the sample drawn from?

  - How were the categories decided?

References

Australian Curriculum, Assessment and Reporting Authority (ACARA), Australian Curriculum Version 8, www.australiancurriculum.edu.au/f-10-curriculum/mathematics.

National Council of Teachers of Mathematics (NCTM) 2018, *Catalyzing Change in High School Mathematics*: *Initiating critical conversations,* NCTM, Reston, ISBN 978-1-68054-014-7.

Siemon, D, Beswick, K, Brady, K, Clark, J, Faragher, R & Warren, E 2015, *Teaching Mathematics: Foundations to middle years*, 2nd edn, Oxford University Press, Melbourne, ISBN 978-0-19552-382-9.

Verster, C, n.d. 'Interacting with Texts: Directed activities related to texts (DARTs)', *Teaching English*, www.teachingenglish.org.uk/article/interacting-texts-directed-activities-related-texts-darts.