**Levels 9/10 English Activity**

**Misused Statistics and Fake News**

**Introduction to Numeracy in English**

Literacy and numeracy are the foundational “building blocks of knowledge, skill and understanding” (Australian Government Department of Education and Training, 2018, p. 5) and a key indicator of quality education. Consequently, the study of English is not only a foundational learning area but is vital for developing young people into informed and active members of society as they “learn to analyse, understand, communicate and build relationships with others and with the world around them” (Victorian Curriculum and Assessment Authority [VCAA], n.d.-a, para. 1). In particular, as students engage with the English curriculum, they are tasked with developing their critical reading and viewing skills, and are exposed to a variety of multimodal texts, in which information is conveyed in linguistic and non-linguistic ways. Statistics can be used as rhetorical devices to inform and persuade readers (Quiring, 2018). Given the increase in social media and the rise of ‘fake news,’ there is a need to ensure that students are equipped with information literacy skills (Cooke, 2018). In the intersection between literacy and numeracy, it becomes vital for young people to develop and apply critical literacy skills to understand and interrogate the ways in which statistics are used within a range of texts. When students critically inquire about how statistics can be used to inform, persuade, and/or mislead, students’ critical thinking and reading skills are developed. Furthermore, by developing these skills, students become informed, active citizens.

The English curriculum is structured by three modes (reading and viewing, writing, and speaking and listening). Within each mode, there are three strands:

* language: the English language (how it works and how to use it)
* literature: the study of and engagement with a range of literary texts
* literacy: the interpretation and creation of texts, and understanding of how literacy applies to everyday life

Numeracy underpins all three of these strands. First, the location and presentation of statistical information in a sentence, paragraph, or text can influence how information is communicated and interpreted. Second, given the concerns relating to the rise of social media and the credibility of online media texts (Cooke, 2018), it is important for students to examine the credibility of statistics used within such texts. Finally, by understanding how statistics can be used to inform and persuade readers, students can apply statistics, as a rhetorical device, in their own written and spoken texts.

In the study of English, students develop and apply their numeracy capabilities when they analyse, interpret, and communicate statistics in a range of texts. Given that statistics can be employed as a rhetorical device to persuade others, students need to be able to:

* identify this type of rhetoric in a range of texts
* develop critical literacy skills to interpret and analyse this type of rhetoric within texts, including those in which current local and world issues are depicted
* create texts in which credible statistics are used

**Developing Numeracy Understanding in English**

Students need to develop critical statistical literacy skills in order to become informed citizens within modern societies, which are “increasingly shaped by and driven by data-based arguments” (Weiland, 2017, p. 33). Statistical reasoning is required in order for individuals to cope with the obligations and responsibilities of citizenship, as individuals must interpret, analyse, and evaluate arguments in which statistics are incorporated. There are often missed opportunities to explore the intersection between numeracy and literacy, particularly within the context of wider social and political issues (Gutiérrez, 2013; Weiland, 2017). As Weiland (2017) argues,

it is crucial for students to have opportunities to tackle complex sociopolitical issues in conjunction with learning powerful statistical concepts and practices in an effort to be able to read and write both the word and the world with statistics as critical citizens. (p. 45)

Similarly, Goos et al. (2014) suggest that informed and critical citizens must also be numerate citizens as data are incorporated in every public issue: “In an increasingly complex and information-drenched society, numerate citizens need to decide how to evaluate quantitative, spatial, or probabilistic information used to support claims made in the media or other contexts” (p. 85). Although drawing upon mathematical knowledge and tools to analyse the appropriate and/or credible uses of statistics is crucial, it is also important to understand how language is used to rhetorically frame statistics in a way that might shape how they are interpreted. For example, consider the following stylistic choices that were made to present the same statistic:

“The numbers rose by 25%.” (no defined timeframe, so it is left up to interpretation)

“The numbers rose by 25% in one day/week/month/year.”

“The numbers rose by a *mere* 25% in one day/week/month/year.”

“The numbers rose by a *whopping* 25% in one day/week/month/year.”

Additionally, structural choices are made by authors when situating statistics within a particular structure or genre, such as a social media post, a chronological sequence of events, or a news report. The structural choices made in a text help in identifying the purpose, as well as the intended audience. For example, the decision to compare the statistics across different states or countries, or to position statistical data within a particular and familiar context is shaped by both the author’s purpose and their intended audience.

Young people need to be equipped to interrogate the language used within texts in order to understand how structural and stylistic choices shape meaning. There are times that mathematical and statistical terms are used incorrectly, often unintentionally, within texts. For example, the word “significant” is synonymous with words such as “important” or “outstanding,” which can be used as descriptive words that are used to signal the author’s purpose. However, in statistics, “significant” refers to the statistics not *likely* being due to chance, which can denote a completely different meaning than the author is attempting to portray.

**Lesson Plan: Misused Statistics and Fake News**

The purpose of this lesson plan is for students to consider how meaning is created in online media texts by critically examining the use of rhetorical devices such as statistics, language, and visuals. Students will explore and interrogate the use of statistics in social media and online news articles in order to make informed and critical decisions about the appropriateness and credibility of data-informed judgements made by the authors of these texts. Students will examine and compare how visuals and structural and stylistic choices within text, shape and frame the use of statistics in online texts.

**Prerequisite/Corequisite Knowledge: English**

Students need to have and/or develop the ability to:

* Recognise that statistics can be misleading
* Understand that different text structures, language features (e.g., vocabulary), and images are used for varying purposes and audiences
* Question the reliability of a source
* Analyse and compare information in different texts

**Background Mathematical Skills and Understandings**

Teachers of English are not expected to teach the mathematical knowledge and skills that students will draw on when engaging with this activity. The students will have learnt and should be adept with the required mathematical knowledge and skills to complete the activity. According to the Victorian Curriculum: Mathematics, the required mathematical knowledge and skills should have been developed in earlier years of schooling, that is, by the end of Level 8.

For this activity, the background mathematical skills and knowledge are:

* Knowledge of percentage
* Familiarity with a range of visual data displays
* Ability to describe and interpret data presented in tabular and other visual displays
* N.B. Although students will be familiar with categorical variables in relation to data displays, they may not have encountered the use of the word “variable” in a statistical context.

**Lesson Description**

***Setting the Scene: Engaging Students***

Write on the board or present in another visual format: fake news. Use the think, pair, share technique to have students discuss the following:

1. What is fake news?
2. What is an example of fake news that you have encountered?
3. How did you know that it was fake?

***Explicit Teaching and Scaffolding***

Present the following two visuals to the class (or choose other visual examples that align with previous teaching content—infographics and/or graphs that demonstrate how statistics can be represented in a range of ways):

Table 1: Crime in the USA 2015 (see <https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/expanded_homicide_data_table_6_murder_race_and_sex_of_vicitm_by_race_and_sex_of_offender_2015.xls>)

Figure 1: Infographic – USA Crime Statistics – 2015 (see <https://www.politifact.com/factchecks/2015/nov/23/donald-trump/trump-tweet-blacks-white-homicide-victims/>)

Allow time for students to view and reflect on the table and infographic. Ask the following questions as part of a whole-class discussion:

1. What do you notice about how these statistics are presented? Discuss the following in more detail:
	1. The type of language or word choices (African Americans versus Blacks, the use of ‘killed’ rather than ‘murdered’)
	2. Use of visuals (e.g., individual with militaristic clothing)
	3. Use of coloured or bolded font for emphasis
	4. The source: Does it look credible?
2. How do you make sense of these statistics? What is being communicated?
3. How might these statistics be misleading or confusing?

Also, discuss what the numbers represent (e.g., the percentages in the infographic do not add up to 100%, so what is the population that each separate set of percentages represents?) and the credibility and reliability of the statistics presented. Have students consider the purpose and the audience of these two visuals.

You can then provide the additional background of the visuals—Trump re-tweeted the infographic about crime in the USA, whereas the table is from the Federal Bureau of Investigation (FBI). It is also important to note that the ‘Crime Statistics Bureau – San Francisco’ does not exist. You can explain that it is important to conduct a fact check when statistics appear suspicious (see, for example, <https://www.factcheck.org/2015/11/trump-retweets-bogus-crime-graphic/>).

Next, co-construct, as a class or in small groups, a list of the discernible features of fake news. How might one spot fake news? The following steps may help:

1. Consider the source. (Have you heard of it before? Does it seem credible?)
2. Read the full article. (Some headlines use sensationalised information or data, or are used as ‘click bait,’ but the article has nothing to do with the headline.)
3. Check the date. (Is it old or recent? It is still relevant?)
4. What hyperlinks or links are used? Do they seem credible? Why or why not?
5. Is the article or infographic just for fun? Is it satirical?

Next, have the students watch the following video about how statistics can be misleading: <https://www.youtube.com/watch?v=sxYrzzy3cq8>

Discuss with students the following ways to spot possible problems with statistics:

1. Check for lurking variables (a hidden additional factor that influences the results).
2. Graphs are a great way to present information but check to see if they have been manipulated. Make sure that it is clearly stated what the graph represents. Are there (appropriate) scales and axes? Is some information there but other important information missing? Has information been grouped? If so, in what ways has this been done?
3. Check for bias. Could there be a range of ways to present these data?

Have students consider what they would change in Figure 1 to make it more credible and a better representation of the statistics.

***Interpreting, Analysing, and Comparing Two Articles***

Have students work in small groups to read and discuss the following articles:

1. <https://www.theage.com.au/national/victoria/vce-and-atar-results-2018-the-top-government-and-non-government-schools-in-victoria-20181219-p50n65.html> (Cook & Butt, 2018)
2. <https://www.miragenews.com/97-of-students-worried-about-their-vce-results-in-2020/> (97% of students worried about their VCE results in 2020).

Have students compare the two articles by listing and comparing the use of 1) statistics, 2) images/video, and 3) stylistic and structural language choices (genre [narrative versus compare/contrast], word choice, sentence structure, etc.). Students can use this information to create a mind map or visual representation and discuss their overall views on the purpose and credibility of these articles.

Gallery walk: After the small groups have completed their visual representation of the two articles, have each group walk around the room to view and discuss their peers’ representations.

Then, as a class, revisit the co-constructed list of fake news features and add or modify based on any new information or ideas from the article comparison activity.

***Extension Activity***

Students can use the following web-based resources to practice spotting fake news:

* <https://doubtit.ca/test-yourself/>
* <http://factitious.augamestudio.com>
* <https://www.forbes.com/sites/alisonescalante/2020/08/03/research-finds-social-media-users-are-more-likely-to-believe-fake-news/#1c893e808657>
* <https://www.getbadnews.com/#intro>

**Table 1: Links to the Victorian Curriculum – English**

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| Strand and Sub-Strand (if applicable) | Content Description (Code) | Elaboration(s) |
| Literacy* Interpreting, Analysing and Evaluating
 | Analyse and evaluate how authors combine language and visual choices to present information, opinions and perspectives in different texts(VCELY442) | Comparing two articles with accompanying images on a similar topic in the media, considering the language and visual choices made by the authors for different audiences |
| Literacy * Texts in Context
 | Analyse and evaluate how people, cultures, places, events, objects and concepts are represented in texts, including media texts, through language, structural and/or visual choices (VCELY466) | * Considering ethical positions across more than one culture as represented in text and consider the similarities and differences
* Questioning the representation of stereotypes of people, cultures, places, events and concepts, and expressing views on the appropriateness of these representations
* Identifying and explaining satirical events, including events in other cultures, for example depictions in political cartoons
* Identifying and evaluating poetic, lyrical language in the depiction of people, culture, places, events, things and concepts in texts

Analysing the ways socio-cultural values, attitudes and beliefs are presented in texts by comparing the ways news is reported in commercial media and Aboriginal and Torres Strait Islander media |
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**Table 2: Links to the 21st Century Numeracy Model (Goos et al., 2014)**

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| Aspect of the Model |  How This Aspect is Addressed by the Lesson |
| **Attention to Real-Life Contexts*** Citizenship
* Work
* Personal and Social Life
 | With concerns over ‘fake news’ and young people’s use of social media for information, students require analytical skills to spot fake news. Students are explicitly taught about the features of fake news to ensure that they are informed and critical citizens as they interrogate the statistical, visual, and linguistic features of online newspaper articles. Therefore, numeracy is linked to the real-life contexts of both citizenship and personal and social life.  |
| **Application of Mathematical Knowledge*** Problem Solving
* Estimation
* Concepts
* Skills
 | Students will make sense of data that are presented in graphs and infographics, particularly when data are presented in a range of ways such as ratios, percentages, and raw numbers. Students will also employ problem-solving skills to identify the various ways that statistics can be interpreted. |
| **Use of Tools*** Physical
* Representational
* Digital
 | Students will understand how data are digitally represented in a range of formats. Student will interrogate tables, graphs, and infographics, as representational tools, and identify how large data sets can be simplified and lead to possible misinterpretations. |
| **Promotion of Positive Dispositions*** Confidence
* Flexibility
* Initiative
* Risk
 | Students will gain confidence in analysing and interpreting statistics as they will be guided and scaffolded through the use of key prompts to help them to interrogate how statistics are used within texts. Students will have an opportunity to analyse a range of statistical representations as a class and in small groups, and thus increase their awareness and exposure to the various purposes of statistics. The texts used in this lesson are sourced from the public domain (i.e., real-life contexts), and therefore, students’ positive dispositions towards mathematics will increase as they realise the need for critical statistical literacy skills in being able to not fall victim to fake news. |
| **Critical Orientation*** Interpreting Mathematical Results
* Making Evidence-Based Judgements
 | Students will exercise their ability to act as informed and active citizens by analysing statistics that are portrayed in online newspaper articles and by considering how statistics can be used to create meaning. Drawing upon their critical statistical literacy skills, students can scrutinise the ways that statistics are presented and the various purposes of their use. Students not only explore how statistics have been presented and portrayed in order to make them credible; they compare and contrast two online newspaper articles and present their findings using a concept map that is viewed and critiqued by their peers. |

**References**

Australian Government Department of Education and Training. *Through growth to achievement: Report of the review to achieve educational excellence in Australian schools.* <https://docs.education.gov.au/documents/through-growth-achievement-report-review-achieve-educational-excellence-australian-0>

Cook, H. & Butt, C. (2018, December 20). VCE and ATAR results 2018: The top government and non-government schools in Victoria. *The Age.* <https://www.theage.com.au/national/victoria/vce-and-atar-results-2018-the-top-government-and-non-government-schools-in-victoria-20181219-p50n65.html>

Cooke, N. (2018). *Fake news and alternative facts: Information literacy in a post-truth era.* American Library Association Editions.

Department of Education. (2019). *High-Impact Teaching Strategies (HITS).* <https://www.education.vic.gov.au/school/teachers/teachingresources/practice/improve/Pages/hits.aspx>

Farley, R. (2015). Trump retweets bogus crime graphic. *Factcheck.* <https://www.factcheck.org/2015/11/trump-retweets-bogus-crime-graphic/>

Federal Bureau of Investigation. (2015). *Crime in the United States 2015.* <https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/expanded_homicide_data_table_6_murder_race_and_sex_of_vicitm_by_race_and_sex_of_offender_2015.xls>)

Goos, M., Geiger, V., & Dole, S. (2014). Transforming professional practice in numeracy teaching. In Y. Li, E. Silver, & S. Li (Eds.), *Transforming mathematics instruction: Multiple approaches and practices* (pp. 81–102). Springer.

Greenberg, J. (2015, November 23). Trump’s pants on fire tweet that blacks killed 81% of white homicide victims. *PolitiFact.* <https://www.politifact.com/factchecks/2015/nov/23/donald-trump/trump-tweet-blacks-white-homicide-victims/>

Gutiérrez, A. (2013). *Critical literacy in Australia: Affordances, tensions and hybridizations* [Unpublished doctoral dissertation]*.* University of Melbourne.

Liddell, M. (2016, January 14). *How statistics can be misleading* [Video]*.* YouTube.<https://www.youtube.com/watch?v=sxYrzzy3cq8>

97% of students worried about their VCE results in 2020. (2020, May 6). *Mirage.* <https://www.miragenews.com/97-of-students-worried-about-their-vce-results-in-2020/>

Quiring, B. (2018). Statistics as rhetoric: Why a statistics education must incorporate communication skills. In M. A. Sorto, A. White, & L. Guyot (Eds.), *Looking back, looking forward: Proceedings of the Tenth International Conference on Teaching Statistics* (pp. 1–6). International Statistics Institute.

Schleppegrell, M. J. (2007). The linguistic challenges of mathematics teaching and learning: A research review. *Reading & Writing Quarterly, 23*(2), 139–159.
<https://doi.org/10.1080/10573560601158461>

Victorian Curriculum and Assessment Authority. (n.d.-a). *English: Rationale and aims.* <https://victoriancurriculum.vcaa.vic.edu.au/english/english/introduction/rationale-and-aims>

Victorian Curriculum and Assessment Authority. (n.d.-b). *English as an Additional Language: Rationale and aims.* <https://victoriancurriculum.vcaa.vic.edu.au/english/english-as-an-additional-language-eal/introduction/rationale-and-aims>

Weiland, T. (2017). Problematizing statistical literacy: An intersection of critical and statistical literacies. *Educational Studies in Mathematics, 96*(1)*,* 33–47. <https://doi.org/10.1007/s10649-017-9764-5>