Maths case study and lesson plan

Maths

Within the mathematics curriculum both at KS3 and KS4, students are asked to be fluent in the fundamentals of mathematics which in turn will allow them to reason mathematically and solve problems. Critical literacy skills are vitally important when it comes to students mathematical reasoning (AO2), associated to problems. Students need to be able to infer what impact their assumptions about a problem may have upon a result.

Critical literacy link to GCSE assessment objectives

AO2: Reason, interpret and communicate mathematically.
Students should be able to:

- make deductions, inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of presenting information

Case study – Year 10 statistics and graphical representation lesson at Acklam Grange School, Middlesbrough

Throughout KS3 and KS4, students study a broad range of mathematical skills from calculating with numbers to representing statistical information graphically. In order to be able to access life within modern Britain students are taught to relate these skills to everyday life scenarios. Often these scenarios include campaigns within the media of special offers, financial mathematics, graphical representations and comparative figures.

The inclusion of these different representations of mathematics in the media within maths lessons allowed students to become sceptical and critical of information placed in front of them. Students became fundamentally aware to not take mathematical representations at face value and inspect the information provided closer before making an informed and unbiased judgement and assessment.

> "Within the media offers for goods and services are often presented in a favourable manner in order to entice the reader to buy items they may not necessarily need or can afford at this moment in time. Students need to be able to select appropriate calculations in order to calculate the savings and benefits of each offer depending on their own personal circumstances. Final sales, warehouse clearances and more are often used to tempt people into buying goods and services.

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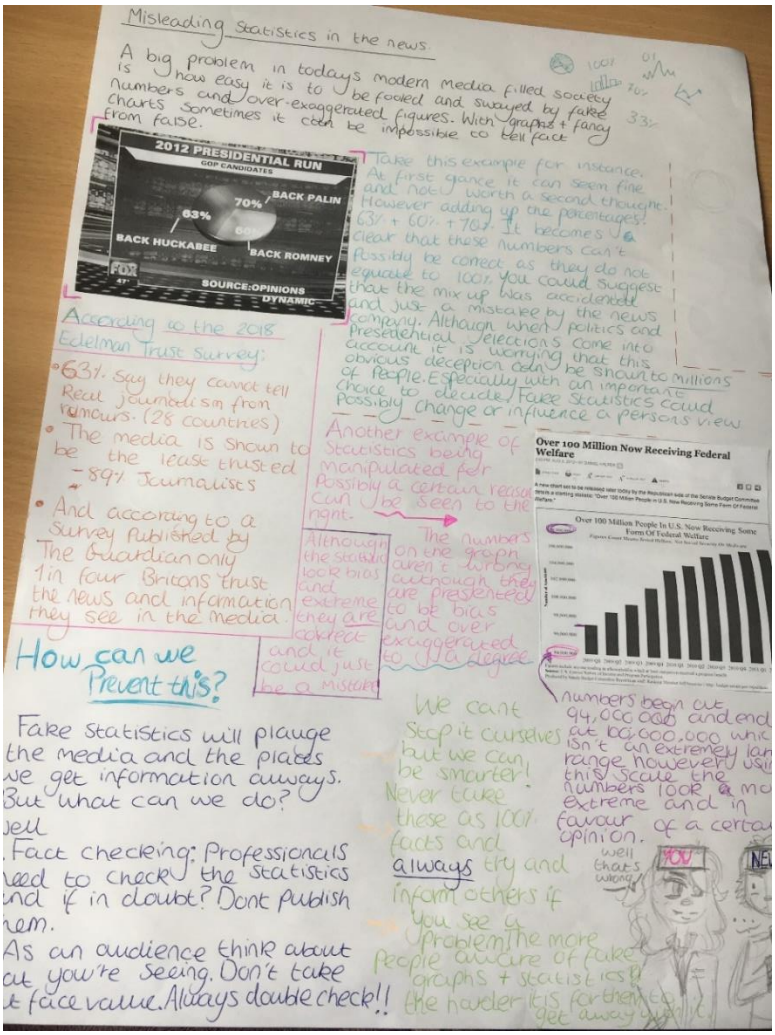
Students need to understand the emotive effects of language used within advertisement campaign so that they can make a well balance and calculated decision." (Danielle Bartram, Maths Lead Practitioner and Numeracy Coordinator)

This lesson required students to use their knowledge of visible mathematics within the media to actively debate where fake news might have presented itself within the media of current topical issues. This allowed students to openly apply their critiquing skills when particularly looking at the impact graphical misrepresentations may have on audience groups. Students were provided with research time where they were allowed to use IT to access the web and research fake news and how mathematics can be used to influence an audience. This allowed the students to see both the positive and negative impact media can have on social classes, ethnicity, gender, sexuality, disability and other impact groups.

Students were later provided with a selective group of graphs and articles and asked to form a critical argument on the use of mathematics within the media's portrayal of fake news and the impact on society. Through their research students were able to critically unpick the information presented and form a well presented argument into the media's precarious use of statistical and graphical representations.



Contributed by Danielle Bartram, Maths Lead Practitioner and Numeracy Coordinator at Acklam Grange School.

Maths example lesson plan

The lesson below allowed students to openly apply their critiquing skills when particularly looking at the impact graphical misrepresentations may have on audience groups. Students were provided with research time where they were allowed to use IT to access the web and research fake news and how mathematics can be used to influence an audience. This allowed the students to see both the positive and negative impact media can have on social classes, ethnicity, gender, sexuality, disability and other impact groups.

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Lesson plan

Topic	How are graphical representations used within the media to influence the audience?
By the end of the lesson students will….	Gold – Critically evaluate the way in which the medias misuse of statistics and misleading graphs may affect different social groups through the use of fake news. Silver – Analyse the impact the misuse of statistics and misleading graphs may have on the media's audience. Bronze – Explain how the graphs and statistics are misleading and used incorrectly within the media.

What will the teacher do?	What will the learner do?
Starter	
Task: Pose question to students for debate: What is fake news and where might you have seen it presented previously within the media? E.g. political campaigns	Students to use their knowledge of visible mathematics within the media to actively debate where fake news might have presented itself within the media of current topical issues.
Main part of the lesson	

1) Students to be given access to ICT facilities. Students to explore and build upon the fake news debate in groups and actively research the use of mathematics within fake news and the impact this may have on different social groups. Extension: to critically explore the moral purpose behind a media company's presentation of fake news. 2) Students to be provided with case study materials to assess. Students need to read and analyse the graphs and articles they have been provided with, with a view to critically evaluating the ways in which the media used misleading graphs and statistics to affect different social groups. 3) Students are to formally note down their arguments as a group onto a document. This can either be an article or a poster display.	1) Students to note down key findings from their research and discuss findings within their groups. 2) Students to critically engage with the materials provided. Students are expected to annotate and critique the articles and graphical representations with the reasons why they may be misleading and also deduce the inference of the impact this may have on the audience. 3) Students to use their critical literacy skills developed within English lessons to formally present a critical argument into the use of mathematics within fake news and impact on social groups.

Plenary

Facilitate the students presenting their findings. Students to use their oracy skills to present their critical arguments. Students to then be open to questions and debate of their findings and interpretations.	Students need to be able to present their findings and thinking clearly to the class on how the graphs and statistics are misleading and the potential assumed impact of this. They should present a balance argument following their research on the impact of fake news.

Resources used:

https://www.quora.com/What-are-good-examples-of-misleading-statistics
http://www.businessinsider.com/fox-news-charts-tricks-data-2012-11?IR=T
http://www.statisticshowto.com/misleading-graphs/
https://www.theguardian.com/media/2012/feb/01/loreal-advert-rachel-weisz-banned
https://www.datapine.com/blog/misleading-statistics-and-data/
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