Making science relevant to students:

A strategy to raise engagement and attainment

1. BACKGROUND

The National Curriculum for Science Education suggests that science should be taught in a way that enables students to 'develop curiosity about the natural world' and an appreciation of how science is relevant to their lives (DfE, 2015; pp. 34).

Findings from a survey conducted by the Wellcome Trust (2020) suggest that only 41% of secondary-aged pupils feel that having an understanding of science is important to their everyday lives. However, this report also found that relevance to real life is one of the biggest motivating factors in learning science. This supports the aims of the curriculum in suggesting that helping students see how science is relevant to them will enable them to learn better, whilst implying that currently those aims are not being completely fulfilled.

This results in two questions:

1. How can I make science more relevant to my pupils?

2. How will this 'relevance' impact my pupils?

2. ACADEMIC LITERATURE

- The Education Endowment Foundation (2018) suggested that good science teaching improves engagement as well as attainment, but that to do this pupils have to be able to see how science is important to them and their lives. Did not provide guidance on how to make science relevant.
- Hulleman and Harackiewicz (2009) found that interventions aimed at helping students make connections between the science curriculum content and their own lives increased interest and improved performance. This effect was particularly strong in pupils who were disengaged due to a lack of confidence that decreased their expectations for their own success. Following the intervention, these pupils reported a greater interest in science and received higher grades. Does not indicate what the relevance intervention consisted of.
- This research supports Wigfield and Eccles' (2000) expectancy-value theory of achievement motivation which suggests that achievement and choices related to achievement made by pupils are determined by two things:
  a) Expectancies for success – their confidence in their perceived ability
  b) Subjective task values – how important, enjoyable, relevant or costly they perceive the task to be
- Therefore, by increasing the relevance of science to pupils, they will be more likely to place a greater value on the subject which will encourage them to work harder and take a more active role in lessons, consequently improving attainment.

3. IMPLEMENTATION

To raise engagement and attainment in science for my pupils in accordance with the expectancy-value theory, I have introduced activities to help them see the relevance of the curriculum content to their every day lives. When a real life link appears in a lesson, the icon shown in figure 1 is used to flag this to pupils. This could be displayed on a presentation slide or a worksheet. For example, figure 2 shows a typical activity slide where students are considering the use of colour filters to create the blue or red lights from a bulb producing white light on police cars.

Fig. 1

Ultimately, the strategy is to use real-life examples to structure activities that help pupils make links between the science content they learn in the classroom and what they see in the outside world. Evidence suggests that this will help students become more engaged, particularly those lacking in confidence, which should help improve their attainment (Hulleman and Harackiewicz, 2009).

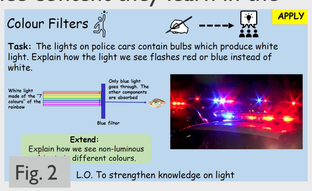

Fig. 2

4. WORK PRODUCED

- Figure 3 – 'The _____ Observer' newspaper article produced by a year 9 pupil discussing the uses of electromagnets. Students asked to apply their knowledge and creativity using literacy skills to think about where they might see electromagnets being used in real life.
- Figure 4 – Diagram of a zoo with endangered animals created by a year 7 pupil as part of the ecosystems topic. Encouraging students to think about animals that are endangered and the importance of zoos in preventing and aiding this. Also thinking about animals' habitats and how a zoo should be laid out.
- Figure 5 – Using the speed of light and sound to compose a written explanation of weather in a storm. Year 9 student explains why we see lightning before we hear thunder even though both occur at the same time. Also demonstrated using a youtube video so students can visualise.

Fig. 3

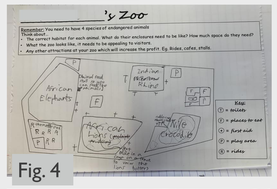

Fig. 4

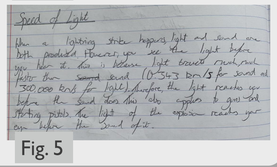

Fig. 5

5. EVALUATION (THEORY → PRACTICE)

Overall, students have responded exceptionally well to the strategy, and have produced excellent work as a result. When initially taking on some of my classes at the beginning of placement, interest in science was fairly low. A great deal of passive compliance could be observed in lessons, where pupils completed work but did not truly engage.

Since I have introduced the strategy engagement in science has increased massively in all of my KS3 classes. I now have pupils going home to research the things we learn/talk about in lessons, and coming to tell me the next day.

In reference to Wigfield and Eccles' (2000) expectancy-value theory, I have noticed that my students are becoming more confident and raising their hands to give answers in lessons, and also asking for help when they get stuck (which they often wouldn't do in the past). Change in attainment hasn't been so apparent, particularly in those that were already high-attainers. For example my year 10 class is a top set class of high-expectancy pupils for whom the increased relevance has had little impact. This corresponds with the findings of Hulleman and Harackiewicz (2009), who suggested that the impact of making science more relevant is stronger in low-expectancy pupils, something I have noticed too. However, since they provide no guidance on how to support the high-expectancy pupils, this is something that requires further investigation.

6. NEXT STEPS/CONCLUSION

Making science relevant to my students is something I intend to continue attempting to do throughout my career as a teacher to ensure that students are engaged and hopefully further attainment. However, there are several things that I will consider and/or act upon in the future:

- I will be sure to monitor the progress of my students to truly determine whether attainment is positively affected
- I will attempt to emphasise relevance in science in ways that are targeted towards pupils of different abilities and interests, as this is not one size fits all (Hulleman and Harackiewicz, 2009)
- I aim to develop a strategy to be used alongside this one that is aimed at increasing the confidence and expectancy of students in science (Wigfield and Eccles, 2000)
- I will consider whether this is a strategy that is more effective with KS3 pupils or whether KS4/5 pupils simply require a different approach
- I will strive to ensure that the curriculum is not lost in the process of trying to make things relevant to students

References:

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