2020 cohort

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Do teachers talk too much?

Hattie *et al* show that around 80% of a pupil's time in a classroom is sat listening to teacher talk (Hattie, 2009) whereas only 10% of lesson time in science is allocated for reading (Lunzer, 1984; Raban et al., 1980). Whilst this exchange of information is essential, teacher-led lessons may not be the most effective format to impart information (Wilson, 1999). Pupils are expected to be passively listening or answering cold-called questions, leading to less inspiring science lessons as pupils get older (Porter & Parvin, 2009). This style of learning also impacts pupil literacy (Hattie, 2009). Without frequent and consistent periods of reading and writing pupils are often left ill-equipped when challenged with simple texts or when asked to complete extended writing tasks (Sherwood & Kovac, 1999). Poor literacy levels are particularly prevalent in Science. In 2018 the Education Endowment Foundation (EEF) (Education Endowment Foundation, 2018) published a report and subsequent recommendations for 'Improving Secondary Science'. The penultimate recommendation, 'developing scientific literacy' is the focus of this study. Writing about science is critical for developing pupil understanding of complex topics (Rivard & Straw, 2000). Writing provides the opportunity for pupils to consider their comprehension of a topic and advance their newly formed ideas (Wellington, 2001). In this study, I plan to combine the findings discussed above into directed activities related to text (DART) (Raban et al., 1980). These DART tasks will comprise of a range of meticulously chosen scientific literature that have been appropriately scaffolded. The information extracted from these texts will then be transferred into various structured activities to aid comprehension.

My research question 'How do activities related to text impact extended reading and writing in science for year 9 pupils?' was investigated using a set of alternative DART resources across a KS4 biology topic in year 9 were created.

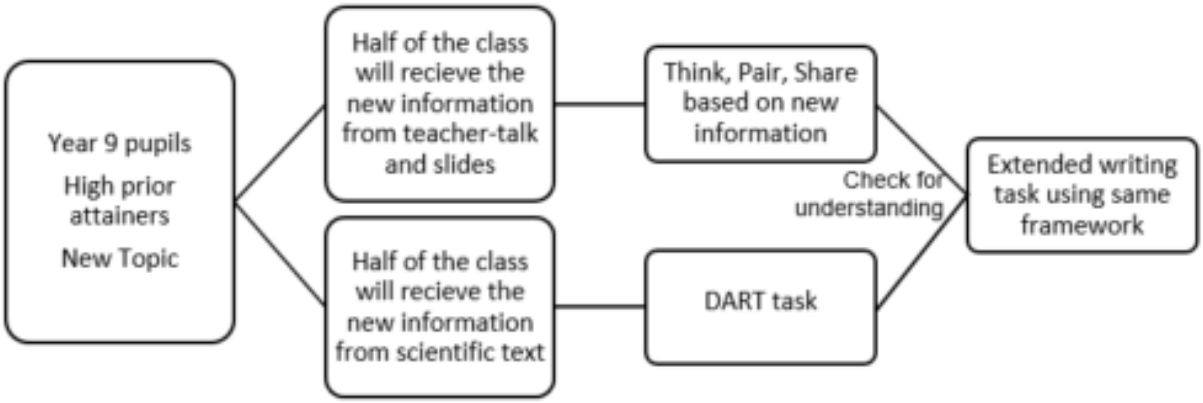

Figure 1: A summary of the study design, in which a year 9 class is split into two and provided the same information in two different formats: through teacher-talk or text/literature. Both groups then attempt the same extended writing task using the same scaffolds and frameworks.

Both groups performed better in terms of total marks when part of the extended reading/writing group. On average, when pupils engaged with scientific text rather than teacher-led exposition they performed 14.27% better on extended writing activities. This was the case in all four pieces of extended writing and equated to 0.86 of a raw mark within each 6-mark extended writing question. These results are particularly interesting as both groups performed better when reading the text. This study showed that pupils were more likely to achieve band 3 scores when they carried out DART tasks prior to the extended writing instead of Teacher talk and discussion, with 18% more band 3 scores. The number of pupils receiving 1-2 marks in band 1 was higher (39.3%) in the groups receiving teacher talk compared with just 23.9% completing DART tasks. This difference may have been due to pupils having the opportunity to engage with the text, understand how to use the keywords in sentences and see them written in context, linking ideas together (Tishman & Perkins, 1997; Norris & Phillips, 2003). These same contexts and links may not have been communicated through teacher talk. Interestingly, there was no difference between the control group and intervention group when the percentage of correctly used key terms was analysed, with both groups using ~51% of the provided key words correctly on average. The use of correct terminology and the banding of marks can be correlated. Pupils receiving scores in band 1 and 2 may be able to recall and use the key words but not link them together, in context to achieve the marks required to reach band 3. In terms of spelling, punctuation, and grammar (SPAG) pupils, regardless of group, made more errors when in the teacher-led exposition group with 1.36 errors per pupil compared to 0.36 errors per pupil in the extended reading group. An interesting example of this is the 'amylase'. This was frequently misspelt in the group receiving teacher talk, with a common misspelling of 'amalyse'. The teacher in this study had a regional midlands accent, teaching in a school in South East London. It may be that hearing this word in an unfamiliar accent lead to a misspelling. O'Neill et al observed a similar phenomenon in Irish accented English with misspellings such as 'different' as 'difrunt' in 7-17-year-old pupils (O'Neill et al., 2021).

As with any small scale, action research study, limitations existing due to small sample size and scope existed that limit the conclusions that can be made based on these data. An important limitation of this study is that just one topic, in one subject was assessed. With a single extended writing question addressing a specific aspect of a topic. A further limitation was that the groups were in the same room at the same time. There is a real possibility, most likely a certainty, that the groups engaging in the scientific text also heard the teacher talk.

Overall, it can be concluded that DART tasks improved extended writing answers in this class, for this particular topic. The year 9 pupils performed better in terms of marks gained, level of answer and spelling and grammar in their extended writing answers, when completing DART tasks opposed to teacher talk and discussion tasks. Finally, the implications of this study may change the nature of teaching in a practical sense. If taken at face value, policy changes on the training of teachers may include DART tasks as a mainstream method of teaching. If the conclusions of this study were to be adopted by teachers in their classrooms, a facilitator-style of teaching would be required (Tout, 2016).

References

Education Endowment Foundation. (2018). Improving Secondary Science. EEF. https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/science-ks3-ks4

Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. Routledge.

Lunzer, E. (1984). Learning from the written word. Oliver & Boyd.

Norris, S. P., & Phillips, L. M. (2003). How literacy in its fundamental sense is central to scientific literacy. Science Education, 87(2), 224–240.

O'Neill, E., Kenny, J., Ventresque, A., & Carson-Berndsen, J. (2021). The Influence of Regional Pronunciation Variation on Children's Spelling and the Potential Benefits of Accent Adapted Spellcheckers. Proceedings of the 25th Conference on Computational Natural Language Learning.

Porter, C., & Parvin, J. (2009). Learning to love science: Harnessing children's scientific imagination. A report from the Chemical Industry Education Centre. University of York.

Raban, B., Lunzer, E., & Gardiner, K. (1980). The Effective Use of Reading. British Journal of Educational Studies, 28(2), 163.

Rivard, L. P., & Straw, S. B. (2000). The effect of talk and writing on learning science: An exploratory study. Science Education, 84(5), 566–593.

Sherwood, D. W., & Kovac, J. (1999). Writing in Chemistry: An Effective Learning Tool. Journal of Chemical Education, 76(10), 1399.

Tishman, S., & Perkins, D. (1997). The language of thinking. Phi Delta Kappan, 78(5), 368–374.

Tout, D. (2016, June 16). The teacher as a facilitator and resource person. Teacher Magazine. https://www.teachermagazine.com/au_en/articles/the-teacher-as-a-facilitator-and-resource-person

Wilson, J. M. (1999). Using words about thinking: content analyses of chemistry teachers' classroom talk. International Journal of Science Education, 21(10), 1067–1084.