

Oracy in science: Can pre-teaching help?

Rationale and aim

In line with our current School Improvement Plan, it is generally recognised that oracy is important both educationally and socially. In broader terms - if you can't say it, you can't write it. In science terms - if you don't understand the vocabulary that underpins concepts, how can you understand the concept being taught?

Our working memory has a limited capacity, and so presenting complicated, unknown vocabulary AND science concepts all at once presents a *cognitive overload* for many students<sup>[1]</sup>.



Additionally, many students lack science cultural capital. This deficit in many children's experiences, outlined<sup>[2]</sup> by Louise Archer, professor at Kings College, cites one of the main areas where students lack cultural capital is science literacy.

This project aims to explore whether the pre-teaching of vocabulary and its meaning has a positive impact on children's attitudes and achievements in science.

Methods

Three main methods were used: Leitner Boxes, Wordwall, and Fluency Sessions.

Leitner Boxes

The Leitner system is a learning method which uses flashcards, card boxes, and a spaced repetition scheduling system to improve learning and memorisation.

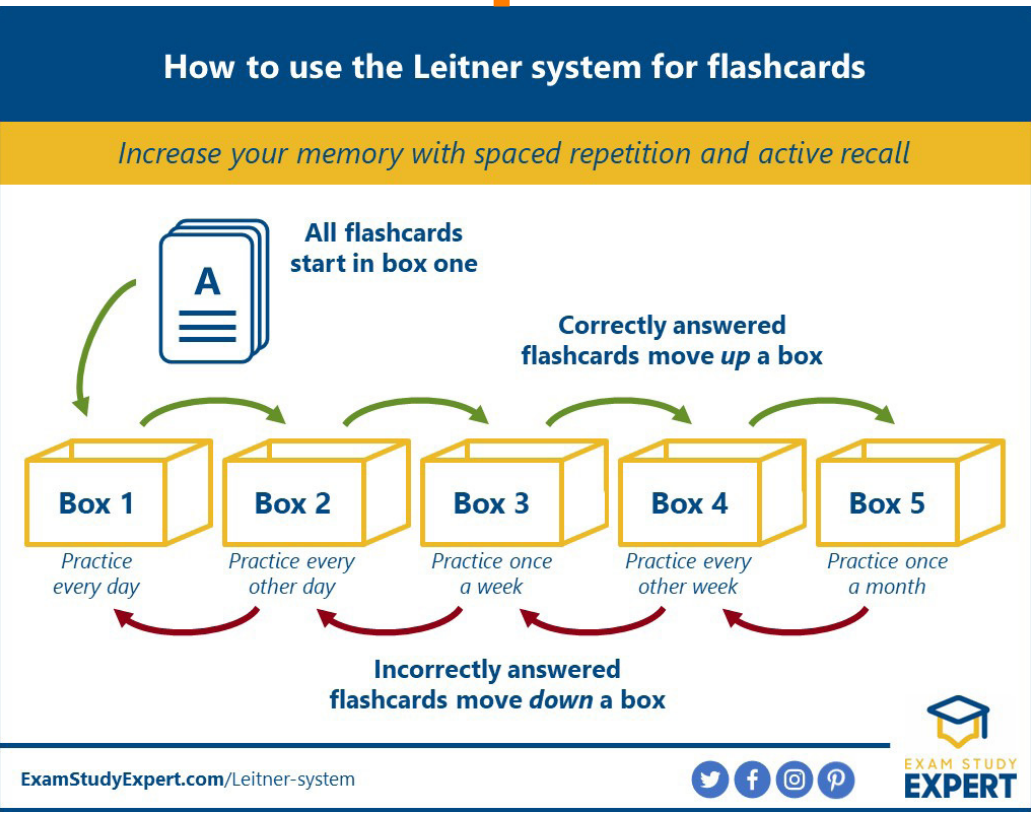


Image source: <https://examstudysystem.com/leitner-system/>

Wordwall

Wordwall<sup>[3]</sup> can be used to create both interactive and printable activities. Each activity created can be played in many different formats e.g. gameshow quiz, match up, open the box; and the same information can be presented in many different written formats e.g. crossword, writing frame, matching wheel

They are easy to set up and deliver, and can present the same information in numerous ways (online and written) to keep interest levels high.

Fluency Sessions

These whole class sessions were held for 25 mins, four times per week. Prior to this project, sessions were put in place to improve reading.<sup>[4]</sup>

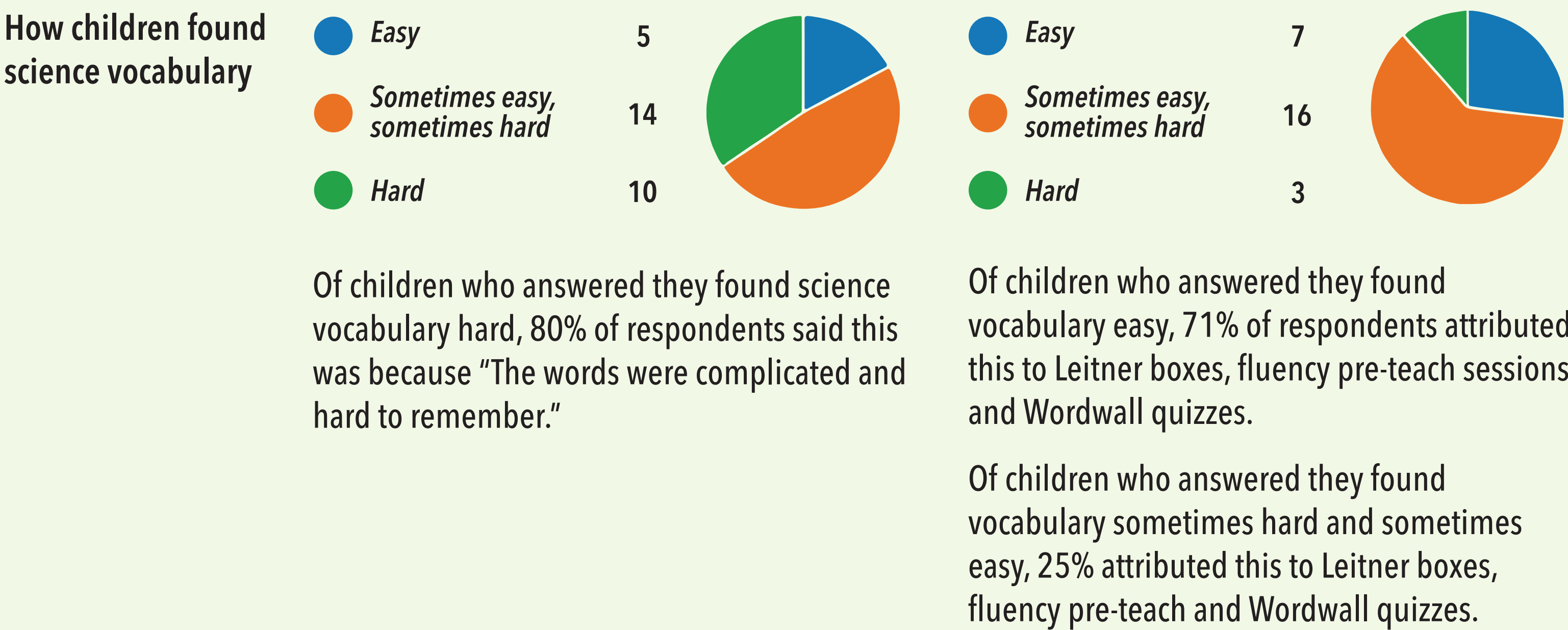
During this project, appropriate science information texts were used in these fluency sessions, as another way of pre-teaching science vocabulary.

Some techniques included: teacher modelling, repeated reading, developing word/phrase lists, paraphrasing, timed reading

Outcomes

A survey of children's attitudes to science and science vocabulary was undertaken before and after delivery.

	Pre-project	Post-project
Anecdotal evidence and observations	Children often used words such as 'thingy' when describing scientific concepts or results of investigations.  Children struggled to grasp some concepts because they lacked the knowledge of language e.g. when talking about materials, they had not heard the term 'thermal'.	After pre-teaching Earth and Space vocabulary (for about 2-3 weeks before starting the topic) using the methods outlined (Leitner, Wordwall, Fluency), it was found that a cohort who were poorer academically than previous cohorts actually seemed to pick up this challenging area much more quickly (this series of lessons was taught in four afternoons, rather than the usual six). Formative assessment showed similar attainment, and time was freed up for consolidation and other areas of the curriculum.



Additional comments children made about science and science vocabulary

I've always loved science, but it is tricky to remember the vocabulary.

Science is just my weakness, science is just not for me. I don't know about other people, but I find science really hard.

I can't remember the words at all. It (vocabulary) can be very tricky.

They (Leitner boxes, fluency, Wordwalls) help me understand the lesson more

I like Wordwall quizzes better than the Leitner boxes

I like Leitner boxes, I find them helpful because it makes the words easier when we do Science

I think it's fun! Thanks for teaching us Mrs. A.

Reflection and next steps

From the evidence seen in this project, there seems to be a compelling argument for continuing to trial pre-teaching of vocabulary in science. The success seen during this project was as follows:

- Better and more confident use of scientific language during science lessons
- Increased confidence starting a new topic area - children started to make links earlier in the teaching sequence and were more confident generally about new, difficult concepts
- Better / quicker understanding of scientific concepts
- As good, if not better, understanding of tricky science concepts

Therefore, in our school we have opted to trial these three methods schoolwide to see if these experiences and benefits, outlined above, match in a slightly larger context and in the more medium / longer term. As our school is part of a local cluster, it is possible that if positive, some of these methods could be used within that context.

References

[1] Perry, T., Lea, R., Jørgensen, C. R., Cordingley, P., Shapiro, K., & Youdell, D. (2021). *Cognitive Science in the Classroom*. London: Education Endowment Foundation (EEF).

[2] Archer, Louise (2021) *Understanding Science Capital*, Professor Louise Archer, RSB Connect 2021 [https://www.youtube.com/watch?v=\\_DZcDRsvqAY](https://www.youtube.com/watch?v=_DZcDRsvqAY)

[3] Wordwall, <https://www.wordwall.co.uk>

[4] Mercer, N. & Dawes, L. (2018) *The development of Oracy skills in school-aged learners. Part of the Cambridge Papers in ELT series.* [pdf] Cambridge: Cambridge University Press