UNIVERSITY OF OXFORD EDUCATION DEANERY DIGEST

The Oxford Education Deanery

Deanery Digests are short, plain language summaries of the Department of Education's research outputs. This Deanery Digest is based on the following project: RCT evaluation of a digital game for homonym knowledge https://liftprojecthub.education.ox.ac.uk/vocabulary-learning

Living plant or power plant: Does contrasting meanings help children to learn homonyms in a digital game?

What is this research about and why is it important?

Most words have multiple different meanings or senses – for example, *plant* can mean a living thing or a factory – and this can cause confusion for students during the learning process. Some have argued that contrasting the two meanings of homonyms, and thereby explicitly drawing student's attention to the different meanings of homonyms, may help to reduce this confusion and boost learning. Furthermore, children with English as an Additional Language (EAL) tend to have poorer knowledge of homonyms in English, and those who know more homonyms tend to have better reading comprehension, regardless of how many words with single meanings they know. Therefore, understanding how to support these students specifically with their knowledge of homonyms is important. The study reported here was a randomised controlled trial that compared two versions of a digital game designed to improved children's homonym knowledge.

What did we do?

Participants were Year 2 children (aged 6 to 7 years) from state primary schools in England, including children with EAL and those with English as a first language (EL1). Students were defined as having EAL only if English was *not* their first language (thus, children who spoke another language, but for whom English was their "mother tongue", were *not* included in the EAL group).

Participants were randomly allocated to one of three groups: control, contrasting, and non-contrasting. The control group played a digital maths game. The contrasting group played a homonym learning game where they learnt and practised the two meanings of homonyms together in the same sessions. The non-contrasting group played the same game with the same words, but where the two meanings of the homonyms were presented in different sessions. The homonym learning game involved test, presentation and practice phases, each with a different game for matching the two meanings of homonyms to images, definitions, and sentences. The game incorporated principles of effective learning game design (such as adaptive difficulty levels, gamification, and feedback) and principles of effective vocabulary interventions (repetition, elaboration, and challenging but meaningful vocabulary). They played the games for 10-15 minutes over five sessions across one to two weeks.

Participants completed pre- and post-tests (before and after the interventions) measuring three different aspects of their knowledge of the target words. They also completed tests of receptive vocabulary breadth, working memory, and nonverbal intelligence.

What did we find?

- The digital homonym learning game improved children's understanding of words compared to the control condition.
- Children with EAL showed the same gains as those with EL1.
- Learning gains were similar for both contrasting and non-contrasting versions of the game, suggesting that presenting word meanings together versus separately has little bearing on how well the different meanings of the homonyms were learned.

What does it all mean anyway?

This research suggests that a well-designed digital game can be an effective way for children to learn the multiple meanings of words. The game was equally effective for children with and without English as an additional language. It also suggests that there is no additional benefit of presenting the two meanings of a homonym together in the learning session vs. separately across different sessions.

Therefore, to support children's homonym learning, it is recommended that teachers apply principles of good vocabulary teaching to the multiple meanings of homonyms: that is, direct, explicit teaching; selection of challenging but meaningful words; exposure to different representations of the word meanings (definition, images, use in sentence contexts); active engagement in activities/practice with feedback; and opportunities for repeated exposures to the words. Well-designed games, including adaptive difficulty levels and reward systems, can be one way to do this. Both children with EAL and EL1 can learn from such teaching, and as children with EAL tend to be further behind with this kind of vocabulary, they may especially benefit.

Note that this study mainly sampled a specific subset of EAL students, that is those who are neither new arrivals nor first language speakers of English. We also cannot be certain exactly which aspects of the digital game intervention caused the effect.

Material, data, open access article: Currently N/A.