

Self-explanation is a powerful learning technique, according to meta-analysis of 64 studies involving 6000 participants



By Christian Jarrett

It is better to ask a student to see if they can explain something to themselves, than for a teacher or book to always explain it to them. That's according to a new meta-analysis of the findings from 64 prior studies involving nearly 6000 participants that compared learning outcomes from prompted self-explanation compared to instructor explanation, or compared to time spent using other study techniques such as taking notes, summarising, thinking out loud (without the reflection and elaboration involved in self-explanation), or solving more problems.

The authors of the meta-analysis, published recently in *Educational Psychology Review*, say that self-explanation is a powerful learning strategy because learners “generate inferences about causal connections and conceptual relationships that enhance understanding”. The process of self-explanation also helps the learner realise what they don't know, “to fill in missing information, monitor understanding, and modify fusions of new information with prior knowledge when discrepancies or deficiencies are detected”.

Past research already established that more effective learners are more inclined to self-explain spontaneously. The meta-analysis confirms that, importantly, prompted self-explanation is also beneficial. Overall, Kiran Bisra and her team at Simon Fraser University found that when students are prompted to self-explain (usually this is in written form, though a few studies involved spoken self-explanation) this improves their learning outcomes with an average effect size of 0.55 (using Hedge's g), which in a learning context is impressive – “a potentially powerful” intervention in the authors' words, similar in effectiveness to “mastery learning” and “peer tutoring”.

Self-explanation was more effective than instructor explanation (explanation given by a teacher or teaching materials), but instructor explanation was better than no explanation, which suggests that part of the benefit of self-explanation comes from the content (which could be provided elsewhere) while a second aspect comes from the unique process of generating an explanation oneself

(prompting the student to recognise links between the knowledge or skills they've learned, and allowing them to identify and address gaps in their understanding).

The researchers checked and the benefits of self-explanation are not due to the technique simply leading to more time being spent in study, though the researchers said more investigations do need to do a better job of controlling for this confound.

The researchers also looked to see if any particular aspects of the practice of self-explanation make a difference to its effectiveness. They found some limited evidence that a multiple-choice format (in which the student chooses a range of explanations from a list) to be the least effective, perhaps because it lacks the self-generated elaboration that is usually involved in more open-ended self-explanation.

On this last point, the researchers suggested that the ideal degree of guidance and prompting (such as whether learners are cued to self-explain specific concepts or left to choose) may depend on their proficiency: as students develop their knowledge and skill, the more freedom to choose what and how they self-explain, the better.

Regarding other factors – such as, the timing of the self-explanation in the learning process; the kind of self-explanation that was elicited (such as justifying an argument or explaining a concept); the nature of the to-be-learned material; the subject matter; and how knowledge was subsequently tested – the researchers found little evidence that any of this made much difference to the benefit of self-explanation. One exception was that it was generally less effective when students were asked to self-explain their own state of knowledge and understanding (a form of so-called “meta-cognitive explanation”), which is logical because this would not involve the student elaborating on and forming connections among the to-be-learned material.

Bisra and her colleagues said that a “major implication” of their findings was that “...beneficial effects of inducing self-explanation seem to be available for most subject areas studied in school, and for both conceptual (declarative) and procedural knowledge.”

The results of this meta-analysis provide an encouraging and straightforward take-away for learners and teachers alike. Just one gripe: I would have liked to see more detailed discussion of the exact kinds of other study technique that self-explanation was compared against, to better identify any unique “ingredients” that make self-explanation apparently so effective. In fairness, Bisra and her colleagues recognise this knowledge gap, concluding: “There is now a need for clearer mapping of the unique cognitive benefits self-explanation may promote, the specific effects of different types of self-explanations and prompts, and how self-explanation might be optimally combined and sequenced with other instructional features such as extended explanation modeling, and inquiry-based learning.”

practice.

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