

Research shows strong gains in critical thinking skills when using argument mapping

Rationale™ is founded on the results of five years of research into thinking skills funded by the Australian Research Council and carried out by the Reason! Project at The University of Melbourne.

The problem

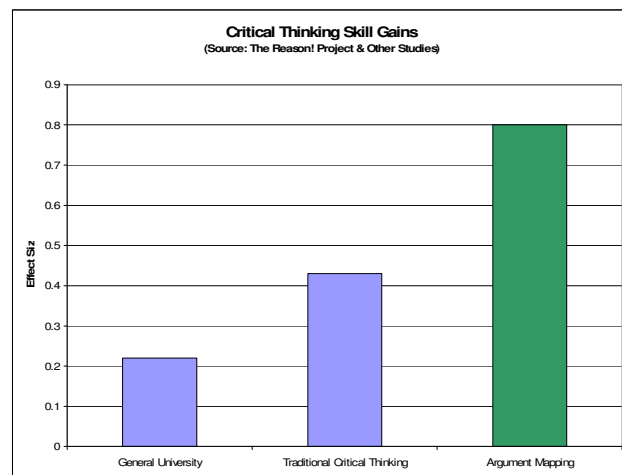
The central question driving this research was: is there an *effective* and *affordable* way to improve critical thinking skills on a large scale (i.e., for large numbers of students)? The Reason! Project researchers investigated this question in the context of a first-year, one-semester undergraduate subject, *Critical Thinking: The Art of Reasoning*. Studies at other universities were finding that such subjects did not appear to add much “value” in terms of improved critical thinking skills. The challenge was to develop a new method which demonstrably produced substantial skill gains.

The approach

Students enrolled in Critical Thinking were required to practice reasoning using argument mapping. This practice was supported by a software package, Reason!Able, specially developed at the University of Melbourne. Their critical thinking skills were measured using an independent and objective test (the California Critical Thinking Skills Test). This was completed at the start of the semester and again at the end. This research was done each year for five years.

Strong gains

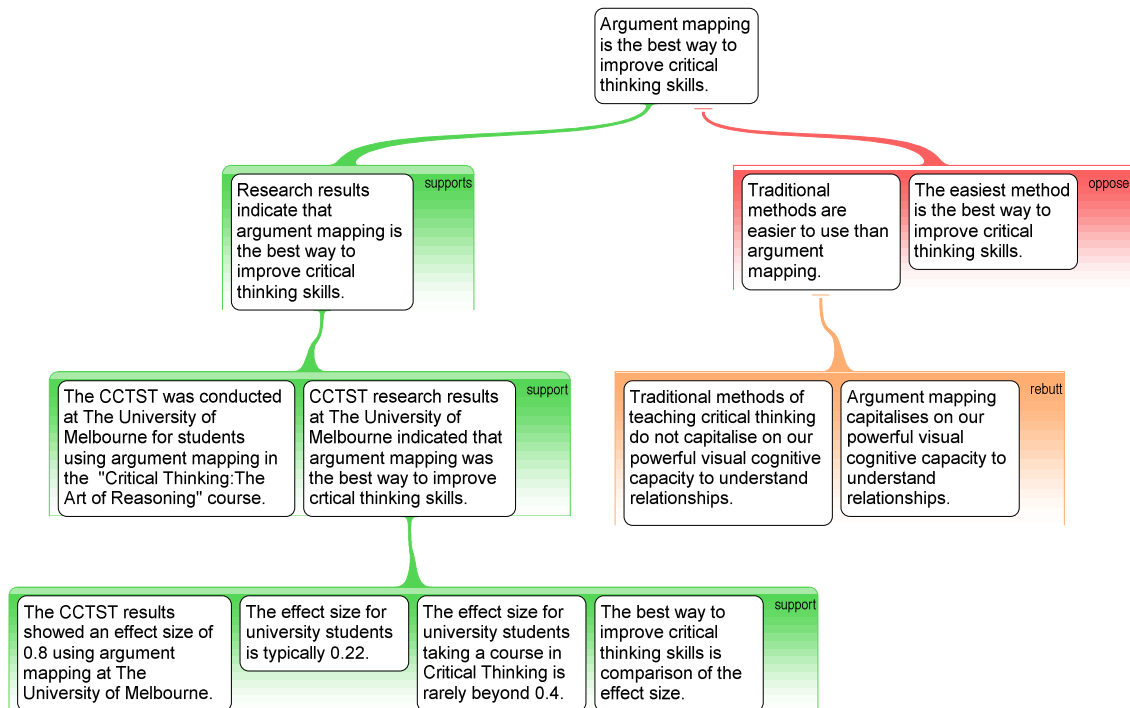
The results revealed that students using argument mapping reliably showed strong gains in general critical thinking skills. The results for each student over the semester showed an average 20% improvement during their semester of study. Another way to look at this data is to use the technical notion of effect size. Following one of the leading authorities, Jacob Cohen, researchers generally regard an effect size of greater than 0.5 to be strong or large. The typical effect size in the Reason! Project studies was about 0.8.



Were these gains really due to Reason!Able-based argument mapping? To answer this, the researchers needed to find out how much the university students would have improved anyway. By combining the results of a great many studies done elsewhere, they determined that the students would typically be expected to improve with an effect size of about 0.22. This indicates that instruction using the Reason! **argument mapping approach improves critical thinking about 4 times more than standard university instruction.** Traditional courses, such as the “standard form” approach, typically improve student skills up to 0.4 effect size, although depending on the studies utilized, this is often a lot lower.

Reason!Able and Rationale

Although these studies were conducted using Reason!Able, we are confident that similar gains would be found using Rationale, which in many respects is a great improvement over the Reason!Able argument mapping tool.



Further reading

- Twardy, C. R., (2004). Argument Maps Improve Critical Thinking. *Teaching Philosophy*, 27:2.
- van Gelder, T. J., Bissett, M., & Cumming, G. (2004). Cultivating expertise in informal reasoning. *Canadian Journal of Experimental Psychology*, 58, 142-152.
- van Gelder, T. J. (2005). Teaching Critical Thinking: Some Lessons from Cognitive Science. *College Teaching*, 53, 1-6