

Diagrams That Really Are Worth Ten Thousand Words: Using Argument Diagrams to Teach Critical Thinking Skills

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Keywords: critical thinking; argumentation; cognitive load; graphical organizers.

Visual Representations

There is substantial evidence from many domains that visual representations aid various forms of cognition (Armbruster & Anderson, 1982; Johnson, Pittleman & Heimlich, 1986; Larkin & Simon, 1987; Novak & Gowin, 1984; Winn 1991). We aimed to determine whether visual representations of argument structure enhanced the acquisition and development of critical thinking skills within the context of an introductory philosophy course. One kind of visual representation is an argument diagram (see Figure 1). We believe that the basic ability to construct argument diagrams can be an important factor in the improvement of students' critical thinking skills.

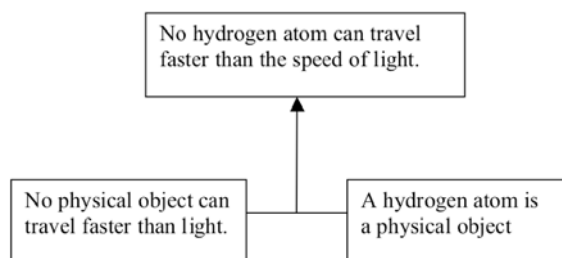


Figure 1: Example of a diagram for a simple argument.

Method

One hundred and thirty-nine students (46 women, 93 men) in each of four lectures (each with a different instructor) of introductory philosophy in the Spring of 2004, and 130 students (36 women, 94 men) in each of five lectures of introductory philosophy in the Fall of 2004 of 80-100 were studied. Thirty-five students (13 women and 22 men) in the Spring of 2004 and 68 students (21 women and 47 men) in the Fall of 2004 were explicitly taught how to construct argument diagrams. Every student in each lecture took a pretest at the beginning of the semester and a structurally identical posttest at the end in which several short arguments were analyzed and evaluated. In addition, on the posttest, the students were asked to provide a visual representation of each argument (which was not graded).

Results and Discussion

The visual representations the students provided for each argument were coded according to the type of representation used: Correct Argument Diagram (CAD) or incorrect/incomplete/missing argument diagram. We compared both

the gains and the standardized gains (gains as a percentage of gain possible) from pretest to posttest for students who, on the posttest, constructed No Correct argument diagrams (CAD = 0), Few Correct argument diagrams (CAD = 1 or 2), or Many Correct argument diagrams (CAD = 3 or more). The results for both Spring 2004 and Fall 2004 are shown in Figure 2.

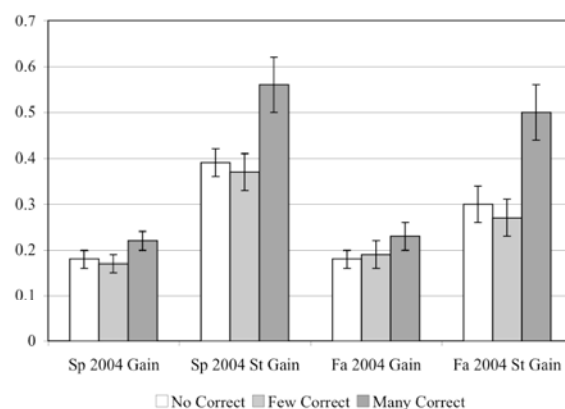


Figure 2: Comparison of gains and standardized gains in both Spring and Fall 2004 for students who constructed No, Few or Many Correct argument diagrams on the posttest.

We found a significant effect of the use of argument diagrams, and this effect was stable even when multiple plausible correlates—such as students' sex, year in school, home college—were controlled for. Indeed, the results were stable even when the instructor was controlled for.

These results suggest that natural—and relatively minor—modifications to standard critical thinking courses could provide substantial increases in student learning and performance.

References

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