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Understanding what Influences Transfer Between Scientific Disciplines

Shaye Fowler
Western Washington University

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Our Purpose
Our research on Science Education has focused mainly on determining the ability for students to use far transfer when encountering challenging situations in a potentially unfamiliar science discipline. This may be done in in-person interviews, or online questionnaires designed to measure the transfer ability of the student volunteers. However, to do this, we need to test our measurements to determine if they are reliable and indicative of actual far transfer; the Transfer Test (TrT) and Conceptual Physics Test (CPT) were created for this purpose.

What is Transfer?
Transfer is the ability to utilize both problem-solving skills and previous factual knowledge on one subject to be able to work through a new challenge. For our research, we are looking at the far transfer capabilities of college students across scientific disciplines, seeing if having experience in certain science contexts can apply and be useful when encountering an unfamiliar scientific situation. Using our TrT and CPT, we are able to account for the difference between experience and previous knowledge of subject material to analyze if the results we see are indicative of what we expected.

Sample Items
Measuring original learning of energy concepts:
Conceptual Physics Test

Measuring ability to transfer energy concepts:
Transfer Test

Current TrT Results

Evidence of validity
- CPT scores correlate to TrT scores ($r = .56$)
- Experts scored high on both assessments
- Students with more physics & chemistry coursework scored higher

Trends Indicating Transfer
Accounting for original learning (the CPT scores), the expected trend of students with more physics experience doing better in a physics test is shown. When analyzing the TrT data, there is still an evident trend of students with physics experience doing better in a chemistry test, regardless of whether they have taken a chemistry class before or not. The distinctions of data in each column allows for the data analysis to focus on transfer ability instead of problem-solving ability or prior knowledge testing.