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| **Reasoning**Research Ideas/Questions from Discussion* **Are people more hard wired for metaphors than analogies?**
* **Do children really understand what relational analogy really is? Does identification of relational analogy have to do with age?  Can relational analogies be queued with younger subjects so that the study can be done at a younger age?**
* **Younger children can identify relational analogies but have a hard time inhibiting salient strategies.**
* **Has anyone looked at individual difference measures and their relationships with analogical reasoning, such as IQ- measures of working memory and inhibitory control**
* **Early measures of inhibitory control and executive function reduce adolescent analogical reasoning**
* **Studying analogical reasoning and visual representation/gestures with ESL to see the effects**
* **Can we estimate the effect size of doing a control study with two classrooms, one regular letting the teacher do what they do and collecting data on representations, and the other room with the teacher trained on best practices to be implemented and looking at the differences at the end of the year**
* **Teachers make analogical comparisons but are not using the best practices to make sure the students are actually benefitting from them**
* **Where should we take this field? What is next?- training students to reason relationally more in generally to make more connects**
* **What does it mean to look for analogies and relations?**
* **Creating classrooms where students know that math is about finding relations**
* **Swap out student for teacher, teaching the teacher this information instead of the students**
* **Need to work with the teachers more instead of tell them, use a scale and have teachers generate their practices to see what works while giving them instruments to check what kinds of analogies work with different students. Teachers share their experiences in using analogies**
* **What is a good analogy? What rules out other analogies as not being the best?  How would we rank them?  What would the criteria be?  What is going on in our brains that tells us the analogy is right? How do we measure the quality?**
* **Can test analogies by telling them to people and see who much they are able to draw from them.**
* **Do we want students to understand one analogy really well, or give them multiple analogies to pull from?  Which is more conducive to learning a topic?**
* **From a practical standpoint, we have to have the skills to translate ideas into practice and the time, how can we move forward on this?**
* **Discussions on spatial graphics should be held with textbook companies to get at it from the beginning**
* **Strategies on how to elicit this information should be directly put into the textbook**
* **Putting this best practices into place while teachers are getting certified instead of after they have been hired and adding more to the workload**
* **Benefits of analogical reasoning is beneficial even in low performing schools if they have enough prior knowledge to get them off the ground, other sequential knowledge is more beneficial**
* **Need adequate resources for the instructional task ahead of you as long as teachers are able to complete this task**
* **Analogies are very beneficial for students with low executive function and lower prior knowledge who need the multiple representations and gestures to really understand the points**

**Best practices:*** **Becoming aware of when teachers are doing analogies so teachers can think about the core relational representations and relationships they are trying to get across**
* **What is the nature of the relationship to think about the best way to show it**
* **In terms of physics, by end of semester some students improved by learning all aspects of reasoning and improve their understanding by relating it to their life experience**
* **Make compared representations visible simultaneously**
* **Use hand gestures that move between the two representations that are indenting to be compared**
* **Use source representations that are within the knowledge set of the learner**
* **Use imagery**
* **Seeing where the analogy breaks down**
* **Paying attention to the correspondences and how the student can see it in the easiest way**
* **If students are having trouble with the analogy, use perceptual similarity to guide them to the correct parts**
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