DOINGWHATWORKS

Video
FULL DETAILS AND TRANSCRIPT

3-D Spatial Skills for Secondary Students (Part 2)

Sheryl Sorby, Ph.D. • November 2007

Topic: Encouraging Girls in Math and Science
Practice: Teaching Spatial Skills

Highlights

- Despite much cognitive research on spatial skills, they are often thought of as a given in the fields in which they are used.
- In teaching spatial skills, having students use computer models and draw sketches in combination is more effective than just relying on the computer.
- Using props can help students visualize the process. For example, Tinkertoys can be used to build 3-D axes.

About the Interviewee

Dr. Sheryl Sorby is currently serving as a Program Director within the Division of Undergraduate Education at the National Science Foundation. She is a Professor of Civil and Environmental Engineering at Michigan Technological University. Dr. Sorby is the former Associate Dean for Academic Programs and the former Department Chair of Engineering Fundamentals at Michigan Tech. Her research interests include graphics and visualization. She was the recipient of the Betty Vetter research

award through the Women in Engineering Program Advocates Network (WEPAN) for her work in improving the success of women engineering students. She has also been a leader in developing first-year engineering and the Enterprise program at Michigan Tech. She is the author of numerous publications and several textbooks. Dr. Sorby currently serves as an Associate Editor for ASEE's new online journal, *Advances in Engineering Education*.

Full Transcript

We've done some work where we've used computer models, and we've had the students also sketch. And the students who just used the computer models didn't develop their skills nearly as well as the students who also sketched. And so having something where your hands are involved in doing something, building something, drawing something, or analyzing something—if you have your hands involved, it seems to develop your 3-D spatial skills better than just looking at things, or trying to memorize things or looking at computer simulations of things. That really, it's kind of—to me, spatial skills is your hand connected to your brain. So the more that you involve your hands in doing things, I think, the better you develop your spatial skills.

We do a lot of sketching of things in our classroom. So and we bring in a lot of props from outside. We show what 3-D axes look like. You can easily build 3-D axes out of Tinkertoys. In the elementary grades they've done work where they have students building castles, and they use that castle to then tell a story about something that's going on. And just, you know, anything that involves the space around you. So drawing a map from here to there would be another way to help develop the students' spatial skills.

Part of the problem with spatial skills training is that, even though it's been recognized as an area of cognitive research for a hundred years and people have talked about it, that most programs—most education programs—don't really talk about it. A lot of my colleagues, especially in engineering, think that spatial skills are a given. And so, "Well everybody has these skills." Or they believe that if you don't have them you can never develop them.

It's not really rocket science, trying to help people develop spatial skills. I mean, it might help somebody become a rocket scientist, but really, the basic stuff and helping people develop their spatial skills is really not that difficult if you try it and practice it. And usually when I've shown teachers just a few things, they can go off and do a lot of things on their own.

We have some materials that we developed for our university class on teaching spatial skills. We also have some teachers who have used materials in their classrooms for developing spatial skills in middle school and in the high school. And again, most of this involves building an object and then sketching it, or building an object and rotating in space and sketching it or doing something like that. But it's a lot of sketching type problems.

I think technology can demonstrate a lot of things about space that we can't demonstrate, like for example,

in earth science. You can build a three dimensional model of what this vein of ore looks like, and you can't really see it in real life. So you couldn't even take a field trip and see it. You'd have to imagine that it was underneath your ground—underneath your feet. But, you could build a computer model that shows that very well so that students would be able to see it. "Oh, that's what this looks like when you've got this vein of ore going at this slope. And this is why the miners dig this way, or this is why, you know, we have to extract the minerals this way." Technology can really help in showing people things and helping them visualize, but I don't think it's the do-all, end-all. I think you still need to do some hand drawn sketching, the manipulation of real life physical objects. I mean, those kinds of things are still important.

For my own, personal history, when I started as an engineering freshman, I had very poorly developed spatial skills, and I think that's part of the reason I went into this area of work—was because I had struggled so much in my own background. And I think through practice, through you know, trying and sketching things and doing things with handheld objects, you can develop your spatial skills. It's not just something that you're born with it or not.