

Optical Engineering

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Optical Engineering to a 14-Year-Old Girl

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I am writing the editorial this month with my daughter, Madison Driggers (otherwise known as Maddie). She is 14 years old, beautiful, makes good grades, has lots of friends, is very popular, and overall, is a great daughter. She really likes Justin Bieber and is going to one of his concerts in a week. I asked her today what she wanted to do after high school. She said she definitely wants to go to college, but her primary interest is medicine. Her reasons are: her mom is an OB/GYN doctor (a big influence), doctors make really good money, and they help people (so it's satisfying and gratifying). Maddie likes babies, so she is likely to be an OB/GYN doctor.

When I asked her if she would consider optical engineering as a career, she said she does not think the field is for her. Her primary reason is that she does not like mathematics. When asked if she thinks it might be glamorous, important, or fun, she says that she definitely does not think it would be fun. She believes that the majority of her friends would not like optical engineering or any hard science career where mathematics plays a central role. She says that most girls who want a professional career are interested in medicine or law because these careers are interesting, glamorous, and gratifying. She thinks mathematics are hard, tedious, and "if you make a mistake, the whole problem goes wrong." That is, there is not much room for error.

How do we make mathematics, physics, chemistry, and engineering more interesting for young people? Maddie suggests that if mathematics in school were more fun, then many more young women (and men) would be interested in these careers. When asked how to make it more fun, she pondered and then suggested that making math class a game show or a contest would be more fun. She says that her other classes are fun because the teachers are funny, interesting, and outgoing, but math teachers don't tend to be that way. She also says the mathematics teachers spend more time lecturing instead of allowing self-discovery.

I have long recognized that the low number of women in optical engineering is a problem. My division has just over 200 people and the majority of them have doctorates related

to optical engineering (physicists, electrical engineers, chemists, and material scientists). Only around 7 percent are women, and it sure seems like fewer young women are becoming scientists and engineers. I have always thought that the primary reason is that optical engineering is not that glamorous or exciting (to those who are not optical engineers) and that we need to do a better job marketing the field and raising awareness about the difference that we make in the world.

Maddie agrees with me and says that she really does not know that much about optical engineering except that it is related to mathematics and she is not interested in mathematics. So, maybe we do have a perception problem and need to raise awareness, but we also (as a community) need to figure out ways to make mathematics more interesting and fun.

Maddie heads to a new school in Maryland this fall. She is a little worried, but somewhat excited. I told her one of the math jokes that she could share to break the ice with her new teacher. From the schooljokes.com website: "Why was the math book unhappy? Because it had too many problems." As a community, we have a problem with the low number of women entering the field of optical engineering, and we all need to be in marketing and education mode. We also need to explore how to make mathematics more fun. In the meantime, I'll keep working on Maddie!

A Note on the Kingslake Award

The *Optical Engineering* staff, associate editors, and I would like to congratulate the 2012 Rudolf Kingslake Medal winners, Alexander Toet and Maarten A. Hogervorst of TNO, for their paper "Progress in color night vision." It is an outstanding paper that has been and will be appreciated by many of our colleagues.

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Editor