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Proof by example Portraits of women in Dutch mathematics

Fulya Kula

In ‘Proof by example’, Clara Stegehuis and Francesca Arici portray women in Dutch mathematics. This edition portrays Fulya Kula, lecturer and researcher on mathematics didactics at the University of Twente. In this interview she tells about her research and her motivation to pursue a career in mathematics.

How did you first become interested in mathematics?

“I actually did not really like mathematics in primary school. I found it difficult to memorize all multiplication tables for example, as I did not really understand the concept behind them. However, during high school, I had a great teacher, who could explain really well. She introduced us to theorems and proofs, and I found this challenging and rewarding. I still remember the formula of Menelaus’s theorem in geometry and enjoyed working through the theorems to figure out the proof as homework.

After that, I did my BSc in mathematics, but I was also very intrigued by the way my professors were teaching, maybe because of my experience in primary school. All were very talented mathematicians, but some of them were not explaining very well, while others were. This motivated me to do my undergraduate and PhD level in the didactics of mathematics. In my PhD for example, I focused

on the concept of the derivative. What prior knowledge is necessary to fully understand the concept of the derivative? And what happens when some of that knowledge is missing?”



Fulya Kula

What are you now working on?

“I am now still working in the field of mathematics and statistics didactics. I investigate how we can improve the teaching and learning of mathematical and statistical concepts. This combines my pedagogical skills and scholarly knowledge. I try to gain a better understanding into how people learn, and how this knowledge can improve teaching.”

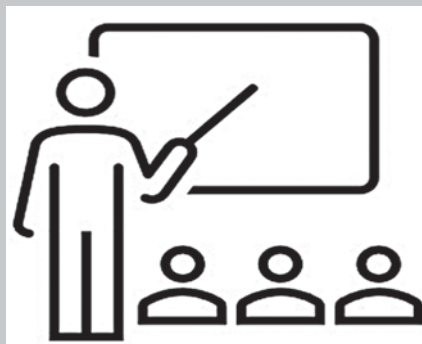
What is the most interesting thing that you have been working on recently?

“I am currently working on my project funded by 4TU.CEE that aims to make the transition from high school math to college-level math easier for students. This means that students should have a better understanding of several mathematical concepts and skills when they are at university. To achieve this, I investigate best practices in curriculum development. I will also create videos and practice material on topics that many students are struggling with. I find this project particularly exciting because it can make a real difference in students’ academic lives, as I often see them struggling in the first year during my teaching.”

Can you give an example of how your research shows how teaching can be improved?

“I had very interesting results on teaching statistical inference. In statistics, you often make probabilistic statements about an entire population while you only investigate at a small sample of it. This concept is often very difficult to grasp for students. Usually, during a course students are first told about the sample (for example the sample mean), and are then told what this sample statistic tells about the entire population. My research shows that it is actually better to start discussing the population first, and how you actually create a sample from this entire population. After that, you can teach what this then tells you about the entire population that we started with.

My research endorses that this second way of teaching makes students grasp the concept of statistical inference more easily. I would really like to now investigate the most common statistics textbooks to compare their way of explaining to my proposed model. Doing so will help me to slowly but surely change the way statistics is taught. This model offers a unique opportunity to teach inference not through the way it is applied, but through the way it is constructed.”



Is there anything else that you would like to achieve in the future?

“I would really like to make sure that research in the didactics of mathematics is actually applied in mathematical teaching. Despite the fact that there is plenty of research that could be useful, the connection between research and practical teaching is not fully realized. My goal is to make research in the didactics of mathematics more accessible and engaging for teachers at all levels. This would allow teachers to have a quick overview of existing research, with tips on how to apply this in their practice.

I would love to create a course on didactics for mathematics teachers at universities as well. I feel that most people at the university really like their teaching, and are also interested in my didactical research, but it is difficult and time-con-

suming for them to get a good overview of the literature and existing knowledge. In such a course, we could go over this together, and together discuss how we can implement this in practice. In this way, mathematics education research really would have an impact on the way mathematics is taught at the university.”

What do you like the most about your job?

“I really enjoy teaching and find it very motivating. My favorite moments are when a student has an ‘A-Ha’ moment and gains a better understanding of a concept. This is also very rewarding for myself, as I managed to make an impact on the student by teaching them a topic that they first did not fully understand. It also shows you the beauty of mathematics: if a student understands all single, small concepts, they can understand a much bigger problem.”

And what do you like the least?

“The workload is sometimes high. This means that I cannot always change my courses in the way that didactical research shows is best, because you simply do not always have the time to do so on top of your current workload. So I am now changing my courses one by one, and year by year, one step at a time.” ❖