

# GÓNDOLA

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## ENTREVISTA CON EUGENIA ETKINA INTERVIEW WITH EUGENIA ETKINA



*Dr. Eugenia Etkina, born in Moscow, Soviet Union. Professor in the Physics Department, at Rutgers University, USA. Has 30 years of teaching experience in physics and astronomy instruction at middle school, high school and university levels. She earned her Ph.D. in physics education from Moscow State Pedagogical University. In 1995-1997 she taught physics courses for students at-risk at Rutgers university (New Jersey, USA), for which she together with Dr. Horton developed a highly successful approach.*

*Her main research interest is in the cognitive and epistemological aspects of learning physics, acquisition and transfer of scientific abilities and the process of constructing physics teacher PCK. Her doctoral students earn Ph.D.s in Learning Sciences, Ed.D.s in Science Education in the GSE and Ph.D.s in Physics Education Research in the Department of Physics and Astronomy.*

*OLGA CASTIBLANCO (OC): Good afternoon Dr. Eugenia. Thanks for accept our invitation. Can you talk us a little about your education as a physics teacher?*

Eugenia Etkina (EE): Well, it is an interesting story; because I am from a family of physicists, my father was a physics professor, and my mom was a math teacher. So teaching was in the family. But when I decided that I wanted to be a teacher, first I did not think of math or physics at all - I wanted to teach literature. However if I were to teach literature in the Soviet Union, in the early eighties, it would mean to tell lies all the time as teaching literature was a part of the political agenda. The government decided what books were good, what books are bad, and what one should say, and what one shouldn't say when teaching students. And I cannot lie. So, I was thinking that if I became a literature teacher I would need to lie everyday to my students. Thus I decided – no literature teaching for me. My mom said: Why don't you teach math? I thought math is boring, so I said: No mom, no math, it does not excite me. And then my dad said; then you should teach physics, physics excites everyone. And I thought: "If it were only true.." but I said nothing and somehow decided that physics was less boring than math, so I could probably teach physics. But I didn't like it, it was my choice ...you know...by exclusion. It wasn't my passion at the beginning. But when I was in the university, I had a teacher, professor Igor Novikov, he taught astrophysics. He was so good, every class was like a detective story. It was... you know... we were making ideas, testing them and retesting them and I felt like we were writing our own stories. Did you go to my public workshop yesterday?

*OC: No.*

EE: Oh, sad, I was doing a similar thing there, this is how I teach now, but the idea came from that professor, this was the person who...you know... ignited my passion for teaching. I was already at the university training to be a physics teacher, but I didn't have my passion for teaching, and he started it... and so, that's it.

But another thing is, that before I am becoming teacher, I thought a lot what kind of teacher I did not want to be, because I know so many teachers who degrade students, who make them feel inferior, you know... so I did not want to be this kind of teacher.

*OC: By the way as your workshop. What kind of things help a person become a better physics teacher? You put this question as a title in your workshop.*

EE: Well, short answer?

*OC: Yes, please*

EE: Stop being a teacher, stop thinking on yourself as the center of the teaching process, put the student at the center, and learn to listen, and learn to interpret what students are saying, learn to help them building their think, to instead off looking for misconceptions, try to look for... you know... good ideas, and students have them, and make them change their brain, instead off you trying to transmit your brain into their brain, instead of that help them change their brain.

*OC: yes, I agree completely, but it's difficult...*

EE: Right, it's difficult, so in the workshop I showed the participants three versions of the same lesson. How you do it, if you don't care about the students; how you do it, if you doing an intermediate version, and how you do it if you are really base what you do on what students think themselves. We could have done it a little better, but it was really difficult as do not speak Spanish: I did not understand why the participants were saying, and they did know what I saying. But try to do, how do you put the student at the center.

*OC: Why do you use the word "magic" to talk about physics teaching?*

EE: Well, it wasn't about physics teaching, it was about physics. The question is about its meaning in my public talk?

*OC: yes, what is the sense?*

EE: Well, because, when people think of physics, they think of... you know...equations, or they think of particle accelerator, or whatever... when I think on physics, I think about the process, how do physicist know what they know, and it turns out that the way physicist come to understand things, it's the same way we as humans learn in everyday in life, how we come to understand things, we use the same process that physicist use, but we don't know that it is physics, so, the magic of physics is in the very process that physicist use, because it penetrates everything that people do but people don't know that they are using the process of physics every day. So yesterday in my public talk I tried to show how this magic works, and how it can help you when you buy a house, or it can help you to create kinetic molecular theory, it's a simply the way of thinking...

*OC: Ok, is because... is difficult define the word "magic" in an educational science context, because "magic" is synonymous of fantasy or enjoying things...*

EE: Yes, right, that's exactly the idea that I want communicate. If you tell for people that you teach physics, what they said you? Normally said, ohhh, you are very smart, or I hated physics,

*OC: or... my teacher was terrible*

EE: Yes, and you never hear: “Oh, you do physics? I do physics everyday too... or I want to know more about physics”, right? But if you say I’m a computer engineer or something, then everyone is positive, everybody can talk about computers, right? But this is not true about physics. That’s means, people think that if you do physics, you are smart, and they don’t do it, it is because they are not smart ...When I’ am teaching, I try to show that Physics is like magic, everything around you has some physics in it and anyone can be a physicist, not anyone can write computer programs, but everyone can do physics, that’s the power of physics and its magic.

*OC: What that’s mean for you “didactic physics”?*

EE: I don’t know, we don’t use this word. Today in my workshop, I talked about Pedagogical Content Knowledge, and, at the end, a woman asks a question, what’s the difference between “pedagogical” and “didactic”?, and I said, what’s didactic? I did not know, and now you are asking again, I must be missing something here.

What is important for me is what I to do to make my students better teachers, and if it’s called didactic knowledge then, I do didactic, but if it’s call pedagogical content knowledge, I do pedagogical. I think people sometimes care too much about words and names and for me the meaning is important, so if we agree on the meaning, then you can call it anything. I care about what you need to learn to become a good teacher.

*OC: OK, What kind of knowledge does a physics teacher need?*

EE: Well, briefly, It would be...I think that the teacher... the necessary part, the foundation is of course understanding of physics, but not only the final product – equations and laws, but the process through which this knowledge was constructed, and also what representation in a particular area are productive for constructing this knowledge – motion diagrams, or force diagrams, or energy bar charts..... And the other piece of the foundation is the knowledge on how people learn, how is the brain works, how they work in groups... you need to use brain studies, consciences studies, psychology and motivational theories, all of these, its also necessary, but these too are not sufficient, because you need to know how do people learn acceleration, or how do people learn the difference between acceleration and velocity, right?.. or what productive ideas students have, and what questions to ask when they work in groups, so this work is productive, and lots of other things. I call it Pedagogical Content Knowledge, you can call it physics didactic, whatever you like, but that is the first component, that distinguishes a good teacher from a physicist, or from a cognitive scientist, is about the process that helps people learn, that’s we call Pedagogical Content Knowledge, but you can call it anyway you want.

*OC: Ok, finally, what would you say to pre service physics teachers, in order to improve their future practice?*

EE: One advice. Do not think of students as sources of misconceptions, think of students as sources of productive ideas on which we can build, understand that ideas that seem wrong in fact are right in some context, so all you need to do is help students find the context in which their ideas are correct and connect them to the right ideas that you help build.

*OC: OK, thank you very much.*

EE: thank you too, it was fun!