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Teaching Physics in a Foreign Language: Challenges and Opportunities

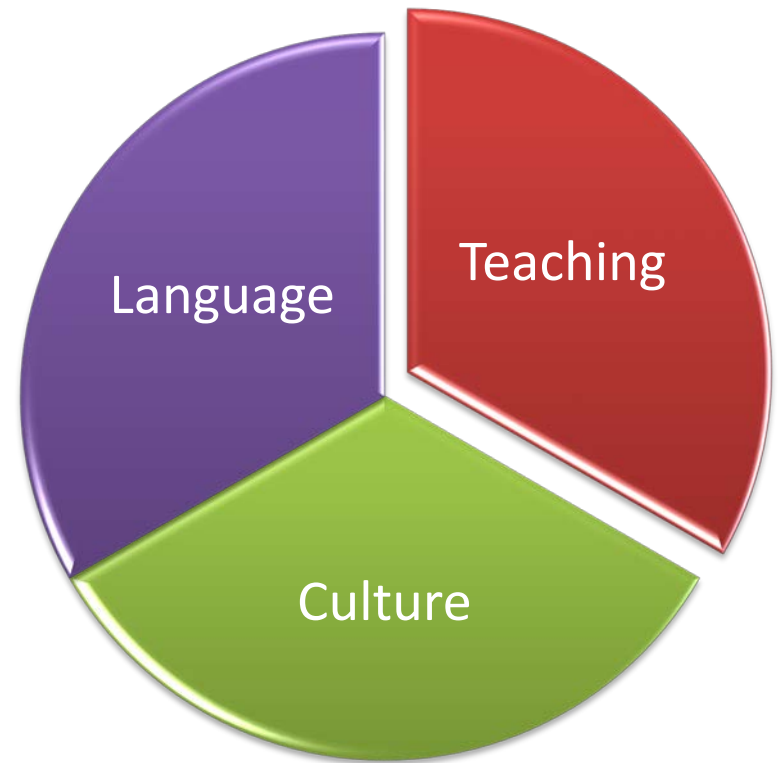
Dr. Marina Milner-Bolotin

UBC Department of Curriculum and Pedagogy

Language and Culture

“Those who know nothing of foreign languages know nothing of their own.”

—Johann Wolfgang von Goethe



1 Dr. Marina Milner-Bolotin



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University of British Columbia

UBC Facts:

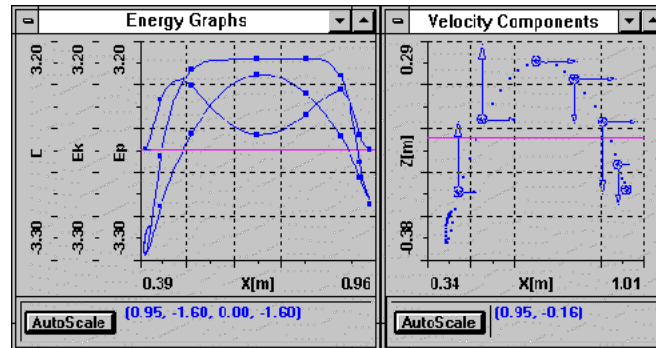
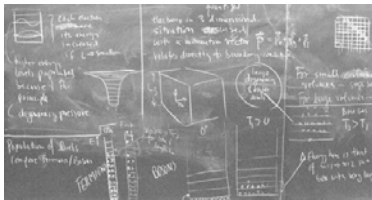
- Public university
- Established: 1908
- Vancouver & Kelowna
- ~63,000 students
- Academic staff: 5474
- Acceptance rate: ~50%
- 34th – World ranking



**14,434 international students
from 162 countries!**

1

My Physics Education Trajectory



New tools



New everything

My Physics Teaching Language Trajectory



T: Russian – Hebrew – English

S: Russian – Hebrew+ – English++

2

My Inspiration



Korina Polinger, Israel



Eugenia Etkina, Rutgers University

These world-class
physics educators
teach in a non-
native language...

3

Science Teaching ... and Language



Mathematics is the language in which
God has written the universe"

– Galileo Galilei

Is English the language of Science? Is it Russian? Is it German?

Why does it even matter? **How do we teach in a foreign language?**

4

Teaching Physics in a Foreign Language



Teaching Physics in a Foreign Language - Challenges

- Lack of confidence: not a native speaker
- Communication challenges
- Different educational/classroom culture
- Different student & parents expectations

Challenges – Not a Native Speaker

*Photo Electric
Effect*

$$E=mc^2$$



Challenges – Communication



University of Texas, Austin

Challenges – Classroom Culture



Challenges – Expectations



5

Teaching Physics in a Foreign Language



Teaching Physics in a Foreign Language - Opportunities

- Lack of confidence: not a native speaker
- Communication challenges
- Different educational/classroom culture
- Different student & parents expectations

Opportunities – Not a Native Speaker

Problem solving is communicating ideas. You have to agree on the language you are communicating in by choosing your axes and defining your vocabulary...

Q1. A car is moving on a straight road at 5 m/s. It is accelerated at 3 m/s². What will be its velocity after 4 seconds?

(17 m/s)

Data
u = 5 m/s
a = 3 m/s²
v = ?
t = 4
s = ?

$v = u + at$
 $= 5 + 3(4)$
 $= 5 + 12$
 $= 17 \text{ m/s}$ Ans.

S?
u ✓
v?
a ✓
t ✓

Opportunities – Not a Native Speaker

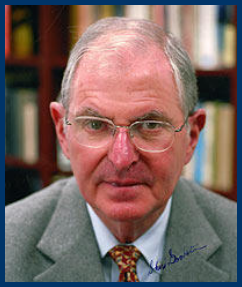
Knowing foreign languages helps when teaching physics. It stops you from taking the language of physics for granted!



Speed and velocity

Opportunities – You are a Foreign Language Learner





Opportunities – You are a Foreign Language Learner

*The key to teaching anything is to remember what it was like not to understand that thing. That's a very hard thing to do. **Every time you come to understand something you didn't understand before, you are transformed. You become a different person from who you were before.** The key to teaching someone else to understand that same thing is to remember your former, untransformed self. If you can do that, I think you can teach anything, even physics.*

Opportunities – Communication



By teaching in a foreign language you naturally slow down and pay attention to the language of physics

By teaching in a foreign language you bring your knowledge and traditions about physics learning



Opportunities – Different Educational Culture



- What are expectations of students?
- Assessment of students?
- What is the role of parents?
- What is available at school?

- What are expectations of teachers?
- Assessment of teachers?
- What is the role of parents?
- What is available for Pro-D?



Opportunities – Different Educational Culture

- Your and parents' views on science and science learning depend on the culture
- You can bring a different perspective
- Your background can help you connect with the students and parents

Opportunities – Different Educational Cultures



According to Unesco, 29% of people in scientific research worldwide are women, compared with 41% in Russia. In the UK, about 4% of inventors are women, whereas the figure is 15% in Russia.

Being from a different culture helps you to challenge the “normal”:

Who learns physics?

Who teaches physics?

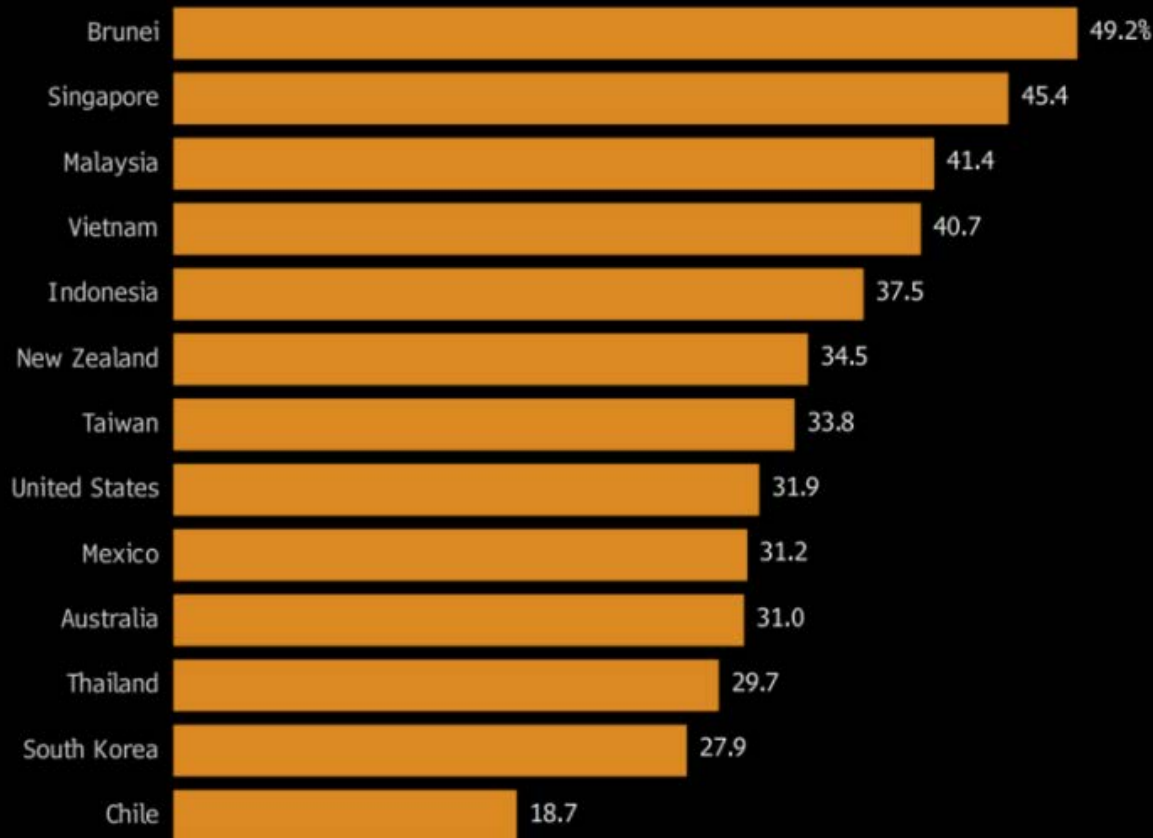
Who are physicists?

Opportunities – Different Educational Cultures

Women in Math

Brunei leads APEC economies in female graduates of STEM disciplines

■ Share of tertiary graduates of science, technology, engineering and math who are women



Women in Math

Brunei leads APEC economies in female graduates of STEM disciplines!

49.2% of graduates in Brunei are females.

In the US – 31.9%²⁶

Opportunities – Different Educational Cultures

Different views of physics teacher Pro-D



Summary

“A different language is a different vision of life.”

—Federico Fellini



“Teaching in a foreign language gives you a unique chance to reach your students.”

—Marina Milner-Bolotin