Physics Education Laboratory
Lecture 03

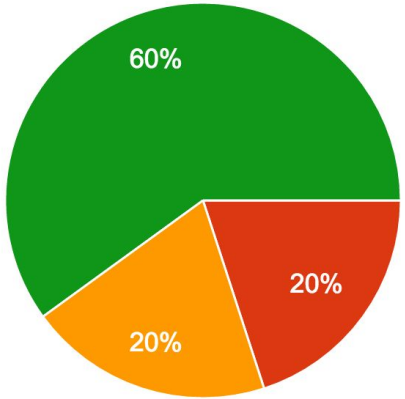
Pedagogical Content Knowledge: Math/Phys interplay

Francesco Longo - 13/10/2020

Inside the survey:

Which kind of physics learner are you?

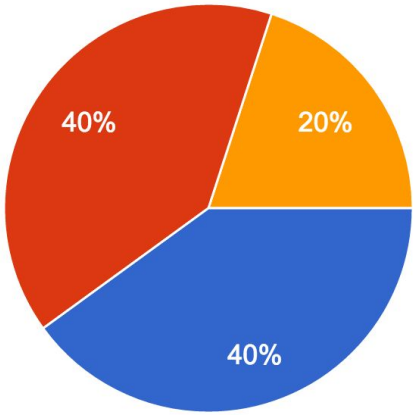
5 risposte



- To learn formulas and facts based on the authority of the instructor and text
- To make sense of the material, to integrate it with my opinion and intuitive knowlegde
- A mix between the previous two, but preferring the first one, with methodical adherence to the procedures
- A mix between the first two, but preferring the second one, building ind…

What do you think about the way you learned Physics (in secondary school course)

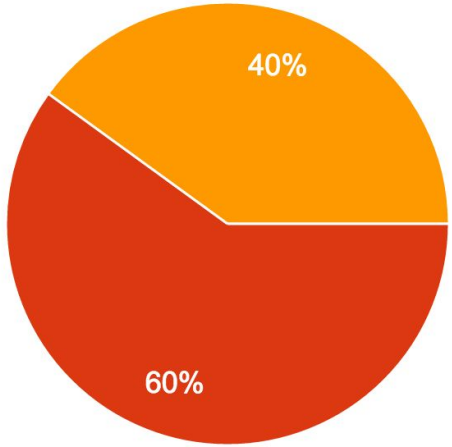
5 risposte



- I'd never had problems, understanding conceptual meaning and formulating it in mathematical point of view
- I had sometimes problems in conceptual meanings and never in mathematical explanations
- I had sometimes problems in mathematical explanations and never…
- I had always problems with conceptual meanings and mathematical explanati…

What do you think about the way you learned Physics (in university course)

5 risposte



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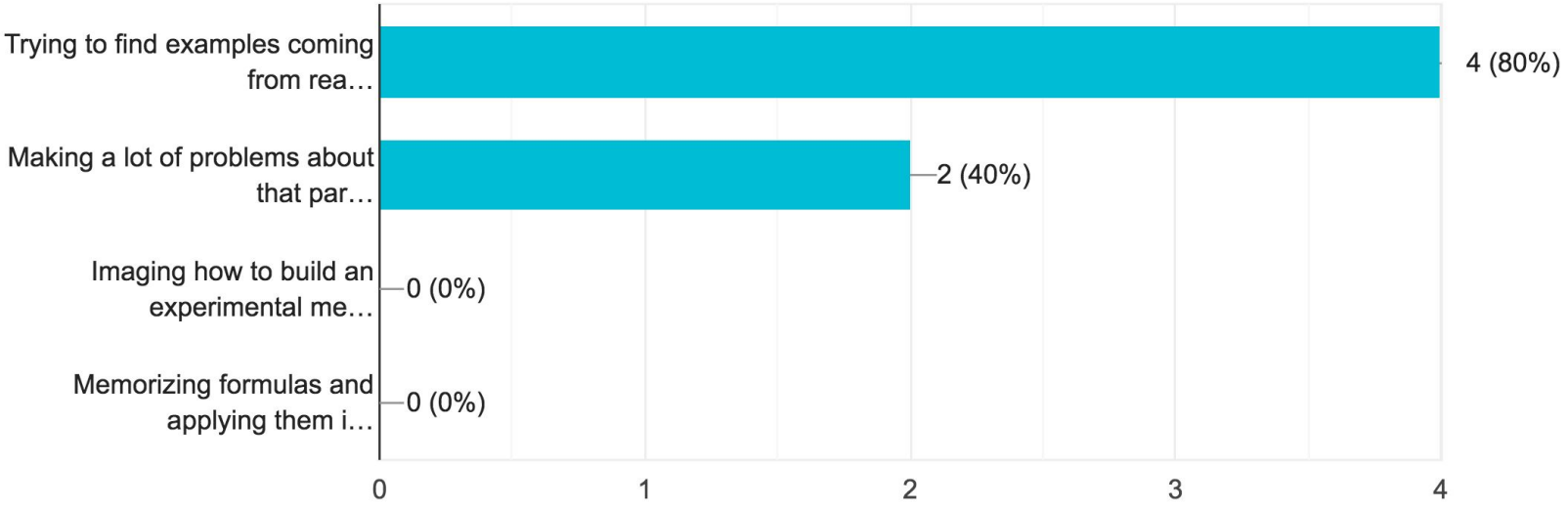
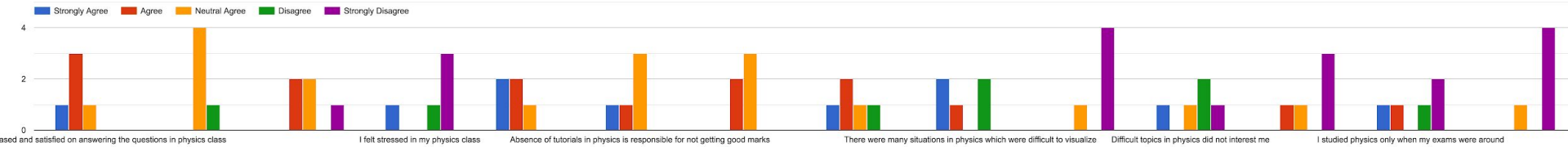
What did you do to improve your conceptual meaning of physics laws?

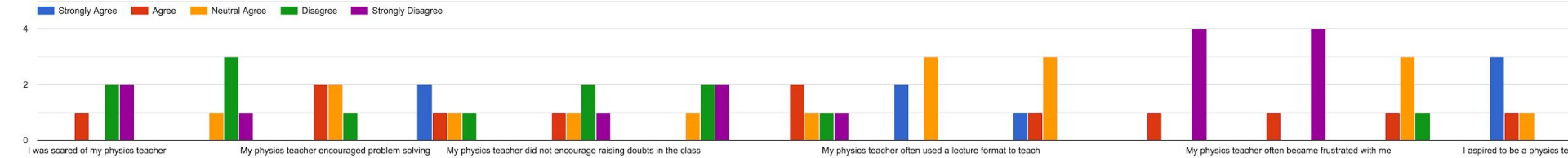
5 risposte



Physics learning experience (referring to your secondary school course)

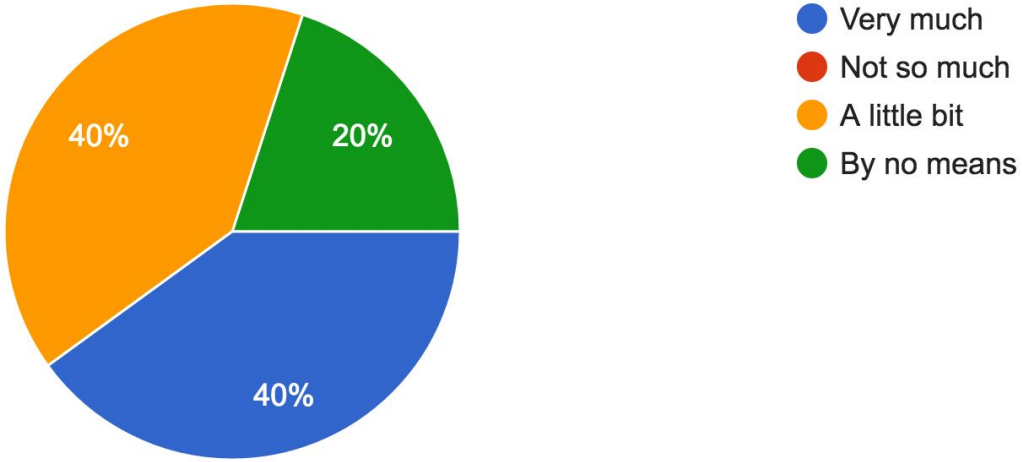


Physics teaching observation (referring to your secondary school course)



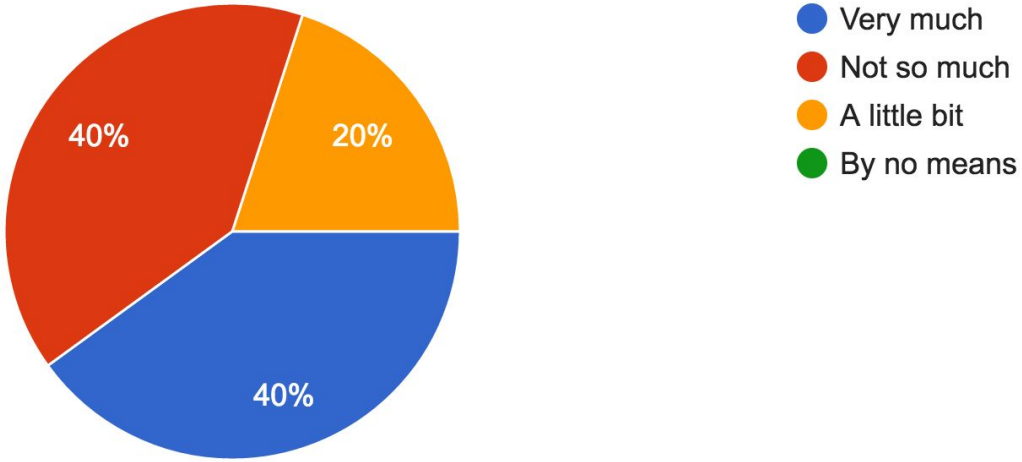
Did your Physics learning experience change during your university course?

5 risposte



Did your Physics teaching observation change during your university course?

5 risposte



Of the following test formats, which is best for measuring how well students understand the material in physics?

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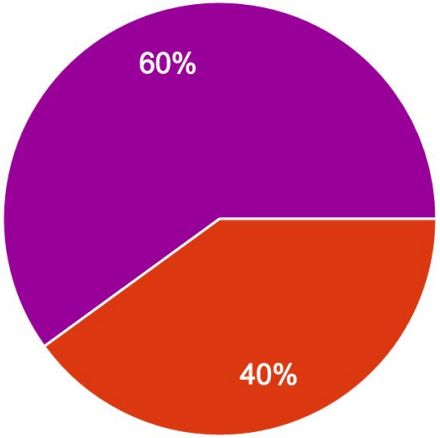
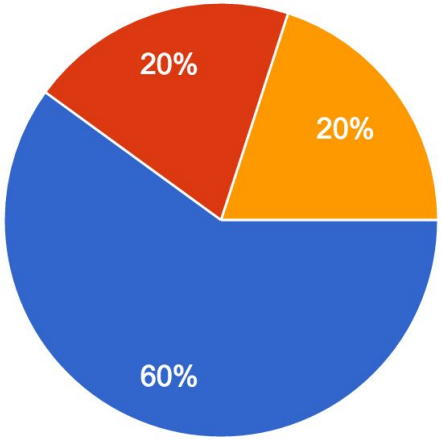


- A large collection of short-answer or multiple choice questions, each of whi…
- A small number of longer questions and problems, each of which covers sever…
- Compromise between first and second, but leaning more towards first.
- Compromise between first and second, favoring both equally.
- Compromise between first and second, but leaning more towards second.

Brandon: "A good physics textbook should show how the material in one chapter relates to the material in other chapters. It shouldn't treat each topic ... With whom do you agree?

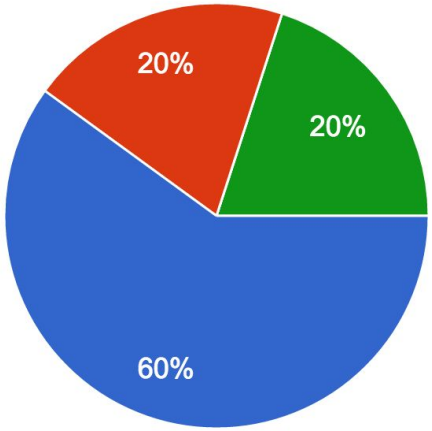
5 risposte



- I agree almost entirely with Brandon
- Although I agree more with Brandon, I think Jamal makes some good points.
- I agree (or disagree) equally with Jamal and Brandon.
- Although I agree more with Jamal, I think Brandon makes some good points.
- I agree almost entirely with Jamal.

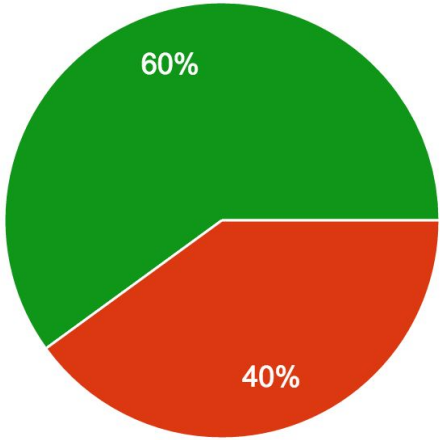
Justin: "When I’m learning physics concepts for a test, I like to put things in my own words, so that they make sense to me." Dave: "But putting thing... learn things the way the textbook presents them."

5 risposte



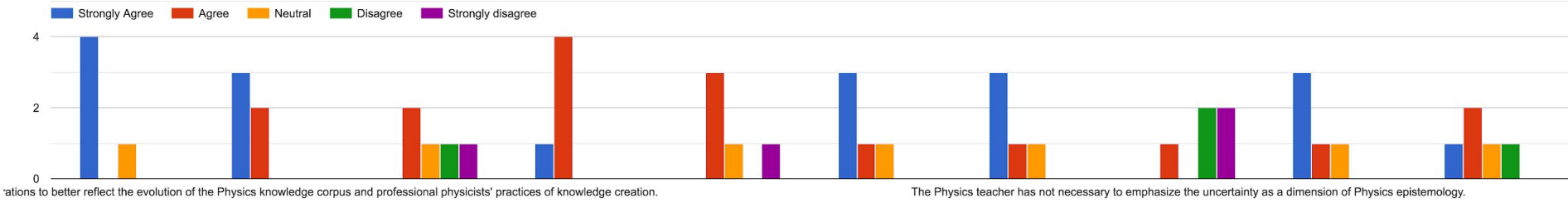
Imagine you are teaching physics at high school and you want to make your students familiar with the concept of block and tackle. Would you do so by:

5 risposte



- just explaining in a verbal fashion, for instance how the lenght of the pulling…
- just showing exemplary pictures of different situations with tackles, point…
- just solving a great number of problems concerning block and tackle
- just starting with a case study, describing it in mathematical language…
- just reading from the textbook and inte…
- None of these

Interaction between Epistemology, Sociology, Learning and Teaching in Physics



Teachers' PCK assists them in fostering the following goals

(Magnusson et al., 1999)

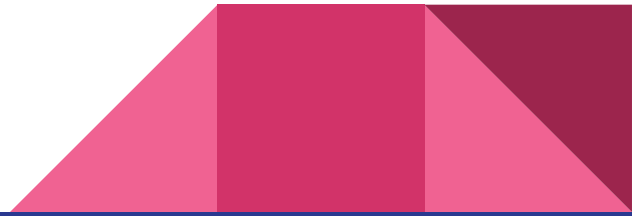
a) Help students develop the 'science process' skills
b) Represent a particular body of knowledge
c) Transmit the facts of science
d) Facilitate the development of scientific knowledge by confronting students with contexts to explain that challenge their naïve concepts
e) Have students be active with materials; "hands-on" experiences.
f) Involve students in investigating solutions to authentic problems
g) Represent science as inquiry
h) Constitute a community of learners whose members share responsibility for understanding the physical world, particularly with respect to using tools for science.

Self-reflecting teaching...

SELF REFLECTING TEACHING …

Is it present a PCK or not?

Which PCK do you recognize?



https://www.youtube.com/playlist?list=PLAA7AA6B0E433653C PSSC - Physical Science Study Committee

https://www.youtube.com/watch?v=CDEDBXuwYvo Fisica della professoressa Ida

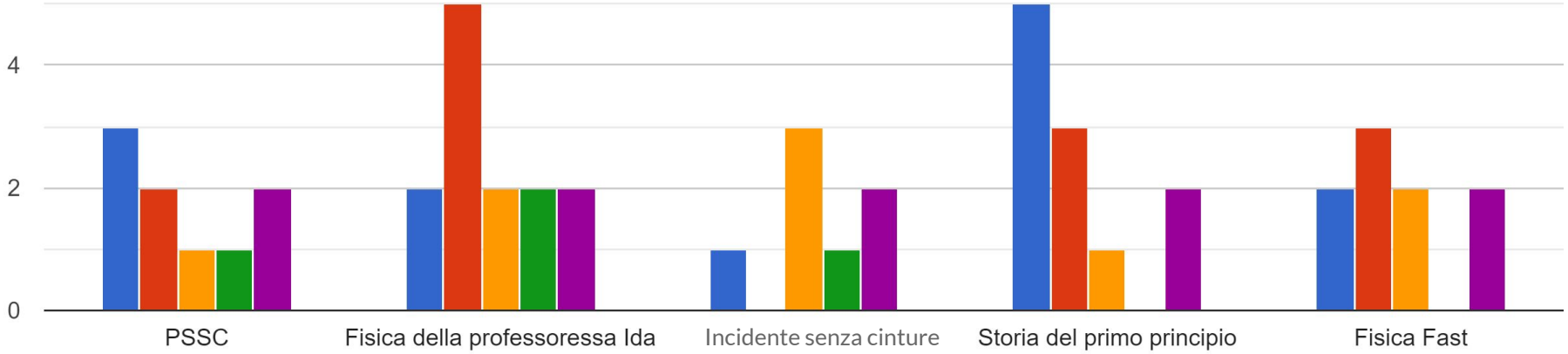
https://www.youtube.com/watch?v=AsNxXS3kYho “Te lo avevo detto” - INCIDENTE SENZA CINTURE

https://www.youtube.com/watch?v=282D-YkMxyI PoliMi - Storia del primo principio

https://youtu.be/p0zDfi_8TKo FisicaFast

SELF REFLECTING TEACHING …

https://forms.gle/EP5mzYEAFw6AGEcn8



Orientation towards science teaching

Knowledge and beliefs about science curriculum

Knowledge and beliefs about students' understanding of specific science topics

Knowledge and beliefs about assessment in science

Knowledge and beliefs about instructional strategies for teaching sciences