Preparing high school teachers and their students for visits to S'Cool LAB

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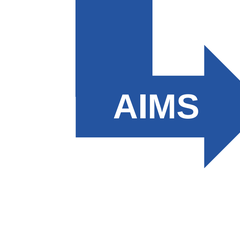
S'Cool LAB Concept and Aims



Hands-on particle physics learning laboratory

- out-of-school learning place (OSLeP) targeting students aged 16-19
- international audience from more than 20 countries
- independent experimentation in small groups

200 m² modular laboratory space at CERN

- capacity for 14 experiments linked to particle physics and CERN's scientific programme and technologies
- state-of-the-art IT equipment

Test bed for physics education research

- iterative re-design of workshops, experiments, and student worksheets
- accompanying research on students' conceptions
- accompanying research on preparation of students

AIMS

Give an insight into the working methods, technologies, and research of the world's largest particle physics laboratory

Make CERN's physics and technologies understandable for students through hands-on experimentation

Research Context

S'Cool LAB audience: diverse backgrounds

- all groups highly motivated; however…
- extremely variable pre-existing skills and knowledge
- often impossible to offer all experiments in students' native language

OSLeP visits in general

- teachers' goals when bringing students to OSLePs are varied [1]; many not achievable in school settings
- providing preparation material is seen as important [2, 3]
- curriculum links, time critical to OSLeP visit preparation [4]

Student curiosity

- important to optimize students' time spent hands-on: desirable that students arrive already curious, i.e. prepared
- "Goldilocks" level of curiosity [5] may be key to successful engagement (fig 1) and positive learning outcomes

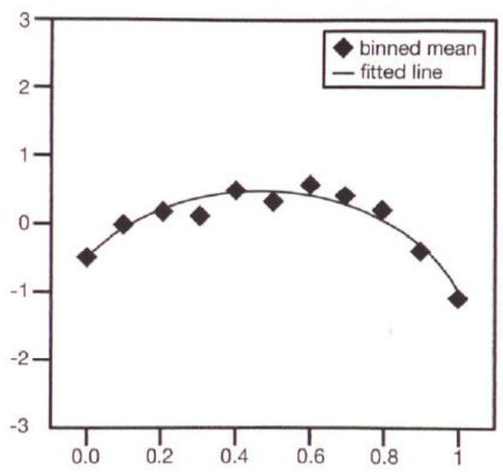


Fig 1: curiosity about correct answers versus confidence in own answers [5, adapted from 6] – medium "Goldilocks" confidence corresponds to maximum curiosity

Research questions

How should one work with teachers to prepare students for hands-on experiences in OSLePs, such as S'Cool LAB?

When preparing students for a S'Cool LAB workshop, how can one elicit optimal levels of curiosity about…
… S'Cool LAB experiments? … CERN's research? … science in general?

Teachers' Views on Preparation for S'Cool LAB

Teachers who visited S'Cool LAB in 2015 were asked for their views on how to prepare students for such workshops

- **Time commitment:** highly variable, from a single hour to several sessions during the entire academic year.
- **Format:** CERN website & YouTube videos mentioned as useful sources. Broad support for online materials in general.
- **Content:** While some teachers can modify their usual curriculum order to cover relevant topics in time for their CERN visit, there is demand for material specific to the experiments the students carry out.

Timeline: Preparation Material by Workshop Date

May - Jun 2015

No preparation material

Oct - Dec 2015

Selected CERN web pages

Feb - Jun 2016

- Providing teachers with a list of key topics to be covered in S'Cool LAB.
- Collecting materials teachers use or develop to prepare their students.

Oct - Dec 2016

- Synthesise teacher feedback
- Pilot sections of material

2017 onwards

- Material to be hosted on dedicated e-learning platform
- Pre-workshop test also online

moodle

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[1] Storksdieck, 2001. Differences in teachers' and students' museum field-trip experiences. *Visitor Studies Today* 4/1:8-12
[2] DeWitt & Storksdieck, 2008. A Short Review of School Field Trips. *Visitor Studies* 11/2:181-197
[3] Anderson & Lucas, 1997. The Effectiveness of Orienting Students to the Physical Features of a Science Museum Prior to Visitation. *Research in Science Education* 27/4:485-495
[4] Kiesel, 2005. Understanding Elementary Teacher Motivations for Science Fieldtrips. *Science Education* 89/6:936-955
[5] Kidd & Hayden, 2015. The Psychology and Neuroscience of Curiosity. *Neuron* 88/5:449-460
[6] Kang et al, 2009. The Wick in the Candle of Learning. *Psychological Science* 20/8:963-973