What is “physics” for prospective primary school teachers

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Introduction

In this poster we present an evaluation of the style of the workshops in a physics course for prospective primary school teachers. Results of a study of students' prior formal instruction in physics, perceptions of physics, attitudes towards physics and their perception of the need for physics instruction in teacher training are also presented.

The physics course

* has no prerequisites
* has lectures, labs and workshops
* aims to present physics as a universal science and as the basis for technology
* aims to engage & enthuse students in physics
* emphasises understanding and explaining
* uses workshops to strengthen the link with teaching and learning of physics.

Methodology

* A written survey was administered in the last lecture of the course.
* The survey had a quantitative section to evaluate the style of the workshops and a qualitative section to obtain feedback on student perceptions, attitudes and experiences.
* The qualitative responses were categorised based on phenomenography.
* A sample of sixty responses were analysed.
Evaluating the style of the workshops

On a scale of 1 (disagree) to 5 (agree), 60 students ranked the following aspects of the workshops.

- a special first session in which students propose and discuss a possible question posed by a primary student (session 1 with Ave=3.6)
- practise teaching presentations (ptp with Ave=3.6)
- demonstrations (dem with Ave=3.6)
- cooperative learning (coop with Ave=3.8)
- workshops as a whole (workshops with Ave=3.6)

Fig. 1 Student response to workshops
The workshops are effective in engaging students in physics. Cooperative learning is valued by students. More students rank the special first session of the workshops as a five. Teaching and learning strategies used in the workshops are successful.

Previous instruction in physics
Fig. 2. Student perceptions of the extent of their previous experience with formal instruction in physics.

Students perceive that they have not studied physics when there is physics in year 9-10 General Science, a compulsory core subject in school.
Students perceive physics in terms of modelling (Model), how things work (HTW), the world around us (World), topics with applications to everyday life (TAEDL), topics (Topics), maths (Maths) and some are uncategorisable (UC).

The structure demonstrated in the perceptions varies from cohesive to fragmented.

Cohesive perceptions of a discipline are related to deep learning.
Students attitudes towards physics vary from good (Good), useful and important (Useful), better than before (Better), contrasting views (Contrast), not useful (No use), bad (Bad) and some are uncategorisable (UC).

Student attitudes varied from positive to negative.
Positive attitudes are related to successful and relevant engagement such as in the workshops.
Need for physics instruction

Fig. 5. Student perception of the need to study some physics.

The question was
“Do you think primary school teachers need to understand some physics? Please provide a reason”.

Students responses were categorised into
* yes, with comments on the depth of understanding and concepts (Y content).
* These students indicated that there was too much in the course
* yes, physics provides explanations, answers (Y answer)
* uncategorisable (UC)
There were no negative responses.
Expect to gain from this course

Fig. 6. Students expectations from the course.

The question was
“Please indicate the most important thing that you expect to gain from this course”.
Students responses were categorised into
*understanding of concepts in physics and how things work.
*ability and confidence to explain
*miscellaneous such as "physics is not all about formulas"
*a pass in the course and *uncategorisable (UC).
The high level categories are linked to what students perceive the study of physics to be and what is relevant to their chosen profession.

Conclusions

Our evaluation shows that:
*42% of students surveyed perceive that their physics background is nil
*more students have cohesive perceptions of physics in comparison to fragmented perceptions
*student attitudes to physics is positive
*students do appreciate the need for understanding and explaining some physics
*the workshops are a successful teaching and learning environment