Pupils' attitudes to practical work in the physical sciences at school

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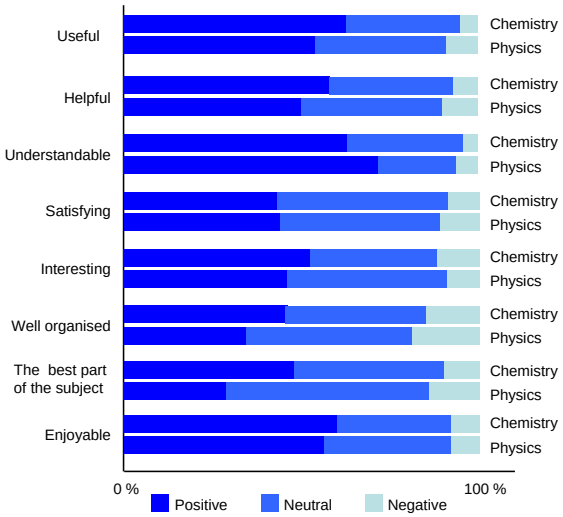
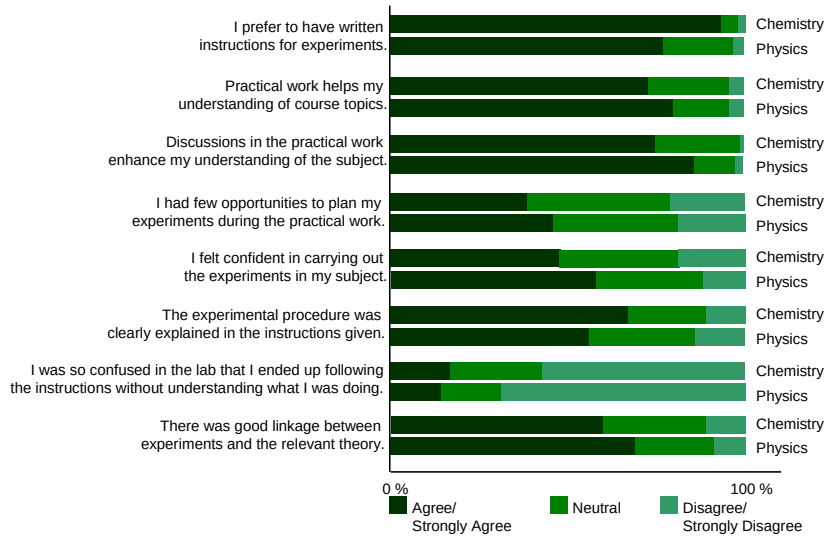
Introduction

- Applying scientific theory in a practical context has long been a strong component of the teaching of the physical sciences at school and university. This study, carried out with undergraduate students as they started the first year of their degrees, investigated the views those students had of the practical side of their subjects at school.
- The study covered the views of 367 Chemistry students and 175 Physics students. It took the form of a survey issued before they had begun their university laboratory classes. The questions were a mixture of "tick box" type and free-form answer.
- In each case the majority of students reported getting the chance to carry out most of their experiments themselves (83 % Chemistry/62 % Physics), rather than as teacher-led demonstrations (16 %/34 %) or PC-based simulations (1 %/4 %).

Question 1: What are your opinions about your experiences of your practical work at school?



Question 2: Think about your experiences at school.



Question 3: If you were put in charge of your final year's practical class, what would you do differently?

- The students were given free reign here to suggest changes. There was a wide range of responses, which were then grouped into categories.
- The top five responses for each subject are listed below. The number in brackets is the corresponding % for the other subject.

Chemistry	
Statement	**%***
Better link between theory and practical work	24 (15)
Better/clearer instructions	15 (15)
Go through the experiment as a demonstration first	10 (3)
Provide more time for experimental work	9 (6)
Do more experiments	5 (-)

Physics	
Statement	**%***
Better/clearer instructions	15 (15)
Better link between theory and practical work	15 (24)
Better equipment	13 (5)
Let students do more of the work themselves	12 (-)
Let students plan their experiments	7 (5)

* Percentages are a fraction of the comments made. (Not all students completed this question.)

Question 4: In what ways do you think university practical work will differ from the practical work you experienced at school?

Statement	Chemistry	Physics
Use of more complicated equipment	25 %	24 %
Use of modern equipment	20 %	22 %
I will get less guidance than at school	18 %	18 %
I will do the experiments myself instead of watching them being done	14 %	17 %
I will have more time for each experiment	15 %	11 %
I will have more choice in the experiments I do.	8 %	7 %

Question 5: Are you looking forward to practical work this year?

	Positive	Neutral	Negative
Chemistry	69 %	25 %	6 %
Physics	70 %	21 %	9 %

Conclusions

- Students leave school with a generally positive view and experience of the practical side of Chemistry and Physics at school.
- The work of school teachers in these subjects is clearly well received and should be applauded.
- Those teaching the subjects at university must take measures to insure that these positive views are developed further as the students' educational careers continue, a job that should be made easier as the students are clearly looking forward to practical work at university.

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