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The perceptions, views and opinions of physics students relating to our undergraduate teaching labs

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> *'The physical laboratory system has now become quite universal. No university in the world can now live unless it has a well-equipped laboratory'*
>
> Sir William Thomson (1885)

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What's a lab for anyway?

A question which students have probably been asking since they were first invented.

There is no one answer.

Literature in this field generally falls into two categories:

- Aims/goals that are too wide to be useful.
- Aims/goals that are too narrow to be useful.

What's a lab for anyway?

The American Association of Physics Teachers came up with 5 categories:

1. The art of experimentation
2. Experimental and analytical skills
3. Conceptual learning
4. Understanding basic knowledge of physics
5. Developing collaborative learning skills

The view of our students

Methodology:

- Surveys
  - Level 1 - 95 responses
  - Level 2 - 39 responses
  - Level 3 - 11 responses
- Follow up focus group interviews - one for level 1, one for level 2
- Results from level 2 and 3 combined, and compared to those for level 1.
  - both have chosen to continue physics, gave similar results and had the chance to choose experiments

Methodology

The surveys consisted of 30 questions split into 5 themes:

1. General opinions: was the lab useful/helpful/boring etc?
2. Student experiences: asked to agree/disagree with various statements (e.g labs help my understanding of physics)
3. The purpose of a lab
4. Pick a favourite and discuss why.
5. What would you do?

Theme 3: A lab's purpose

The students were given 8 reasons why laboratory work is an integral part of a physics course and asked to pick 3 which they considered to be the most important.

Theme 3: A lab's purpose

	P1	P2/3	Total
1. Physics is a practical subject	56	61	58
2. Experiments illustrate theory for me	45	61	50
3. Lab work allows me to test out ideas	19	14	18
4. Experiments assist me to plan and organize	10	6	9
5. New discoveries are made by means of experiments	47	41	45
6. Experimental skills can be gained in the lab	45	59	50
7. Experimental work allows me to think about physics	44	35	41
8. Experimental work makes physics more enjoyable for me	15	20	17

Theme 4: Pick a favourite

Which experiment was particularly useful or enjoyable?

	P1 (%)	P2/3 (%)
Easy	17	6
Fun	8	6
Got it finished	8	
Tied in well with theory	6	8
Interesting	4	14
Practical	4	6
Challenging		6
Good instructions		16

Theme 4: Pick a favourite

Did you find that experiment easy or challenging?

- Easy 25 %
- Challenging 32 %

What did that experiment teach you?

- Understanding of theoretical knowledge 33 %
- Equipment/measuring tools handling 21 %
- Lab/experimental knowledge/skills 4 %

Theme 4: Pick a favourite

List any skills which improved as a result of doing that experiment.

- Data analysis/problem solving 35 %
- Teamwork and patience 12 %
- Computing/lab skills 4 %

Theme 5: What would you do?

Students were asked what they would do differently if they were put in charge of the labs.

Range of responses … the most popular being …

Statement	P1	P2/3
More detailed demonstration and instructions about experiments	35	20
Increased time	17	2
Use of pre-labs & improvement of scripts	9	18
Enough sets of equipment - in working order.	7	6
More supervision	2	8

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Conclusions

The students responded to our labs in a generally positive manner.

From their point of view, labs provide an environment where they

- learn more about their course work;
- develop/improve data handling skills;
- develop/improve their teamwork experience.