

Leading Effective Lab Sessions

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Goals of the
engineering labs

Planning lab
sessions

Today, we discuss:

Writing lab
reports

Lab activities to
increase student
learning



Trouble at the lab

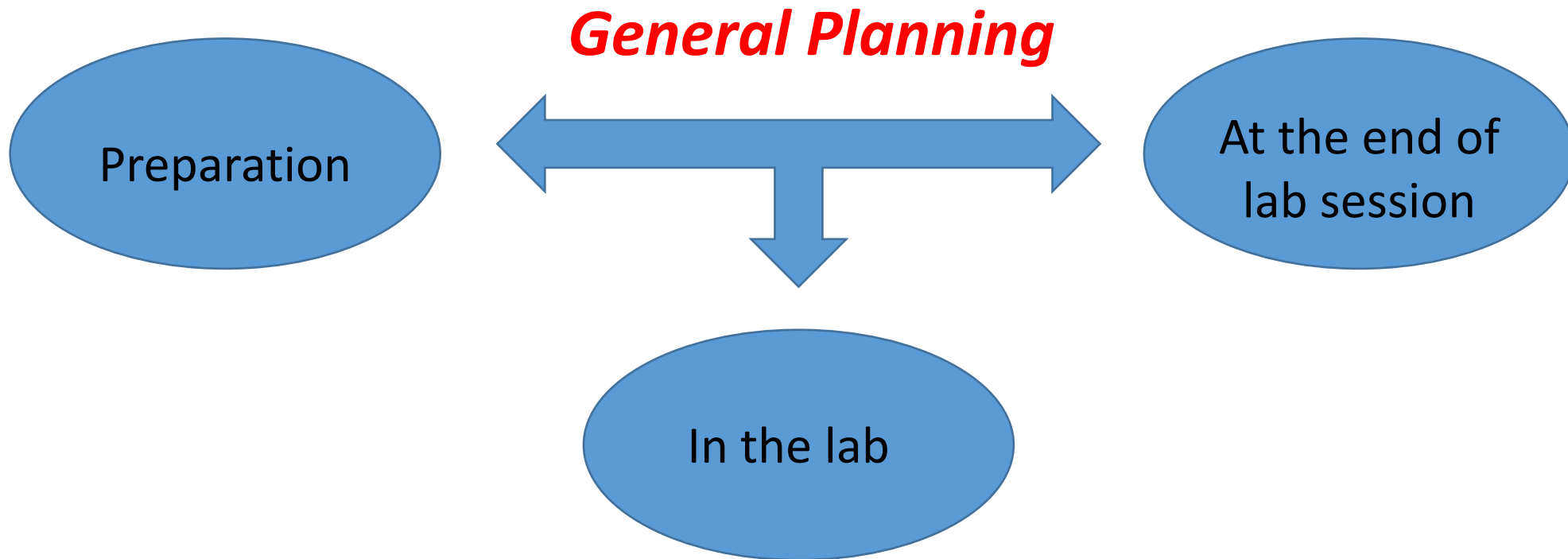
<http://www.economist.com/news/briefing/21588057-scientists-think-science-self-correcting-alarming-degree-it-not-trouble>

Goals of the engineering labs

- Provide opportunities for students to work in small teams projects that utilize state-of-the-art technologies
- Provide students hands-on experience in design of experiments, principle of measurements and digital data acquisition
- Outlining procedures to solve problems and experiments to test hypothesis
- Enhance students' critical thinking skills in learning and discovering for themselves by defining problems, asking questions, and analyzing ideas
- Enhance students' oral and writing skills to be able to communicate with engineers or customers, and present effectively their ideas, designs or results by learning to document their work in technical reports and presentations

Planning lab sessions

Depending on if you are co-teaching lab with the instructor or you are in charge of the lab on your own, you may have different plans.



Preparation

- Read lab instructions in advance.
- Check if there is any difficult steps or unclear instruction.
- Think about objectives and learning outcomes.
- Make sure that you have all the tools and supplies you need and confirm this with course instructor and lab supervisor.
- Set up the equipment in advance.
- Conduct experiment at least once before the session.
- Get familiar with lab safety procedures and location of all safety equipment and material safety data sheets.

In the lab

- Give a brief and effective presentation about lab activities.
- Introduce lab equipment
- Talk about lab objectives
- Talk about theories related to the lab subject
- Show importance of the experiment by relating it to the real world experience and applications.
- Talk about steps of the experiment.
- Ask questions to see if students understand the procedure.
- Mention any required safety instructions.

In the lab

- Ask students to work in groups and as team.
- Go around the room and see how they are doing.
- Talk to every one and ask them quick questions to check if they understand what they are doing.
- Answer students' questions and offer them useful advice.
- If some groups have difficulties in some parts so there is possibility that other groups have the same issue. You can explain it to everyone.
- Take attendance if it is required.

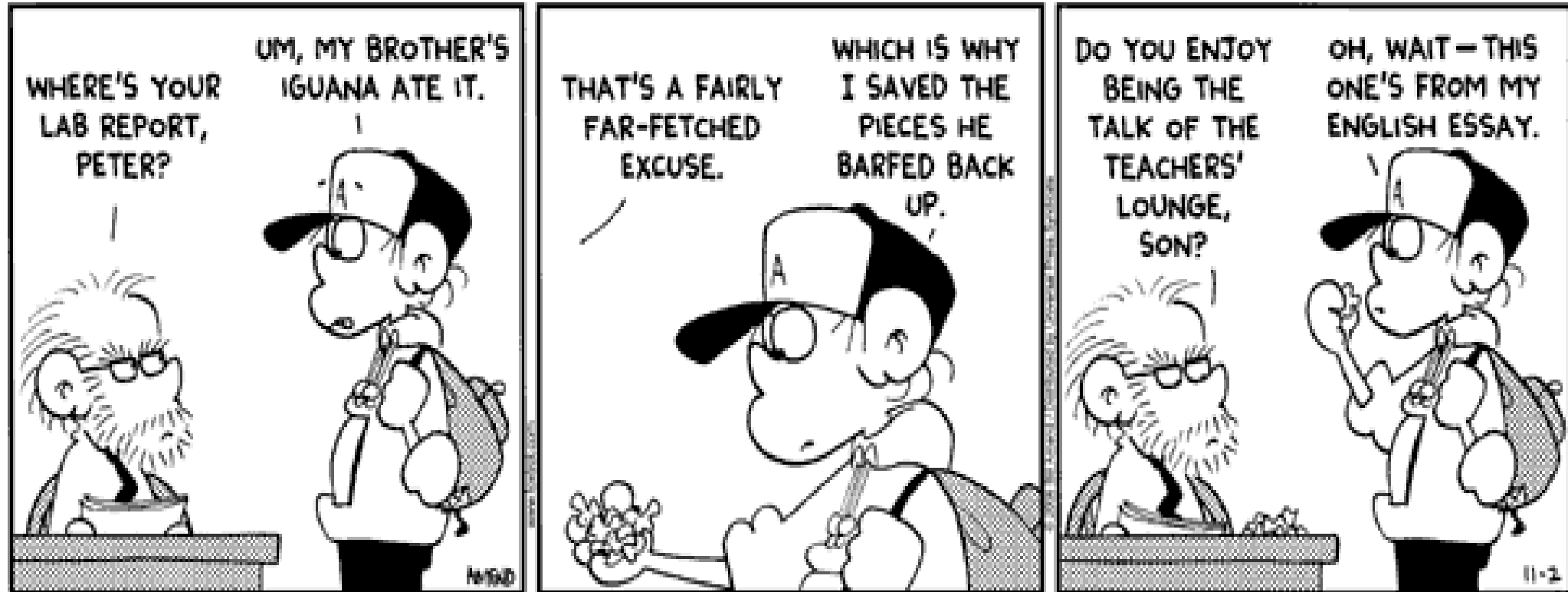
At the end of the lab session

- Remind them to take hardcopy of softcopy of the test results
- Work with students to summarize findings and conclusions
- Briefly explain how to write a lab report and also your expectations.
- Mention accepted format/s for including raw data, calculations, graphs, and diagrams.
- Answer students questions and concerns.
- Ask them to clean the lab and return tools and equipment to their first place.
- Provide them your contact information and your availability for future questions.

Lab activities to increase student learning

- Making lab activities more open-ended.
- Group discussions.
- Written ideas and predictions and exchange with other groups.
- Use simple objects for discussing parameters involved in an experiment.

My Brother ate my lab report!



A delicious lab report

- Any examples of strong lab reports?
- Best approach for preparing a lab report?

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A good lab report has:

- 1) Structure and format
- 2) Purpose
- 3) Observation
- 4) Details and facts
- 5) Data analysis (Raw data, Assumptions, Equations, Analysed data)
- 6) Graphs (showing trends)
- 7) Results, discussion and interpretation
- 8) Errors and their effects on results
- 9) Comments
- 10) Conclusion

Conclusion:

- Plan your lab session so that you can cover most of the elements that make your session effective.
- Lab activities should help student critical thinking and increase team working skills.
- Report is like a story with a beginning and end. It should show that you understand the story and do not let the reader get lost through the story.

References

- http://www.unbc.ca/sites/default/files/assets/centre_for_teaching_and_learning/tips/running_an_effective_lab.pdf
- <https://www.uoguelph.ca/tss/id/ta/tahb/tah4e.html>
- <http://www.engr.wisc.edu/services/elc/tahand.pdf>
- <http://www.engineering.uoit.ca/undergraduate/teaching-labs/>
- http://www.exploratorium.edu/ifi/resources/workshops/lab_activities.html

Thanks ...

Any questions?