KUL2017 – ABSTRACT SUBMISSION (short presentation, workshop, round table)

Format: Short presentation

Students' own collective criteria - influence on peer feedback and lab report quality

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Keywords: formative feedback, generic skills, peer review, quality criteria

SHORT SUMMARY

What happens when you let the students collectively decide together what's meant by "good quality" for example in a lab report? Will this adequately guide their own learning as shown by their written lab reports and peer feedback comments? Or is it better to just tell them what you expect?

ABSTRACT

Intended audience:

This presentation will likely mostly interest teachers who use or want to start using peer review in their courses (at bachelor or master level). Teachers of courses with lab report assignments may also be interested in my example of use of peer feedback in this learning context.

Problem statement:

Many students, at the onset of advanced level studies at Chalmers, lack the ability to produce a good quality lab report. Such generic skills are expected to be in place before students leave Chalmers with their master's degree. Experience has shown that "just" telling the students how to write a good report is not sufficient. Might they listen more to each other than to the teacher?

Suggested solution:

If students are collectively given the chance to spell out what they mean by a "good quality" lab report, agreeing upon a list of criteria in class, this list can be used to guide their learning through applying their own criteria. This list of criteria can support their individual first draft writing process, as well as their individual feedback given to each other in a structured peer review process. Finally, the feedback given by the teacher can reference the students' own list of criteria when making the final assessment of the revised report.

Chosen learning scenarios:

This method has been applied for two consecutive years in an introductory course within the MPWPS program. An introductory lecture before labs start includes a collective exercise where students provide their take on quality criteria for lab reports. The teacher takes the role of secretary, creating their collective list on the whiteboard, and making the list available in PingPong after the lecture. (See Ref. 1.) If key aspects are being forgotten by the students collectively during the process, the teacher can drop gentle hints in order to have the final quality criteria list quality assured.

Seven obligatory short labs are performed in pairs, but only one of these labs is individually and randomly assigned to each student for writing a formal lab report. Students are then assigned peer review roles, and apply these quality criteria to a report on a different lab by another student. Revised lab reports are then submitted, along with a short text on how the peer feedback was incorporated into the final version. With peer review of first drafts, the reviewer as well as the author of the report will be learning during the process, while carefully applying the quality criteria.

During the two most recent years, when the above system was in place in this course, the teaching differed in one significant way: the most recent year included a lecture dedicated to academic honesty and the avoidance of plagiarism. (See Ref. 2.) In previous years, quality criteria were provided by the teacher, not by the collective group of students. (See Ref. 3.)

Student achievement measures:

We analyze the student achievements (lab report quality) as a measure of their learning in three different aspects: core subject content learning, generic written communication skills, and academic honesty. The latter analysis is reported in a separate presentation (Ref. 2.) The generic written communication skills will be the focus of my presentation, with an attempt at measuring the degree to which the student's own quality criteria list was actually successfully applied in their lab report and peer review writing. It will however not be possible to make a "fair and scientific" comparison to previous years' student lab reports, since other factors were also changed at the same time.

Comparison of resulting achievement for different scenarios:

Student learning connected to similar quality criteria will be compared for the "student collectively generated" criteria (the latest two years of the course) and the "teacher generated" criteria (provided previously). The two different years this student generated criteria scenario was used had slightly different criteria lists – which may or may not be evident in the outcome of the students' writing. This course has just finished, and the analysis will be performed during the coming study period before the KUL conference, so results are pending.

Alternative solutions:

In a more traditional scenario, the teacher informs the students of the quality criteria, set by the teacher, and the teacher applies the criteria when grading the assignment. Both comments and grades are usually provided by the teacher to individual students, who sometimes resubmit assignments after taking into account the teacher-provided feedback. However, in many cases, the feedback comes without any further requirement posed, and therefore without strong incentives for further learning.

Much research has been done on criteria based assessment including negotiating criteria with students, (see e.g. Ref. 4.) Here, however, I have just given my suggestion of one way of assessing, which I have found to work well

References:

1. "Lab report quality criteria", available on PingPong at the following link: https://pingpong.chalmers.se/courseId/7038/content.do?id=3366624

2. KUL 2017, Undervisa och examinera akademisk hederlighet, submitted "short presentation"

3. KUL 2012, Systematisk feedback och progression som stöd för studenters lärande inom generella kompetenser.

4. Biggs, J. "Teaching for quality Learning at University", 2003, chapters 8 and 9.

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Sheila Galt and Hans Hjelmgren – Short presentation MP12

KUL – Chalmers – 2017-01-12

What's the problem?

- Not all master students were demonstrating ability to write a good quality lab report.
- "Just" telling them what was expected for good quality did not seem to help enough.
- Teacher feedback without required re-submission often "wasted work".

A push in the “right” direction?

- We tried letting the students collectively formulate quality criteria for a good lab report.
- We also asked them to apply their collective quality criteria when giving peer review feedback on first draft lab reports.
- Teacher only reads “final” version for decision to accept report quality or require re-submission.

How did we rig this?

- Introductory lecture before labs start:
- Teacher documents students' own quality criteria suggestions on whiteboard.
- Anything important missing fixed with "broad hints".
- Criteria published for guidance in lab report writing and peer review.

What was the setting?

- Electromagnetic Waves and Components, RRY036

  Obligatory first course in master program MPWPS:

  Wireless, Photonics and Space Engineering

- 7 short labs, done in pairs, rough notes taken during each lab
- 1 of 7 random individual lab reports assigned after all labs completed
- "quasi-random" assignment to peer review a report on a different lab

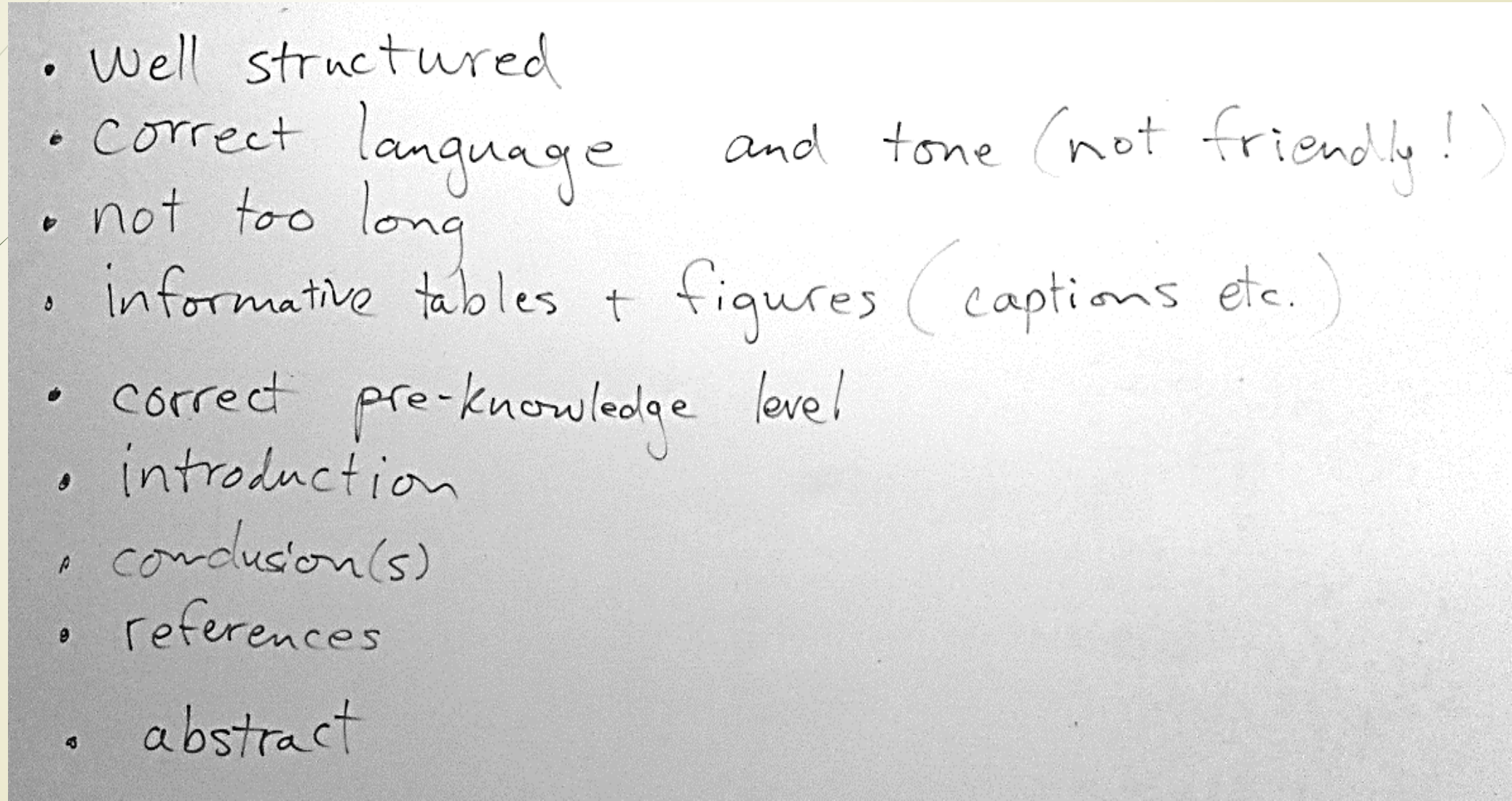
- Monday: first draft submitted through Urkund
- Wednesday: peer review submitted
- Friday: final report submitted with comments on how peer review suggestions used

Students' own criteria 2016:

A good lab report:

- good structure
- background, overview, what, why?
- concise writing (no bla, bla, bla!)
- use spell-checking!
- relevant diagrams
- proper ref. of data, outside sources
- not plagiarized
- table of contents
- expected and actual results
- Small abstract
- ref. to numbered formulas
- refer in text to numbered tables/figures
- conclusion
- hypothesis
- discussion

Students' own criteria 2015:



Teacher's criteria 2014 (and before):

- Max 10 pages, 1 page per lab station.
- What, why, expectations, main findings, conclusions.
- One relevant table or diagram of your results for each.
- Summarize so you understand after 5 years!
- No template, choose your own structure.
- One unique report per student.
- Do not copy and paste anything.
- Use your own words to explain.
- Learn to find the most important content.
- Write in English.
- Check spelling and grammar first.
- Hand in through Urkund.

- Students were required to write a report including all 9 short labs.

Examples of peer review comments:

- Great job throughout the report. I added some comments about things I think could be changed / rephrased and so on.
- Credit needs to be given to the creator of this image.
- Needs to say Figure 3a.
- DEFINIETLY not possible to get 0.01Ω. But even if you meant kilo-ohm, it's way to precise margin of error to be true.
- The background should be divided in introduction and background
- There is also no real discussion part, while you do claim to have an unsolved issue from the lab that you might want to discuss.
- It would be nice to reference to all the tables also in the text, like "In table 2 it can be seen that..."
- I enjoyed a lot to read your report and I also learned some new things of my own.

Problems with plagiarism

- 2016 – found 3 out of 28 reports with academic honesty issues
- 2015 – no significant academic honesty issues
- 2014 – found 3 out of 22 reports with such issues, as well as “stolen” figures out of the lab PMs.

- Special obligatory academic honesty lecture included 2016.

Extra problem with LaTeX and Urkund

- Urkund with pdf from LaTeX requires fix for illegible ligatures.
- Examples of illegible text are specific symbols for “ff” or “fi” which are replaced by “*” in Urkund.
- This problem can make the Urkund plagiarism analysis useless for the teacher.

- Please follow these instructions below from Urkund and resubmit your pdf file.

- Users of LaTeX should be aware that the ligatures that are created by this software in the pdf output are incompatible with URKUND.
- LaTeX can be set to disable ligatures by adding the following lines:
  \includepackage{microtype}
  \DisableLigatures{}

How about the report quality?

- Much improved when students apply own criteria and peer review.
- This "study" not well designed since other aspects changed too.

Table 1: Measured intensities for different angles. θ is defined as the angle between the axises of transmission for the two linear polarizers. The intensity is in arbitrary units.

θ [°]	0	15	30	45	60	75	90
Intensity	14.0	19.5	34.4	57.3	78.8	94.8	99.8

By subtracting the background light (the minimum value, 14.0) and normalizing the intensities (dividing by the maximum value, 99.8-14.0), the result can be plotted and compared to Malus's law, as seen in Figure 3.

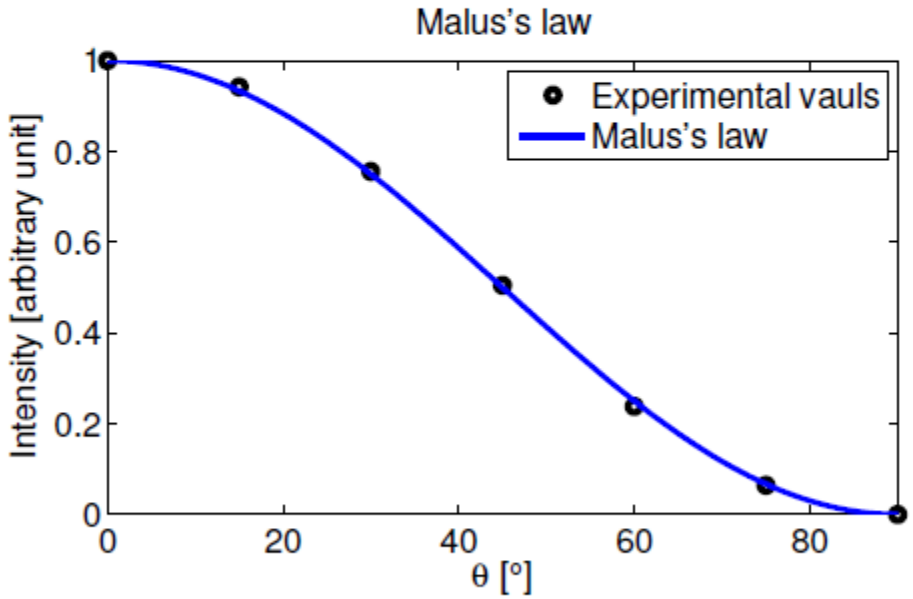
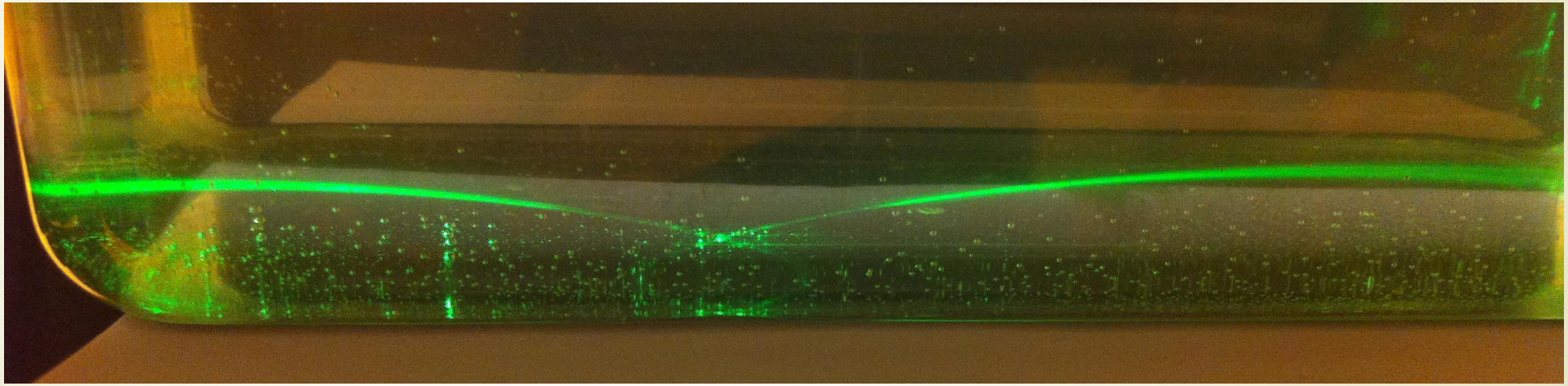


Figure 3: Experimental values compared to Malus's law. The black circles are the normalized measured data from table 1. The blue line is the intensity that would be expected from Malus's law ($\cos^2\theta$). The standard deviation, in terms of the normalized arbitrary unit, is $4.05 \cdot 10^{-5}$.
Image source: authors own work.

And just for fun … sugar cube graded index light ray superbender demo



Take home lessons

- Collective work on quality criteria seems to strengthen learning.
- Students “listen” to each other, and want to show good performance.
- Peer review teaches both subject content and generic skills.
- Peer review saves teacher workload.
- Academic honesty is still an issue to keep in focus.

Thanks for listening!