



# A study of inter-rater agreement when teachers assess students' laboratory skills in science.

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## Background

Education and assessment in Swedish schools contains syllabi which are based on a goal referenced model. The overall goals emphasize quality over quantity and include both cognitive and non-cognitive skills. The criteria for assessment and grading are structured according to a simplified version of Bloom's revised taxonomy. The overall goals are described as skills and also contain grading criteria which constitute guidelines as to what teachers should observe when assessing students'. The grading criteria is defined in three levels E, C and A. According to the grading criteria for science the teachers should assess the students' laboratory skills by observing them. The students' skills in using equipment are described in the three following levels: *in a basically working way, in an appropriate way and in an appropriate and efficient way.*

## Steps in the process

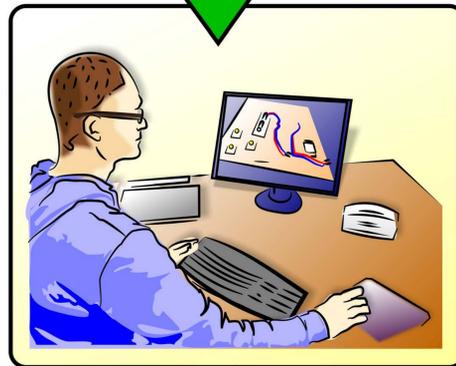
**Step 1.**  
The teachers worked individually and formed a scoring guide for a specific laboratory task.



**Step 2.**  
The teachers worked together as a group to agree on an scoring guide.



**Step 3.**  
The teachers' worked individually and assessed the students' performing looking at films.



**Step 4.**  
The teachers' worked as a group discussing similarities and differences then made a new agreement of an scoring guide.



## Findings in the process

**After step 1** Teachers were able to individually concretize what characterizes the qualitative levels of the specific task based on their teaching experience and knowledge of using the grading criteria in their teaching.

**After step 2** The group had trouble concretizing what to assess - the process or the result?  
The group had difficulties agreeing on what characterizes the qualitative levels of the specific task.

**After step 3** The teachers found it easier to assess a straightforward task then a more complex task. Inter-rater agreement was higher when the group used a more concrete assessment guide and lower when the assessment guide was more general.

**After step 4** The group looked at the films again and obtained a higher agreement when they were allowed to discuss their judgements in the group.

## Purpose

The aim of the study was to examine how teachers assess students' laboratory skills, whether they could operationalize what should be assessed based on the qualitative levels in the grading criteria and, finally, whether their assessment of the students' skills was done in an equivalent way.

## Empirical analysis

A random sample of 6 teachers was invited to take part in the study. The teachers all worked at different schools and had at least ten years' experience of teaching and assessing 15-year-olds' knowledge of science. Work included both individual tasks and group discussions.

## Conclusions

Teachers interpret the grading criteria and the meaning of the different levels (in a basically working way, in an appropriate way and in an appropriate and efficient way) in different ways and therefore designed the scoring guide differently. As a consequence the teachers have problems assessing the process in an equivalent way.

The cause might be that the assessment guide is too vague or that the character of the task is quite complex. When teachers are given the opportunity to meet and discuss the assessment they obtain more equity (they reach greater concordance).

## Limitations

There may be a risk that this model of working, i.e. that teachers are allowed to meet and discuss assessment can lead to strong individuals in the group affecting the assessment process too much. The agreement within many small groups will perhaps not lead to national equity using this particular work method.

### References:

- Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives*. New York: Longman.  
National Agency for Education. (2011). Curriculum for the compulsory school, preschool class and the leisure-time centre 2011. <http://www.skolverket.se>