

The ongoing process of aligning two courses for STEM teachers in a new Master's programme at Chalmers:

An example from "Learning and Leadership"

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As the term constructive alignment (Biggs, 1999) indicates, the central idea of this educational framework is that different aspects of a teaching and learning unit/situation should be brought together in a way that is mutually reinforcing various aspects and not putting them at odds.

The aim of this poster is to illustrate an ongoing process of aligning two related courses within a programme by drawing on experiences from developing two courses for the Master's programme "Learning and Leadership" which started at Chalmers in 2011. The two courses in question, *Natural Science and Technology Education 1* and 2 (NSTE1/2) focus on issues of teaching and learning in the three upper secondary school subjects chemistry, physics and technology. The first course is more practical in nature while the second is more theoretical.

At the moment the first cohort of students (n=6) has gone through both courses and preparations are being made to run the first course for the second time. While constructive alignment is the guiding principle of the work the practical principle for

the long term development of the courses is to work through a series of iterations with the end of each course serving as major checkpoints for the process. At these points, in conjunction with the formal course evaluations, the current iteration of the course in question is evaluated and potential improvements considered not only in relation to the singular course but to both courses together as well as the broader context of the whole programme.

However, the formal course evaluation through web survey have been considered to be insufficient (n=5 responses) to serve as the sole input to this evaluation and development process. Also, no additional structured data gathering has so far been carried out either by the course leader or a third party. However, by drawing on the principles of action research (e.g., Noffke & Somekh, 2005), a wealth of input on the courses has been collected on a regular basis, for example from reading student assignments and engaging in frequent discussion about the courses with students and other course stakeholders. Some of this input has been written down in a journal and all of it has contributed to help the course leader construct a fuller understanding of the courses on both a practical and a meta level. Reflection is a key concept here as well as dialogue with key course stakeholders. While this process so far mainly has been of an informal nature, it is an approach lecturers at Chalmers easily can adopt and apply to their own practice, and it can serve as a starting point for a more formal and structured exploration of the continued process of aligning the two courses in question.

The process goes ever on.

NSTE2 v.0 (1st draft)

Main themes

- Evaluate lessons/labs
- Development suggestions
- Lead development work

Minor themes

- HoST, ToS:SS, ICT, ESD
- Theory of learning

NSTE2 v.1 (2012)

Main themes

- (Evaluation and development of teaching)
- Theories of learning (3 sessions)
- ESD (4 sessions)
- ToS:NS+SS (3 sessions)

Minor themes

- Some ICT
- Things not yet covered

Some activities

- Seminar with assigned readings
- In groups plan detailed ESD lesson sequence
- Individual essays + take home exam

ToS:NS

NSTE2 v.2 (2013)

Main themes

- Subject specific educational theory
- The subjects' character
 - ToS:NS+SS (3 sessions)
 - HoST (3 sessions)
- The role of evaluation and development is still unclear

Some activities

- Seminar with assigned readings
- Only individual assignments
- "Reading course"

HoST (expanded)

The evolution of Natural Science and Technology Education 2

- The theoretical course
- Runs Sept.–Nov.

The evolution of Natural Science and Technology Education 1

- The practical course
- Runs January–March

NSTE1 v.2 (2013)

Main themes

- Plan lessons/labs + full course
- Teach lessons/labs
- Forms of examination
- Dedicated subject specific teaching (5 sessions)

Minor themes

- ICT (3 sessions)
- ESD (4 sessions)

Some activities

- Seminar with assigned readings
- In groups plan course + sequence
- Three individual microteachings
- Evaluation of course book

ESD module, some ICT content

Detailed lesson sequence assignment

NSTE1 v.1 (2012)

Main themes

- Plan lessons/labs + full course
- Teach lessons/labs
- Forms of examination
- Some expanded subject knowledge

Minor themes

- HoST (1 session)
- ICT (1 session)

Some activities

- Seminar with assigned readings
- In groups plan course + sequence
- Two individual microteachings

NSTE1 v.0 (1st draft)

Main themes

- Plan and teach lessons/labs
- Forms of examination

Minor themes

- HoST, ToS:NS, ICT

Key to abbreviations

- ESD = Education for Sustainable Development
- ICT = Internet and Communication Technologies
- HoST = History of Science and Technology
- NSTE = Natural Science and Technology Education
- ToS:NS = Theory of Science: Natural Science
- ToS:SS = Theory of Science: Social Science

References

- Biggs, J. (1999). What the Student Does: teaching for enhanced learning. *Higher Education Research & Development*, 18(1), 57–75.
- Noffke, S., & Somekh, B. (2005). Chapter 10: Action Research. In B. Somekh & C. Lewin (Eds.), *Research Methods in the Social Science* (pp. 89–96). Thousand Oaks: Sage Publications.