

## **Extended Abstracts från ISL-programmet för de parallella presentationerna med ISL-bidrag kl 13.15-14.15**

### **1. Breaking Catch-22 of Engineering Education for Sustainable Development: An Example of Parallell Learning of Teachers and Students**

J Lonngren, D Jacobsson, E Marsell, E Nilsson

**Room: E:1406**

**Paper type: Research seminar**

#### **Abstract:**

Both research and practical experience show that teachers have trouble implementing Education for Sustainable Development (ESD) (Bursjö 2011), especially in engineering education where a culture of value-neutrality and objectivity still seems to prevail (see for example Holmberg et al 2008). Consequently, the integration of ESD into engineering curricula is often insufficient in respect to requirements set up by the Swedish Higher Education Act: graduates of engineering are expected to possess complex skills connected to ethics and sustainable development (Högskoleförordningen 1993).

The purpose of this presentation is to provide a positive example of how these problems have been overcome in a specific engineering program at Lund University. We discuss the introduction of an innovative course by a group of students and faculty without substantive prior expertise or experience in Engineering Education for Sustainable Development (EESD).

We (some of the course developers/course leaders) use collaborative action research methodology to discuss similarities and differences in teachers' (ours) and students' learning in the process of creating and subsequently improving this specific EESD-intervention. Our analysis is based on personal reflections and focus group discussions by the course developers/course leaders, as well as students' course evaluations from three consecutive years, and EESD literature.

As an analytical lens, we use the concept of Communities of Practice (CoP). We identify two levels of CoPs: 1. The team of teachers (senior teachers in collaboration with highly motivated students) working with the course over the years, and 2. All actors involved in each year's course cycle, i.e. the group of teachers and the enrolled students. In relation to these CoPs, we also identify two (partly overlapping) cycles of action learning which relate, respectively, to the course development over the years, and our work with each specific course cycle. The purpose of this analysis and discussion is to uncover parallel learning of teachers and students as the course evolves.

Another purpose is to facilitate the implementation of EESD. Therefore, we also reflect on the perceived prerequisite of teachers' expertise for teaching sustainable development in engineering curricula. We discuss the specific conditions that allowed the creation and execution of our course with the aim to empower other teachers to venture on the undertaking of EESD in their courses by trusting the development of their own skills "by doing EESD". Thus we hope to contribute to an increased integration of ESD into engineering programs in Sweden and abroad.

## **2. Designing and Implementing a Communicating Science Course for Undergraduate Science Students**

E Jandciu, B Dunham, J Stewart, A Trites

**Room: E:1407**

**Paper type: Research seminar**

### **Abstract:**

In this seminar, we will begin by outlining the backwards design process (Wiggins and McTighe 2005) used to design a new undergraduate course at the University of British Columbia (UBC) called Communicating Science. Next, we will facilitate a group discussion on activities and assessments that could be used to improve students' abilities to communicate science. Finally, we will show some examples of student work that demonstrate how the course has given students practical communication skills they can use no matter their future endeavours.

Communicating Science (SCIE 300) introduces students to a variety of methods for communicating scientific information to diverse audiences. Students graduating with a science undergraduate degree may continue on a traditional pathway by completing graduate school in science and ultimately becoming research scientists in industry or academia. Many will choose alternate pathways and become teachers, journalists, politicians, or physicians, to name just a few possibilities. Regardless of the career path, a diverse range of communication skills is required. In addition, for society to make rational decisions based on solid scientific knowledge, scientific information must be communicated broadly and effectively. UBC undergraduate students recognize the importance of these skills, but a majority feel that although communication skills are expected during their degree, they find formal training in these areas lacking. SCIE 300 was developed to address this perceived deficiency.

The learning goals for SCIE 300 were developed with input from several departments in the Faculty of Science and through collaboration with teaching and learning scholars, educational technologists, and UBC staff with journalism and publishing expertise. There are three overarching learning goals for the course: (1) Communicate scientific information to scientific audiences, (2) Communicate scientific information to non-expert audiences, and (3) Critically appraise scientific information and reporting. Specific lesson-based learning objectives were developed to help students meet the broad learning goals.

To meet these learning objectives, students are asked to consider how science is communicated to a variety of audiences through carefully designed activities [DeHaan 2005]. For example, when considering scientific audiences, students perform a scientific investigation in groups [Peat et al. 2005]; they create a proposal, draft an outline, and give a conference-style presentation. Individually, they participate in peer review and finally compose a paper in the format of a scientific article. When considering non-scientific audiences, students contribute to a course blog, write in journalistic style and produce their own podcast and video about current scientific research [Lippincott 2007]. Woven throughout the course are hands-on writing activities that address common problems in scientific writing. We also include class discussions on many contemporary issues related to communicating science, such as the role of social media, copyright, and public misconceptions of science and the scientific process.

To evaluate student attitudes and perceptions of the various components of the course, surveys and focus groups were developed and administered. The responses have been used to make refinements to the course content, activities, and assessments.

### **3. Internationalization - for whom and why? A discourse analysis of the concept of internationalization in national policy documents.**

S Jämsvi

**Room: E:1408**

**Paper type: Research seminar**

#### **Abstract:**

Internationalization in higher education is taken for granted, and most researchers in "globalization and education" agree that we live in a global knowledge economy (Lundgren, 2010). As early as 1978 Lyotard (2009) prophesied that knowledge would change from having an intrinsic value to being a commodity, something that is consumed, produced and sold. A question for higher education is how the intentions and ideas of internationalization is formulated in national policy documents, and what kind of discursive shift has occurred since the government report on internationalization in 1974.

In this research seminar I will briefly present the findings from a critical discourse analysis (Fairclough; Halliday) conducted on Swedish policy documents in higher education, briefly drawing on texts from the European Union Council and the European Commission. Focus in the analysis is on how globalization/internationalization is described and presented.

Preliminary findings hardly surprisingly show that the notion of economic interests is strong. Internationalization is described in terms of a world economy and a global labour market where mobility of people and international elements in professions are benchmarks. Internationalization is also presented in terms of quality, where international cooperation contributes to new perspectives, and where people at universities, e.g. students and teachers, from other countries or with international experience are seen as assets. Internationalization in higher education is also about promoting understanding and respect for different viewpoints, international solidarity and joint responsibility for the world.

In the discussion I would like to raise questions on the impact and consequences of the national (and supra-national) policy discourse emerging in the findings. Possible perspectives to problematize could be knowledge as an item for sales, knowledge as an investment, reciprocity and power, and English as lingua franca and as a business language. Discussions could be held on societal and organisational level as well as on individual level. The analysis and its findings can also be subjected to discussion.

#### **4. Scaffolding pedagogic excellence in higher education**

M Elmgren, A Pears, S Palsson, S Andersson, A Berglund, I Frost, T Dahlstrom, F Harlin, L Forsell, B Gembert

**Room: E:1409**

**Paper type: Research seminar**

**Abstract:**

What is the best way to support learners and learning? Development of education practices which draw consistently on current best practice and disciplinary educational research is a serious challenge for universities. In this paper we initiate a dialogue on approaches to addressing this challenge.

The educational development strategy for Uppsala University articulates the University vision, "Uppsala University shall offer first-rate education programmes, in which teaching keeps pace with current research developments in educational studies and subject-specific teaching methods." (Teaching and Learning at Uppsala University, 2008) How is vision to be articulated? While high level strategic decisions are an important component of reform in higher education, engagement at many organisational levels; between lecturers in the disciplines, academic boards of studies and teaching and learning units, are needed to carry this vision into practice (Gosling 2009, Holt et al. 2011).

The Faculty of Science and Technology at Uppsala University has developed a highly successful model with which to tackle this challenge. TUR, the faculty council for educational development, plays an important role in coordinating initiatives in practical scholarship of teaching and learning (Boyer1990). TUR gathers higher education researchers in the disciplines, students, educational leadership and lecturing staff facilitating scaffolding of competence in combination with leading disciplinary based education research and provides a unique opportunity to connect disciplinary educational research outcomes to the delivery of higher education. Simultaneously the proximity to the disciplinary context provides rich context and enhanced credibility to the professional development activities that TUR coordinates and delivers. Broad stakeholder engagement provides an effective and far reaching contact network within the faculty, promoting informal communication and strengthening shared academic values in teaching and learning practice. The importance of students as true partners, who take active part in all activities cannot be overestimated (Bovill et al., 2011)

Evaluation of TUR's activities emphasises the importance of stakeholder involvement and tailored academic development in subject didactics and engineering education philosophy and theory. Staff who have taken part demonstrate an enhanced repertoire of teaching and learning techniques, and appreciation of their role in facilitating student learning and personal development.

TUR encourages academic collegiality in teaching and learning practice through activities such as seminars, workshops, and conferences. Teaching and learning innovation is stimulated by making a fund available from which staff can apply for funding for specific educational development projects. A network for teachers with these grants is organised, with feedback on the application and discussions concerning design, implementation and evaluation of projects and ideas for dissemination of results. Support is also given to educational leaders at all levels, through networks and meetings in smaller groups, to discuss development and cooperation. Recognition of commitment to excellent education by teachers is also a key aspect of the Uppsala strategy. TUR has developed criteria to recognise and promote excellent teachers, which has been adopted by the Faculty.

We conclude that the model has been highly successful. It has been internationally evaluated (CrED report 2011) as highly promising, is well accepted within the faculty and university, serving as a model for other development initiatives.

## **5. Assessing Student Learning Outcomes across Science and Mathematics Curriculum**

M Mentkowski, J Abromeit, H Mernitz, K Talley, C Knuteson, W Rickards, I Kailhofer, J Haberman, S Ment

**Paper type: Research seminar**

### **Abstract:**

Developing assessments for European and U.S. science and mathematics curricula in the last 20 years has become even more complex (Ericsson, Charness, Feltovich, & Hoffman, 2006; Shavelson, 2010). As learning outcomes, constructs often defy definition because they appear holistic, disciplines teach different dimensions, and unique world views underlie educators' efforts at synthesis. For example, disciplinary educators are often more interested in opening students' minds by developing their perspective-taking. In contrast, professional school educators often show more interest in students' use of best practices that meet or exceed professional standards (Rogers, Mentkowski, & Reisetter Hart, 2006).

One problem is whether faculty-designed assessments across disciplines and professions are fair to students, judge what they claim to judge, and consider that students do need to learn to demonstrate competence whether or not they pass an assessment (Messick, 1989, 1994). Presenting author reports on an assessment design by a council for student assessment (Alverno College Faculty, 1979/1994; 2000).

Thankfully, instructors who teach often serve as assessors, who may evaluate competence across some disciplines, to help them capture breadth and depth of constructs and essential role performances. So this council designed an assessment for faculty/staff assessors, who judge whether and how students can connect and integrate content and competencies across mathematics and science courses, expecting students to perform in outside-of-class settings. Students are asked to identify and solve unfamiliar problems, because this may be evidence that students can transfer learning outcomes across a curriculum and over time (Mentkowski & Sharkey, 2011).

Transfer does not always happen. Faculty/staff design team listened to colleagues who taught professions, who observed students not demonstrating their learning. Business professor observed: "Too many of our students avoid using quantitative evidence to make arguments, even when it is right in front of them." This assessment requires all students at college midpoint to integrate scientific reasoning, quantitative literacy, analysis, and problem solving across science and mathematics courses, outside regular coursework, although students were successful on course assessments.

During interactive training of staff assessors from across disciplines and professions, researchers recorded/categorized questions raised about validity and reliability of faculty/staffs' own judgements (Hammond, 1996) and whether assessment policies and procedures were fair (Messick, 1989). Issues included: achieving purposes for out-of-class assessments; establishing design-team's expertise (disciplinary/assessment); ensuring relationships between content/competencies assessed and courses completed. During assessor training, assessors established consensus on judgments in relation to criteria across disciplines and professions. Two council members independently judged a random sample of 40 performances, achieved inter-judge agreement of 95%, and council resolved other issues through action research before subsequent assessor trainings (Reason & McArdle, 2008).

Seventy-four percent of students pass, so departments use assessment results for curriculum evaluation. Humanities faculty/staff coached council to create workshops for students who did not succeed and provide for re-assessment: only four of 457 students have not passed re-assessment so far. History professor commented, "Assessor training challenged staff comfort levels in quantitative literacy. We question how to better prepare our students to analyze and present statistical information." Bransford, Brown, and Cocking (2000) would question whether the workshop enables students to adapt and transfer learning outcomes to the re-assessment, which implies further research.

## **6. Developing Targeted Interventions Using Concept Inventories**

G Birol, G Bole, P Kalas, K Nomme, A O'Neill, C Pollock

**Room: E:1145**

**Paper type: Research seminar**

### **Abstract:**

Diagnosing student misconceptions and targeting specific learning interventions have become increasingly important in our efforts to improve student learning. Students come to post-secondary institutions with diverse backgrounds and experiences and are not aware of the misconceptions that they bring to this new learning environment. In large classroom settings, which are common in research-intensive institutions, it is not possible to gauge students' prior knowledge through questioning. Concept inventories allow rapid detection of these misconceptions and measure the effectiveness of targeted interventions intended to correct them.

Students often hold deeply rooted misconceptions, beliefs and ideas that may diverge widely from scientific consensus. These fundamental misconceptions can become significant barriers to further learning. To address them and thus develop appropriate strategies to match their learning needs, we must first assess their understanding of concepts.

Concept inventories are useful tools to capture student misconceptions by targeting specific concepts. Concept inventories differ from many traditional multiple-choice tests in that concept inventories are designed specifically to assess conceptual understanding, rather than memorization of content.

We have been designing concept inventories on topics in biology using the methodology described by Smith et al. (2008). The development of a concept inventory involves identification of key concepts, qualitative research into student misconceptions, development of multiple choice questions in which student misconceptions are used as distractors, validation of these questions through think-aloud interviews with students, and expert validation of all questions.

In concept inventories each distractor represents an alternate conception held by students (D'Avanzo 2008) and they can be used to identify not only how many students in a class have mastered a concept (i.e. best answers), but also what common misconceptions students may hold (Garvin-Doxas et al. 2007). This allows the instructor to design interventions specifically targeting that particular misconception. One application is to diagnose common misconceptions before teaching a given topic, such that the instructor can specifically target them while teaching. Another application is to evaluate the effectiveness of an activity or teaching strategy (Libarkin 2008).

For example, we used the meiosis concept inventory as a pre/post-test to assess the effectiveness of specific, structured learning activities in a large first-year biology course with three different sections. During the four weeks between the pre-test and the post-test the students in the "lecture only" section had two lectures with participatory activities on meiosis, while those in the "lecture and activities" section had one introductory lecture and a structured, 50-minute long activity on meiosis that took place in lieu of the regular lecture class. Students in the "control" section, on the other hand, were not taught meiosis until after the post-test. We have seen significant differences among sections.

In this presentation we will discuss the use of concept inventories and share our results. Participants will work in small groups to design targeted interventions that would be used to improve student learning gains. Finally, we will discuss ways to share concept inventories and the data they generate. We encourage participation from all disciplines.

## **7. Using teaching and learning projects as a way to integrate SoTL into an institutional culture.**

M Larsson, K Mårtensson.

**Room: E:1147**

**Paper type: Research seminar**

### **Abstract:**

In this study we investigate in what way SoTL projects originating from teacher training programmes at a research-intensive Swedish university have been integrated into different institutional cultures. 200 academics that over the past two years have conducted SoTL -projects within teaching and learning programmes are included in the study. They belong to four different faculties: Faculty of medicine, social sciences, economics, and humanities.

University teachers increasingly engage in the scholarship of teaching and learning. The idea of systematically observing and analyzing processes of teaching and learning, relating this to theoretical understanding, and sharing and disseminating the results seems to have resonated well with general and recognized academic approach.

One way to support the development of SOTL in Swedish universities is through teacher training programmes for academics (Lindberg-Sand & Sonesson, 2008; Mårtensson et al 2011). In such programmes, participants conduct a SOTL-project (scopes may differ between programmes), and report it in writing to the course group. They are also encouraged to present it in other forums, such as departmental seminars and local teaching and learning conferences. Projects typically deal with a question concerned with potential teaching and learning development within the participant's disciplinary field.

Effects from teacher training programmes have been investigated previously (Gibbs & Coffey, 2004; Gran, 2006; Prosser et al, 2006). Although it might be difficult to compare the effects between programmes, one common conclusion from such investigations is that the result largely depends on the local context in which the academic teacher works. If the knowledge that can be gained from such programmes is valued in the local context, the effect and the appreciation seem higher. The contrary also applies: if the local context does not value the potential development originated from teacher training programmes, the effects are reported as more negative (Gran, 2006; Prosser et al 2006). Other studies have confirmed a strong relationship between local teaching and learning cultures, teaching approaches and the development of teaching and learning (Jawitz, 2009; Knight & Trowler, 2000; Lindblom-Ylänne et al, 2006).

The results of the study are currently being collected and will be analyzed during late spring 2012. The presentation will show the results in terms of successful factors and possible obstacles with regard to integration of SoTL into an institutional culture. Moreover, we will discuss the role of teacher training programmes in promoting Scholarship of Teaching and Learning in the development of institutional culture.

## **8. Improving Teaching with Research: the Role for Theory-Driven Evaluation**

L Jolly

**Room: SC:Pepparholm**

**Paper type: Research paper**

### **Abstract:**

For the last five years universities in Australia and New Zealand have experimented with the use of the Engineers Without Borders (EWB) Challenge in their first-year engineering courses. The Challenge offers the opportunity for first-year students to solve design problems for real communities in the developing world. The rationale behind the adoption of the Challenge by various universities varies but usually includes some expectation that real projects in these settings would motivate students, allow for a focus on social, environmental and economic sustainability and foster team-based approaches in learning and teaching. In 2010 the Australian Learning and Teaching Council funded a theory-driven evaluation which examined 13 universities all of whom use the Challenge in different ways. The aim of the evaluation was the Realist one of finding out “What works for whom under what circumstances?” Data collection was carried out through observation of classes, interviews with staff and students, analysis of course documents and student reports and an exit survey of students. Here we report specifically on the third phase of the project which examined attempts to embed the findings of the early stages of the evaluation in the next year’s teaching.

The evaluation stages were based on the Realist model of Pawson and Tilley methodologically but also drew on a range of learning theory and expert knowledge to model the relevant contexts and mechanisms at play in the courses being studied. Relevant aspects of context were found to include factors such as how the problems were presented to students (in technical or contextual terms for instance) and the alignment of course design, teaching practice and assessment. None of these are surprising findings but they do illustrate the extent to which accepted teaching principles such as constructive alignment are not put into practice. In Phase 3 of the project we have focussed on three attempts to embed findings: one concerned adjustments to assessment to improve alignment; another concerned the use of the EWB Challenge projects in a multidisciplinary subject outside of engineering and how the nature of the projects affected teaching and learning; and the third set of changes revolved around attempts to make sure a large teaching team was implementing the projects in a consistent way. Data was collected by observation, interview and the use of staff diaries with regular debriefing sessions throughout semester.

At the time of writing this abstract we have not finalised analysis of Phase 3 results but already there are indications that a key issue for the improvement of teaching through research concerns the nature and necessity of collaboration. Best results appear to be achieved where researchers and teachers work most closely together and where the whole teaching team works closely to develop common understandings of and strategies for using the research. Since collaboration is something we are often concerned to teach our students, it behoves us to pay closer attention to how we develop this skill in ourselves and develop infrastructure to support it.

## **9. From student to lecturer: 20 years of research on assessment as a timeline**

L Norton, B Norton

**Room: E:1426**

**Paper type: Research paper**

### **Abstract:**

Assessment has always been prominent in both research and practice in all sectors across the world. Its complex and problematic nature is due in part to the different purposes it is required to fulfil which broadly speaking could be described as: diagnostic used to make some judgments about students' existing abilities; formative, more commonly known as assessment for learning (Black & Wiliam, 1998); summative which is intended to certify students' achievements, and , evaluative, as a measure of quality of an institution, teaching programme or individual teacher (Chartered Institute of Educational Assessors, 2010). Such a variety of purposes delineates what Ecclestone (2001) has neatly described as political (accountability, quality assurance) and pedagogical imperatives and this has proved to be, in our view, the essential dilemma. Do we design assessment to maintain standards and demonstrate levels of achievement or do we design assessment to help our students learn? This question also has an impact on our understandings and use of feedback.

In this paper we will align with the ISL theme by presenting findings from over 20 years of research into assessment and feedback in the UK higher education sector, which has involved 34 studies. In so doing we will show how the research has taken us from a concentration on improving student performance to that of looking at the whole issue from the lecturers' perspectives. Our theoretical concept is taken from Biggs (1994) argument that learning takes place in a system, and that if you want to change one component of that system, all the other components have to change. In this paper we will argue that taking a systemic approach to assessment and feedback, while making perfect sense in theory can fail in practice because there are systems within systems and in practical terms we cannot take account of, or influence them all. In this context , we will suggest that a more useful and inclusive approach is to think of assessment, feedback and its relation to learning as a timeline continually influenced by external movements (e.g AfL, NSS, QAA) which will go on developing. Sometimes the theoretical underpinnings of such factors can be questioned and challenged ( see for example Taras,2010 on assessment for learning, Hattie, 2009 on constructivism). In this timeline we will highlight from our own research five major themes which were catalysed by a very early study which clearly demonstrated a mismatch between students' and lecturers' perceptions of what counts as a good essay (Norton, 1990). From this original finding we have carried out research focused on: 1)efforts to improve essay writing; 2) students' perceptions of fairness in assessment; 3) lecturers' perceptions and practices in assessment; 4) new lecturers' perceptions of assessment design, and, 5) experienced lecturers' beliefs about how assessment and feedback links with the learning process. We will end with a discussion of how ongoing research and scholarship is necessary to meet future challenges in assessment and feedback in the next twenty years.

## **10. Becoming a student and unbecoming a student again: the role of the ethical imagination in the development of student agency.**

C Neame

**Room: SC:Brunnen**

**Paper type: Conceptual paper**

### **Abstract:**

The conference theme that this paper addresses most directly is graduate outcomes. The original trigger for the work is the increasingly ubiquitous theme of graduate attributes, and the development of these attributes through the curriculum. Rather than focus on a set of attributes which supposedly characterise the graduates from a particular institution as sharing some common institutional profile, at the Glasgow School of Art we have identified the theme of 'the ethical imagination' (Kearney, 1988) as emblematic of the fundamental need to engage students with the responsibility of understanding the world from a perspective other than their own. What students do in their learning, why they learn, and the consequences of their learning for themselves and for others, are issues that students themselves should be confronting, as a prerequisite to a successful transition from student to graduate, ready to make their way in what Barnett has now famously labelled the "supercomplex" world (Barnett, 2000).

From the moment that students begin their higher education journeys (a well worn, but relevant metaphor), whether driven by aesthetic, economic or affective motivators, the issue of impact should be highlighted: the impact of the experience on the student, and vice versa. Are students to be targeted by benevolent institutions towards a graduate attribute ideal, itself described and shaped by the wisdom of policy makers and curriculum designers? Or should students be more responsible for determining their own process of 'becoming' (Barnett, 2007)?

These issues will be outlined in the presentation, building towards a framework that aims to model the tensions between the purpose and practice of higher education, and specifically the tensions between theory, aesthetics, competence, vocationalism and ontology in that education. Drawing on a diverse literature from the philosophy of education, from John Dewey to Howard Gardner, the paper interrogates the relationships between constructs of higher education purpose and practice, and some of the implications of tensions within these constructs for the institution of higher education generally. It suggests that the negative connotations of these tensions for identity and knowledge construction (when they are construed as dichotomous oppositions), may be tackled by acknowledging an ethical imperative to treat these components of the educational process as mutually requisite. When both identity and knowledge formation are guided by ethical principles the tensions become forces of balance, not of conflict.

The discussion questions for the conference session will follow from a conclusion which suggests that these tensions do not have to be seen as a source of anxiety and opposition, so much as essential mechanisms for achieving a balance of purpose and practice – a balance which our students should be achieving primarily through their own agency.

Following the presentation of the paper a discussion will be structured around several discussion questions, such as:

- Should students be expected to examine the proper purpose and appropriate practice of their higher education, as an integral component of their learning journey?
- Do we have an ethical responsibility to bring such discussions about?
- How might we effectively do so?