KTH Scholarship of Teaching and Learning 2015

ABSTRACTS

A1 - Reducing Barriers of Publishing Lectures on the Web

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Abstract

Publishing lectures on the web, or lecture casting, can have several advantages [1] and student experiences from using lecture casts have been very positive [2]. For example students are not bound to a specific time and place and there are possibilities to watch whole or parts of lectures several times. However, the use of lecture casts is not very widespread, and there are a number of reasons why a teacher might be hesitant to lecture casting. In this roundtable we presents the results and experiences from using one specific method of lecture casting which address a number of these reasons. 1) teachers' anxiety over appearing in a video, 2) cost and ease of producing and distributing the lecture and 3) difficulties to update lecture casts.

The method is to use narration-mode in PowerPoint and to publish the result using BrainShark, one of several available web-based tools for publishing narrated PowerPoint lectures on the web. This method has several advantages. First, publishing only voice and slides is a lower mental barrier for the lecturer than to also include a video of the lecturer. Second the technical threshold is very low. The only equipment needed is the computer with the PowerPoint presentation and optionally an external microphone. The entire production and distribution is also handled by the lecturer alone, no technical personnel is needed which also greatly reduces the cost and administrative overhead of publishing lectures. Third, the lecture-casts are easy to update, since individual slides can be added, removed, or re-recorded without re-recording the entire lecture.

Our tests show that the production time of recording and distributing a lecture cast is only marginally longer than giving the lecture in class, and that no technical expertise or extensive instructions are necessary, making the method available to all teachers.

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Keywords: lecture casting, e-learning, technology enhanced learning

A2 - E-learning, peer instruction and the flipped calculus class-room

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Abstract

In the fall term of 2014 first-year students at KTH were offered introductory videos to the Calculus lectures. The aim was to help them come prepared to class, thereby making way for a more (inter)active teaching and learning format. In some lecture groups various forms of active learning, like peer instruction, were used, but many groups still were taught using traditional lecturing.

Although data is still being analyzed, it is clear that there is a positive correlation between consistent use of the video material and success on the final exam. What is not clear, though, is whether there is a causal relationship. There might be common causes to both. Part of the explanation may be that the ambitious students, who make an effort to study continuously during the course, succeeded well in the examination but also to a higher extent watched the videos in advance.

Although the results of using of peer instruction in calculus are promising, it is notoriously difficult to measure the effect of various teaching and learning activities. Even in a situation were several lecture groups with different teaching formats are given the same exam, it is hard to see to what extent differences in results are explained by differences in the teaching method.

However, on the part of the teachers, the use of student active teaching and learning formats, has led to new insights as to why so many students have such a hard time learning calculus. Structural problems of the school system as well as non-trivial pre-calculus difficulties seem to lie at the heart of this matter.

Keywords: Key words: Pedagogical/Teaching tools, E-learning, First year experience

A3 - Eat the cake and keep it: Or how to get the best out of your Peer-Instruction sessions, without sacrificing lectures.

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Abstract

Peer-Instruction (PI) [Mazur, 1997, Crouch and Mazur, 2001] is a robust teaching praxis for addressing many of the key factors for creating critical learning environments. In particular, PI stimulates discussions on the subject matter, gives the possibility of giving cues and immediate feedback, increases student participation in class, gives the chance for reinforcement through discussion with peers and interaction with instructor and gives the chance for immediate corrective feedback. All of these elements have the highest impact on student learning according to Bloom [Bloom, 1984] and to Walberg [Walberg, 1984].

In my practice of PI I found two main challenges that were difficult to address:
1. Students like the smooth introduction to the subject matter that a lecture offers
2. It is difficult to assess which are the concepts with which students are struggling the most and adapt PI-sessions accordingly. This is typically done via previous experience, results on previous exams or through some form of interaction with the students prior to PI-session.

A newly developed web-based tool: Scalable-learning (www.scalable-learning.com) offers an easy solution to the two above mentioned challenges. Through Scalable Learning, video recorded lectures can be made available to the students to watch. The twist is that one can add self-assessment questions to those lectures. Students are requested to complete the pertinent scalable-learning modules before the in-class PI session giving the instructor the possibility of:
1. give students a smooth introduction to the subject matter
2. identify which concepts should be brought up during PI-sessions by analysing the statistics on the self-assessing questions

This approach has been used for a course on medical imaging with ionising radiation. During the round table I would like to share my experience with this course and promote a discussion on how to combine in an optimal way PI-sessions and web-based lectures on Scalable-Learning.

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Keywords: Peer Instruction, e-learning, flipped classroom

A4 - Norm-critical pedagogy in higher education

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Abstract

Critical pedagogy (or norm-critical pedagogy) is a line of thought, practice and activism in which issues of power, and the way these manifest in educational situations, are at the core (Kalonaityté 2014; MFK n.d.). Critical pedagogy takes its starting point in recognising that no knowledge is neutral or free from values, and that these values need to be uncovered and addressed in order for education to contribute to a more just and sustainable society. Besides looking at how norms construct the knowledge per se (i.e. what is seen as relevant, objective and universal knowledge), critical pedagogy also addresses norms concerning the distribution of power in an educational situation, as well as diversity across faculty, students and providers of knowledge alike.

The need for a more critical understanding of education in general and educational situations more specifically has been raised by the KTH student union THS, in a recent study of how KTH deals with gender equality, diversity and fair treatment (JML) (THS 2014). A critical approach to knowledge and learning is however also useful in postgraduate education, through its way of uncovering power structures and norms (Mattsson 2012).

This workshop aims to bring together educators at KTH Royal Institute of Technology who are interested in learning more about critical pedagogy. The workshop will be started by a short introduction to the concept of critical pedagogy. Thereafter we will together in the group carry out a number of short interactive exercises inspired by the book "Normcreative" (Vinthage and Zavailia, 2014). In these we practice to be self-reflexive and how to practically work with perspectives challenging norms in academia and in education.

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Keywords: Critical pedagogy, Equality and Diversity, Power and Knowledge

A5 - Experiences on course development practices in a Power System Analysis master course (EG2100)

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Abstract

Abstract:

In this work, we present the different course development practices put into place by the teaching staff and share the experience accumulated over a four-year period. The research platform for the work is a master course on Power System Analysis (EG2021, renumbered in EG2100 in 2014), given by the department of Electrical Power Systems at KTH.

The course design process used is consensus-based and considers the implementation of constructive alignment theory that was first implemented four years ago, as presented in [1]. The method was implemented together with an intensive feedback procedure involving the student group, to follow up on the efficiency of the changes implemented, and identify future changes to implement. The feedback procedure uses three different course evaluation surveys directed to the whole group of students at different time of the course, together with final interviews involving a smaller group of students carefully selected. The procedure for selecting the students use the R-SPQ-2F method [2] and the interviews are analyzed with the repertory grid technique as summarized in [3].

Another contribution of the work will focus on the use of in-class response systems ("clickers"). The course implemented this system 3 years ago, using a solution provided by Ombea [4]. The clickers are mainly used for multiple feedback purposes. Questions focus on testing the pre-requisites for each lecture, enabling the students to identify lacks of pre-requisites. Other questions, mainly in the middle of the lectures, focus on the subject being taught. These implement the think-pair-share techniques to help the students acquire a better understanding of the subject, while providing instant feedback to the lecturer on the need to go back on unclear matters.

Over a four-year period, several limitations affecting the quality of the course development methods chosen have been identified. The work will finally approach the different challenges brought by the institution for applying the aforementioned methods.

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[4]OMBEA- Classroom Communication System, www.ombea.com

A6 - The Interactionary as a Didactic Format in Design Education

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Abstract

Project-based education allows students to explore real-world problems and challenges. It can also be more cost-effective than traditional teaching and individual tutoring. However, projects are sometimes messy, need a long takeoff roll and risk being difficult to monitor by teachers. There is a need to better understand and support students' creative design processes. We propose the 'interactionary' format as providing one way forward to meet these needs. An 'interactionary' is a highly time-constrained collaborative design assignment which forces students to complete a design task live on stage (Berkun, 2001). We present findings from three separate case studies in which the format has been tested. The studies involved students of interaction design (Ramberg, Artman, Karlgren, 2013) and chemical engineering (Artman, House, Hultén 2014) as well as multidisciplinary student teams (Artman, House, Hultén, Ramberg, Unpublished).

Our results show that the interactionary as a didactic format engages students and allows them to explore a messy design space. Furthermore, three phases of the design process were identified in all studies: ideation, sketching and reflection/evaluation. The groups displayed differences in their multimodal approach to design. For example, the engineering students mainly made use of ephemeral communication strategies (gestures and speech) rather than sketching with physical materials, while the two other student groups employed physical materials (clay, lego, paper sketching) to a higher degree. Furthermore, there was a tendency for the design objective to override the specific competences of the participating individuals whereby the design process became a collaborative team effort. Students mainly made use of their everyday knowledge, indicating a need to better address domain knowledge (in interaction design, chemical engineering or other domains respectively). Nevertheless, all thirteen groups in the three studies articulated and produced prototypes and basic use-scenarios within the time-limit which shows that the format engages the students and enables a short project takeoff. There remains, however, the need for research into how teachers can instruct, coach and intervene in the design process as well as in the use of disciplined domain knowledge.

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A7 - Experiences from a Degree Program in Mechanical Engineering with an International Profile

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Abstract

KTH, Royal Institute of Technology in Stockholm Sweden, has taught a degree program in mechanical engineering since the beginning of the 19th century. The current program in Mechanical Engineering is a five year program, based on a three years BSc program and a two year MSc program. The program enrolls about 160 students every year.

In 2012, an international profile was established. Students of the degree program choose during the first year to apply to an international profile based on one of three languages: Spanish, German or French. Acceptance criteria include good performance during the first year and language skills from prior studies.

If accepted, these students are following a modified curriculum for their second and third year of studies. For the second year, language courses spans the entire academic year and constitute 27,5% of the total numbers of credits in the curriculum for that year. The third year includes a mandatory exchange semester abroad, with engineering studies in the local language (Spanish, German or French).

To facilitate for the exchange semester, KTH has signed exchange contracts with a number of partner universities. Exchange semester curricula have also been established at each partner university, so that a prior agreement of the list of courses to be taken at each university is predetermined.

These curriculums have been established in mutual agreements between KTH and the partner universities. To facilitate, the KTH curriculum has been adapted so that the list of courses to include in the exchange semester consists of courses easily found at most universities and the more specific courses has been moved to the semesters the students are studying at KTH.

In this paper, we present an evaluation of the first pilot cohort. The first year, total 24 out of 160 students were accepted to the international profile. Considerably more students applied but did not qualify. Of these 24 students, 19 choose Spanish, three choose German and two choose French. These 24 students were divided between three Spanish universities, two German universities, one French university and one Swiss.

At the time of writing, the first pilot cohort has just been transferred to the partner universities and in the full paper, we will present the outcome of this first pilot and evaluate the results.

Keywords: internationalization, mechanical engineering education
Session format: round table, work in progress or research paper

Keywords: internationalization, mechanical engineering education

A8 - Transferring the Executive Seminar to the Executive Webinar: A Case Study from Executive Education at KTH

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A9 - TEL - What is it good for?

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Abstract

Technology Enhanced Learning (TEL) is the use of technology to enhance and enrich learning situations or learning experiences. At the conference we will argue that research in TEL is needed in order to assess and gain knowledge under which circumstances the use of certain technologies will enhance the learning experience.

The use of the word *technology* is here to be understood in a broad sense and includes both analog and digital technology, see McLuhan that described technology* as "any extension of ourselves" [1]. With this view of technology, several analog milestones in the history of learning such as the alphabet, books, pencils and paper is to be considered uses of TEL. Furthermore, the research field of TEL should not be restricted to digital or electronic technologies, which could narrow our view of what could be accomplished. This view further implies that electronic-learning (e-learning) becomes a subset of TEL.

From an activity theory perspective TEL can be seen as the use of technology as a mediating artifact (or tool) for enhancing learning in various kinds of activities, either in formal or informal learning situations [2]. Vygotsky [3] introduced the zone of proximal development as the difference between what a learner can do without help, and what she can do with help. TEL is intended to provide the learner with such help, which then goes beyond helping to learn but also helping to do (i.e., carrying out tasks, whether in a classroom or at work). This help can be regarded as an augmentation of performance, as well as of learning.

To conclude, technology can be used to enhance and enrich the learning experience and the learning situation as an extension to ourselves or as a mediating artifact with the intention to expand the of proximal development. The mission of research in TEL is to contribute to the knowledge about under which circumstances the use of (a certain) technology will enhance the learning experience.

*McLuhan uses the words medium, media and technology interchangeably.

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Keywords: Technology Enhanced Learning, activity theory

A10 - Expo-Based Learning (EBL): Augmenting Project-Based Learning with large Public Presentations

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Abstract

Consumer electronics are thriving like never before. The 2014 Las Vegas International Consumer Electronics Show, e.g., brought together over 152,000 attendees and produced global headline news. In engineering education in general, and in Interactive Computing in particular, educators have an unprecedented opportunity to motivate students to play a central role in that exhilaratingly large public atmosphere. What will happen to computer science students if they stand center-stage at a public consumer show presenting their original course projects to thousands of people? This is the core question of this abstract [1].

We propose *Expo-Based Learning* (EBL) as Project-Based Learning (PBL) augmented with the constructively-aligned goal of achieving large public impact beyond the course. We promote this impact through the challenges of 1) large public presentations and 2) professional portfolio building. The public presentations challenge the students to meet immutable deadlines, create robust interactive systems, and place them in the hands of a wide audience ranging from toddlers to professors. We grade students based on the impact their project presentations generate at the public venue. To foster lasting impact and motivate the students, we required individual professional portfolios containing a description of their projects, an account of the public impact, and running documented code.

The contribution of this paper is the analysis of the effects of Expo-Based Learning through a case study and a synthesis of actionable insights to reproduce positive results. Succinctly, the public presentations were the greatest motivator for excellence, timeliness, robustness, expertise, and communicativeness. The portfolio served as a strong secondary motivator for the excellence of the work.

Audience Engagement

We will engage the audience for a 20-minute discussion where we raise the following open questions: 1) how do we motivate other educators to adopt EBL? 2) How do educators in other, less interactive, fields engage active participation from an open audience? 3) How do we engage educators from other national contexts where public venues may not be as readily available? 4) How do we evaluate public impact? We will adapt to other questions and discussions.

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A11 - Experiences with computer supported labs and course content synchronization: DD1315 progmed14

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Abstract

The course «DD1315: Programmeringsteknik och Matlab» is a 7.5 ECTS introduction to programming, given for many of the KTH curricula. For the ongoing course round for the first year students in Mediateknik, we introduced a number of changes in the course layout and presentations. For this contribution, we wish to present the changes that were done to the 1.5 ECTS section on Matlab, and seek help with evaluation and next steps of our changes.

The course is taught with a flipped classroom approach: tutorial videos from Mathworks were assigned as lecture preparation; with automated grading systems: unit tests in Mathworks' newly launched coursework platform Cody were the basis for the examination on this course section; with dense self reflections from the students: each lecture and each lab session had a written self reflection attached to it; and with coordination in the lab problems against the parallell linear algebra class for the same group of students.

For evaluation we have started comparing pass rates for this group of students with other groups: both for the pass rates for the Matlab section of DD1315, and for the pass rates of the linear algebra course it was synchronized against.

Keywords: matlab synchronization with parallell courses automated grading

B1 - What chemical engineers need to learn and what we teach –an example from pulp and paper industry

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Abstract

The Swedish forest-based industry is facing many challenges such as decreasing paper consumption, serious competition from other pulp producing countries such as Brazil and Indonesia and an interest to obtain new materials from wood rawmaterial, for example bioplastics or textile fibre. In study presented by the Swedish Forest Industries Federation (Skogsindustrierna) together with Pöyry, it was predicted that the pulp and paper industry will have an increased need for skilled personnel [1]. However, in another study performed by Innventia and Kairos future it was concluded that the Swedish pulp and paper industry is facing an alarming shortage of skilled personnel whereas at the same time universities no longer have specific programs for the pulp and paper industry [2].

At KTH, the department of Fiber and Polymer Technology, we are giving courses related to the forest-based industry and it is of high importance that the learning outcomes from our courses are well suited to the existing and new challenges faced by the forest-based sector. A meeting was initiated between teachers from the Fiber and Polymer Technology department and representatives from a number of pulp and paper industries and research institutes to discuss what a chemical engineer graduating with a master from our department needs to know in order to get employed in the forest-based sector.

The representatives from industries and research institutes present at the meeting all agreed that basic engineering knowledge is of outmost importance in order to be employable. All specific knowledge on pulp and paper processes is a plus, but knowledge of the process can be obtained at the mill or institute, whereas a lacking ability to for example understand flow sheets or perform mass balance calculations cannot be mended.

 It was obvious that the industries and research institutes present at the meeting have a genuine interest in having a closer contact with the education at KTH. As a result from the meeting, Innventia has been involved in two courses given in the fall semester 2014.

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Keywords: Teaching and learning in subject perspective Course development Work related learning

B2 - Seminar or support group? Responding to students' emotions in sustainability education

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Abstract

There are almost 250 courses at KTH that are tagged as ESD courses (environment and sustainable development). Some courses are mandatory, and the student group can then be heterogeneous in terms of their level of understanding and investment in sustainability. We teach such a course for media technology students and have earlier discussed how value-laden the subject of sustainability can be (Pargman and Eriksson 2013). Sustainability is an inherently difficult and complex subject matter, and, some of the facts (Stocker et al. 2013) can be disturbing or even threatening the individual's sense of well being (e.g. the potential for mass extinction or sea level rises). As teachers we have noticed that presenting such information can provoke strong feelings, as exemplified by the students who approached us after a lecture on climate change, and, with tears in their eyes asked if we could say something more optimistic.

There are many emotional barriers to difficult issues such as climate change, as described in Norgaard's (2011) book on the social construction of climate change denial. By talking about climate change and resource scarcity, we also to some degree raise topics and open up discussions that go against the ingrained default belief of us living in the best of times, continuing our march towards a future of unlimited progress (Greer 2013). These discussions to a high degree *contradict* the (meta-)message that students get from other courses at KTH. One way we have handled these issues is to use the seminars as an opportunity for the students to vent their emotions, if necessary allowing the discussions to digress from the pre-planned theme. This opens up questions concerning our roles as teachers. How can we find a balance in our roles as domain experts versus acting as therapists?

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B3 - Experiences from different program integrating courses

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Abstract

A *program integrating course* (PIC) is a course that runs at a low speed through several years, often all years, of a program. It can be designed in different ways, but some properties are common:
- PIC enables the students to become more professional in handling their studies. So called self-regulated learning is an important learning factor in higher education [Nicol & Macfarlane-Dick, 2006].
- PIC shows the main thread of the program, how the courses are linked.
- PIC gives an opportunity to focus on "softer" program learning outcomes that are hard to cover fully in ordinary technical courses.
- PIC consists of reflection seminars in small, usually cross-grade, groups of students, lead by a professor or lecturer as a mentor. In the seminars the students should exercise meta-cognition and their ability to reflect on different topics, such as study techniques, procrastination, studying abroad, plagiarism and responsibility, and the professional life after the studies.

Such a course has many positive effects [Kann, 2011], which has led to an explosion of program integrating courses at KTH. Since 2009 the number has grown from one to 13, and 2015 even more programs will start a course.

Since the PIC courses are run on different programs of different types and by different teachers it is interesting to discuss the differences between the courses and the experiences from running PIC.

In this round-table three different PICs on different types of programs will be presented:
1. Viggo Kann: DD1390 Program Integrating Course in Computer Science Engineering (Master of Science in Engineering program, first cycle).
2. Mats Bengtsson: EQ2220 The Sustainable Wireless Systems Engineer (Master of Science program, second cycle).
3. Karin Almgren: ML1040 Programme Integrating Course in Mechanical Engineering (Bachelor of Science in Engineering program, first cycle).

If you are involved in a similar course or just interested in program integrating courses you are welcome to join this round table.

Viggo Kann, 2011. En programsammanhållande kurs med många funktioner (in Swedish). Presented at 3:e utvecklingskonferensen, LiU.

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B4 - Project Lax - The right changes for the wrong reasons, or just plain wrong?

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Abstract
This paper outlines the background and carrying out of Project Lax, a project aiming at a pedagogically both ambitious and radical redesign of the courses offered by KTH's Unit for language and communication.

The project, which ran throughout 2014, included an analysis of KTH's students' learning needs and the learning outcomes of the unit's courses, the adaption of a non-standard grading system, alternative ways of examinations, and increased use of e-learning technologies, and was characterised by intensive collaborations between the unit's teachers within and across disciplinary lines.

The revised courses were required to meet three targets: they should be sustainable within the new economical frames set by the university; they should from the learners' perspectives be as good as, or if possible better than, the courses they were set to replace; and they should not increase, and if possible decrease, the workload of the teachers.

The project was arguably the most ambitious and radical in the Unit's history, and while the new courses – scheduled to be delivered for the first time in the spring of 2015 – are yet to be run and analysed, the endeavour was in many ways fruitful, stimulating and opened new vistas for the teachers.

However, the project was anything but rooted in the need for educational development; conversely, it had everything to do with the perilous situation of so-called complementary skills at a technical university; perilous both in terms of funding and in terms of these courses' position in the university syllabi.

In this way, while the project had a clear sense of urgency, the reasons for change were mainly push and very little pull. This raises questions related to educational development. What happens – to courses, teachers, and students' learning - when educational development and pedagogical initiatives stem not from learning needs, but from economical needs; not from a will to excel, but from a will to survive? What happens with a teacher who is redesigning courses in such a way that he or she may well be out of work?

It is beyond the scope of this presentation to answer the questions above, but in a more narrow analysis the project perhaps more than anything else highlights the questions how and where students at a technical university are supposed to acquire the communication and language skills listed e.g., in

the CDIO Syllabus; skills often said to be vital parts of the global competence needed by tomorrow's engineers. Some tentative answers to these questions will be presented

Keywords: Educational development, Global competence, Communication and language skills

B5 - Walking with Seminars

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Abstract

Sedentary behavior is a growing health problem in the Western world. According to WHO, physical inactivity is the fourth most common cause of death in the world and behind 6 % of deaths. Students in teaching and learning situations are no exception where for example students from Luleå University of Technology on average sits around 10 hours per day, of which more than 6 hours are when at their university (Dijkstra & Syrén Sandström, 2014).

There is, therefore, from a public health aspect, reasons to find alternatives to sedentary teaching and learning situations. However, we have gone a step further and looked at opportunities to move also from a learning perspective. For example,"mind- wandering" is very widespread in teaching situations, where studies show that students can focus on average between 3-5 minutes before they lose focus (Rosen, Cheever & Carrier, 2012; Judd & Kennedy, 2011), which increased physical activity could possibly counteract . Furthermore, studies have shown that walking lead to increased creativity (Oppezzo & Schwartz, 2014).

In our study, four groups of 5-8 students performed a seminar while walking outdoors with a twofold purpose: to achive the health benefits mentioned above, but also to improve the quality of the seminars. In a questionnaire we examined how students experienced these seminars compared to traditional classroom-based seminars and their perception of communication during the seminars, the overall quality of the workshops and how they felt after the seminars.
The results are in favour of the walking seminars: the 23 students (of 27) who answered the questionnaire report improved communication, sense of well-being and quality and 83% would like to see more such walking seminars at their university.

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Keywords: Seminars Physical activity Well-being

B6 - "Microblog use in higher education: an exploratory study of student and teacher communication with Twitter as a back-channel"

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Abstract

In this paper we present an explorative study of using the microblog Twitter to support communication. The study included 167 students at KTH Royal Institute of Technology taking the course Communication in engineering science during the semester 2014/2015. The students were instructed to post at least 20 tweets with a course-specific hashtag.

The study was designed to evaluate the students' attitudes before and after participating in a microblog activity and to evaluate the communication. Although several studies look at microblog use in higher education (e.g., see Fox & Varadarajan, 2011; Prestridge, 2014), little is reported on detailed examinations of the communication between students and/or teachers.

The method included data collection from the microblog as well as pre- and post-questionnaires. The pre-questionnaire asked for background data and students' attitudes, while the post-questionnaire repeated the questions about students attitudes about social media. The results from the questionnaires showed that the majority of the students did not changed their attitude to the use of social media.

The data collection from the microblog is partly done (first 1000 tweets have been analyzed) and so far questions, user mentions, links and the frequency of used words have been considered. All of these highlight important aspects of the communication and main use of the microblog. The distribution of the tweets among teachers and students shows that the three teachers account for 15% of the published tweets, while the students account for 85%. Of the tweets sent by the students, 27% were questions and 18% were answers to others' questions. The word frequency analysis shows that most of the communication was centered around course specific aspects e.g., words about assignments. 14% of the tweets contained links to external material such as websites with related information or images from the classroom environment.

Although the results presented here are not conclusive and concern a small portion of the entire dataset, the results show several examples of how students and teachers used Twitter for communication.

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Keywords: Communication, Microblog, Higher education

B7 - The Problem of Scientific Theory: The Case for Introducing Science Studies for First-Year Students.

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Abstract

The course Communication in Engineering Sciences, where I teach, is mandatory for all first-year students at the Computer Science and Engineering programme. There we teach scientific writing, and the students are required to base their papers on a scientific theory. This is a tough requirement for students new to higher education! And is it a relevant one?

A quick survey of different report-writing instructions from various academic sources confirms this ambivalence to including a theory section or not.

The motivation for including theory already at this level is that they will be asked to include such a section in their final degree examination report, so they better start learning what that means. But can you ask them to write scientifically without them first having been educated in science?

A second question is if science and scientific theories are relevant knowledge for students where few wish to continue to the doctorate level: the majority plans to get jobs outside the academy. Swedish legislation (Högskolelagen, 1977:218) states that all education at universities and colleges must be based in science. But what does that mean?

When looking at these questions, I also believe we have to approach the perceived difference between science as "pure" and technology as "applied". In short: how scientific should a technical education be?

I argue that the solution could be to see – and teach – science and 'the scientific method' as something that would benefit our students also in the non-academic workplace after a finished degree. The key, I believe, is motivating them by teaching "scientific thinking" early, and, most importantly, convince our students that this can apply to problem-solving in general.

In this day of "truthiness" and unfounded "facts" that go viral on the internet, perhaps it is motivated to introduce the scientific method on a broader scale at KTH.

Keywords: scientific method, writing, theory

B8 - CONALI Ontology. A Framework for Design and Evaluation of Constructively Aligned Courses in Higher Education: Putting in Focus the Educational Goal Verbs

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Abstract

An increasing number of Higher Education professionals have embraced the Constructivism theory in contrast with the traditional trasmissive pedagogy approach where the focal figure is the teacher. Constructivists emphasizes that the learners acquire, or construct, knowledge through their own activities and previous knowledge. Teacher role is to set up an environment that can provide a good learning experience for the students. In view of this the alignment of the intended learning outcome (ILO) with the teaching and learning activity (TLA) and the assessment task (AT) of the course becomes an important requirement for good learning. The driver of the alignment is the educational goal verb (EGV) that represents the educational goal underling a specific intended learning outcome (ILO). This verb should be elicited by the course's TLA and be the base for the consequent AT. The convergence of constructivism with this concept generates the constructive alignment pedagogical paradigm. This paper is about the creation and first instantiation of the CONALI ontology. The CONALI (CONstructive ALIgnment) ontology has been developed by the authors during the last months and this paper is presenting the first embodiment and results. The CONALI ontology answers the requirement for a structured framework to describe the vast body of knowledge developed in such a field. The salient aspects of constructive alignment have been extracted and classified in a comprehensive taxonomy. The following description of the semantic relationships among the different classes resulted in the CONALI ontology. The chosen modelling language is OWL: this provides the possibility to describe in a computer understandable way a higher education course to an unprecedented level of detail. OWL enables also the creation of a specific knowledge base by populating the model. The knowledge base can then be analysed and interrogated on many important issues concerning the alignment of the instantiated course. The CONALI ontology becomes an important tool to design and synthesize the related domain knowledge.

This paper proves the usability of CONALI ontology as tool to represent the courses in an engineering program and evaluate the alignment of their activities. The specific instantiation is based on the Industrial Engineering program at KTH Royal Institute of Technology in Stockholm, Sweden.

Keywords: Course development, Pedagogical/Teaching tools

C2 - Educational use of Social Annotation Systems for Peer Feedback

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Abstract

Social annotation systems provide a way for several students to annotate shared documents in an online environment (Novak, Razzouk & Johnson, 2012). We have for a number of years used social annotation systems in order to allow students to comment on each other's work, and have very positive experiences for using it in academic writing in bachelor theses (Hedin, 2012; Pargman, Hedin, & Hrastinski, 2013). In this roundtable we present and demonstrate the method that is used, and add the experiences from using social annotation systems in two other courses, with more strict guidelines for what constitutes good feedback practice inspired by Nicol & Macfarlane-Dick (2006), and by De Bono's "Six thinking hats" (De Bono, 1999).

After introducing social annotation systems in bachelor thesis writing, the throughput has increased from 78% to almost 100%, even though a causal effect cannot be established. The attitudes of the students have been very positive, where both giving and receiving feedback to and from fellow students has been seen as activities well worth the effort. The feedback guidelines have increased the quality of the feedback given by freshmen students.

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Keywords: social annotation systems, peer feedback, technology enhanced learning

C3 - Responding to the needs of KTH students with special educational needs and developing inclusive teaching and learning strategies

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Abstract

The number of KTH students with a clinical diagnosis of various disabilities has increased substantially in recent years. These students often show enthusiasm to begin their studies, but have difficulty completing them because of a loss of motivation, a lack of study skills or due to their inability to structure and prioritise their studies effectively.

A clinical diagnosis explains a person's disability, but says nothing as to how the person should be treated or expected to interact with the community (Ohlsson, 2011). Ohlsson points out that a diagnosis does not cover the pedagogical knowledge and consequences involving a third party. Therefore, it is almost impossible to provide the educational assistance that students with disabilities need to complete their studies.

According to Gustavsson, there has long been a tendency for people with disabilities to become stigmatised by society, which leads to a conflict between their learning and their identity. This conflict has consequences for the level of support provided for and accepted by the individual, his/her self-image and contact with the community. It is at this juncture that education and health come together to support the individual at both the personal and social level, says Gustavsson.

AT KTH, we have a lot to learn in order to better understand how students with disabilities can develop academic and social skills more effectively. The purpose of this roundtable is to characterize and understand various disabilities and thereby increase awareness of our own uncertainties about disability. Then follows a discussion about new "inclusive" approaches to teaching and learning that ensure that all students have access to, and can engage in, the curriculum.

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C4 - Creating a curricula in Cyber-Physical Systems

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Abstract
We have surveyed existing education efforts and initiatives in areas related to Cyber-Physical Systems (CPS), Internet of Things, Embedded systems, and Systems engineering. All these terms emphasize the currently ongoing technical paradigm shift where the physical world, embedded systems and IT-systems become interconnected, providing unprecedented opportunities as well as new challenges. Engineering education in these areas is typically fragmented, from computer science/IT, over embedded systems to electrical engineering and physical systems.
Several academic and industry initiatives to create new CPS programs illustrate strong interests and awareness of these challenges. We provide an overview of foreseen educational needs, existing state of the art in education and an analysis of the subject of CPS with the purpose of understanding the implications for education. The investigation points to key issues in curriculum design regarding balancing depth and breadth, theory and practices, academic and industrial needs, and core technical skills with complementary skills. Curricula in CPS could, if the right balance is achieved - with T-shaped engineers and beyond, educate CPS engineers of the future that are "ready to engineer".

C5 - Experiences from peer review of lab reports – Is there a new way of effective feedback to students?

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Abstract

Here, we present a simple way to introduce student peer review of laboratory reports to engineering students. The module design actively engages students in a learning activity that mimics the way an expert would argue when making a fair judgement of a report. In some detail, the judgment was made in a two-step process, where students first should find errors and mistakes in their peers' written laboratory reports and classify how severe these errors would be for the total report according to a classification scheme. In the second step, they should make an overall judgement of the report based on the found errors and mistakes and summarise all what they have found in a written referee report, which was sent back to the student that wrote the original report for corrections if needed. To reduce anxiety, the review process was completely anonymous and handled by a teaching assistant, who had a similar role as the editor in a scientific journal during the process.

Our evaluation of the module was based on a detailed course survey and showed that students were positive to this experience and that they in particular appreciated the classification scheme for their learning. This result may suggest that the 'arguing like an expert' component of the module was more important for student learning than the actual feedback from peers [1]. From a feedback research perspective, this could indicate a way to train students' *inner feedback mechanism* [2], which in such a case would facilitate their development into independent learners. In this presentation, we will shortly describe our results, let the participants experience this type of learning in a simple and relevant case and initiate a discussion about what these findings may suggest concerning the way we are teaching our students.

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Keywords: peer review feedback lab reports

C6 - Tutored academic writing as motivation and a formative assessment for learning

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Abstract
It has become customary to introduce students to scientific writing through submitting manuscripts from Master's projects to workshops and conferences. Some plausible reasons for teachers to encourage writing are for disseminating project outcome, for populating ones publication list, and not least for balancing research and teaching, which otherwise is problematic [2]. When students can partake in studies, we accommodate research-based teaching [4]. Furthermore, the nature of a submission–and–review process aligns with principles of formative assessment [1], which impact student motivation and learning [5].

In this paper we report first-hand accounts of facilitating learning through academic writing with focus on student benefits. In particular, we look at possible effects of authoring scientific papers on the student's motivation, learning, work outcome, and post-study career opportunities. The cases are gathered from several years of supervisory experience from the authors and their affiliated research groups where many of our students publish papers. We will also look at issues of supervising in general [e.g., 6] and writing in particular [e.g., 3].

Generally, we experience that publishing students get more engaged in their projects and show greater independence. They also express affinity towards scientific thinking and appreciate their own contribution. Finally, we see that these students are successful after studies, either in academia or in industry.

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Keywords: publishing, theses, research

C7 - Arranging an Exam Before the Exam – The students love it, and it is easy to do!

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Abstract

For a student, it is well known that one of the most important aspects of learning is receiving feedback on what is done. For a teacher, with increasingly larger student groups, less hours to spend on teaching activities, and students possibly located off-campus, providing feedback is quite a challenging task. Therefore, methods of efficiently exchanging feedback should be of great interest to both students and teachers.

As a practicing teacher, I repeatedly receive comments from students claiming that "this exam was harder than that of last year". Interestingly enough, I have received the same comment previous years too, meaning that either the exams are getting harder and harder year by year, or that the students are not "well prepared for the exam".

To investigate the reason behind the comment, I therefore arranged for the students to take a *test examination* – an opportunity to *practice taking an examination*. The circumstances around the test examination were set to mimic the real examination, i.e. the same time allowed, the same helping aids, and for some test examinations, even the same examination rooms.

The test examination is an actual examination from an earlier year (complete with a written solution and not available on the course web page). Hence little time is used to create and perform a test examination. The feedback to the students is given by handing out the written solution and having the students comparing it to their solutions.

During the course, five test examinations were arranged, and short evaluation questionnaires were performed after the first two occasions to monitor student reactions. A more in depth evaluation will be done at the end of the course. Based on responses from the two first questionnaires the students greatly appreciate this concept. One student even stated that he/she would not have passed the real examination without the test examination.

Results to be presented/Questions to discuss during KTH SoTL 2015:
•Student perception of the idea, pros and cons
•Will the test examination method improve student results in the real examination?
•And more…

Keywords: feedback, examination

C8 - New modules for the KTH Social (moodle) plattform designed to enhance student learning in technical courses

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Abstract
E-learning opens many possibilities in expanding the pedagogical portfolio of teachers. With the right pedagogical motivation, the use of on-line tools in conventional campus courses can enhance students engagement and learning. We present some new developments of open-source modules as plug-ins for the KTH Social (Moodle) plattform that were designed with such a motivation. The plug-ins include support for equation building, simpler computations and coding practice, chemistry-related experimentation, peer review and instruction capabilities, as well as capability for self-assessment and student preparation. The modules are currently being completed and will be briefly presented. The aim of the presentation is to initiate a discussion that explores implementation possibilities for the developed modules to enhance students engagement and learning across KTH campus courses.

Keywords: technical courses, modules, plug-ins

C9 - The role pre-testing in understanding educational effectiveness

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Abstract

Evaluating teacher performance is an important yet exceptionally difficult problem. Many different criteria are used to describe a teacher's effectiveness, including performance of students on exams, responses of students to course surveys and peer review. An exam at some point after a course (or any educational program) is completed is arguably the central criterion, since it is designed to evaluate the final outcome of teaching – what students know (and understand and can do) in relationship to some subject matter. Indeed standardized tests are the most widely used approach to evaluating educational performance, ranging from individual teachers to the performance of educational systems of entire nations. Here I point out a major shortcoming in the way test performance is currently used to understand teacher effectiveness, and discuss a possible solution.

Tests are typically designed to determine the ability of students who have completed some course of study to meet certain predetermined criteria (the learning goals). Practically speaking, a bar that has been deemed of appropriate height for some particular group of students is set – and a teacher's effectiveness is then evaluated by the fraction of students who can clear that bar. However, this approach does not take into account what the students knew before the course started and only evaluates what the students know after. But what students learn in a course is the difference between what they knew before they took the course and what they know after. When trying to understand a teacher's effectiveness, it is misleading to hold the teacher accountable for poorly prepared students or give the teacher credit for having especially well prepared students. Indeed a common defense of poor outcomes in some settings is that students were adequately prepared. Determining what is actually learned demands some measure of what the students knew before, and a way to compare that to what they know at the completion of a course. The most direct way to determine the relevant prior knowledge is specific and subject related pre-testing of students. Here I will discuss different approaches to pre-testing, and issues related to quantifying learning by comparing pre- and post-course testing results. This type of analysis promises to yield not only insights into teacher effectiveness, but also key aspects of course design.

Keywords: Teacher performance, Teacher effectiveness, evaluation

P1 - Dialogue sheet seminars - a method for reflection and introduction to higher education

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Abstract

Dialogue sheet seminars - a method for reflection and introduction to higher education

On the Media Technology program at KTH we have over twelve years conducted dialogue sheet seminars as one of the first activities for the new students on the program. The method involves the students in small group discussions with subjects concerning their future studies. The questions are mostly reflective in nature and covers topics such as the division of responsibilities between universities, comrades and the individual, and the real purpose of higher education. We argue that dialogue sheet seminars are an effective and economical method to introduce and reflect on higher education and that this method is generally applicable to all types of higher education.

This poster is an actual dialogue sheet as it is used.

Keywords: Reflection, higher education.

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Keywords: Reflection Higher education

P2 - Bonus system as a step towards flipped learning

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Abstract

Many studies have shown that high students' activity and continuous feedback increase the learning outcomes [1-3]. Therefore, different teaching activities have been suggested to increase the time the students spend on actively learning the course material. One of them is flipped learning which also called flipped or inverted classroom [4,5]. Our study investigates how the different learning activities of an optics course for optometry students are perceived by the students and affect them in their studies. In addition to the traditional teaching and learning activities (lectures, tutorials, self-study classes, practical labs, control and final exam) a bonus system with concept questions and clickers' questions were introduced. Mixed-method design was applied in the current study. Both quantitative data on attendance and time on task as well as qualitative data on motivation and preferred learning activities were investigated. As a result, the students' performance on the final exam was slightly higher this year (68%) as compared to previous years (55% on average). The bonus system was found to be important in increasing students' motivation and attendance as well as in giving them feedback. It was also found that the students who actively participated in all major course activities had good performance on the final exam. It is planned to further develop the optometry course by expanding bonus system in order to increase students' motivation and self-learning activity.

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Keywords: Teaching and learning in subject perspective, Course development, bonus system

P3 - A short Note on the Experience of Using Concept Cases in a Master Level Course

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Abstract

Concept questions and similar diagnostic tests and exams have been described in literature and are used in several courses throughout KTH and in academia around the world. It is based on the idea that students have to properly understand the subject and, thus, cannot rely on a "plug and chug" procedure to derive the correct answer(s). It is a method for the lecturer to, mid-lecture, check the level of understanding amongst the students and to adapt the lecture content based on the outcome of the concept questions. E.g., if the students performed poorly, material can be revisited and explained differently or more in-depth. This iterative process will hopefully improve the leaning of the students and it has been stated in literature that students understand the subject better but not on the expense of being able to "solve problems" (i.e., using equations).

It is here described how this above mentioned approach was applied in the form of "Concept Cases" in a Master level course at KTH; the problems that were first faced, the discovered necessities for application and some remedies performed for improvement. The concept cases were used both during lectures but also in the written exams.

It was seen that there are several key components that have to be managed to successfully apply the concept cases. Firstly, a clear introduction with a proper layout and presentation of the problem is vital so as to minimize any misconceptions surrounding the setting of the concept and problem. Secondly, the nature of the multiple choice questions has to be rational, i.e., ludicrous options will instantly guide the students to the correct answer(s) and will, thus, lower the impact of the concept case. Thirdly, an open discussion amongst the students is critical to promote and evolve their reasoning. Finally, a clear and distinct presentation of the answer(s) together with an open discussion about the students, and lecturers, reasoning is needed.

Keywords: concept questions, peer instruction