



## Faculty of Science & Technology invites you to

# Teaching & Education Day, August 20 2019

**Teaching & Education Day** vänder sig till alla anställda vid fakulteten som är intresserade av att vara med och utveckla undervisningen på våra kurser och program. Seminarier och andra presentationer kommer att hållas på engelska - programmet nedan presenteras därför enbart på engelska.

### Welcome to the 5th Teaching & Education Day!

Seminars and introductory presentations will be held in English. The conference is free of charge and open to everyone at the faculty interested in continued development of our courses and programmes. The programme will start at 09.00 and ends at 16.00. Coffee and lunch will be served.

**When?** Tuesday 20 August, 08.30-16.00

**Where?** Umeå Folkets hus

## Programme

09.00-09.30	Coffee & sandwich	
09.30-09.45	Welcome	<i>Sara Sjöstedt de Luna, pro dean</i>
09.45-10.45	Keynote 1	<i>Lena Tibell, LiU</i>
10.45-11.00	Fruit/shot & leg stretch	
11.00-11.45	Short lectures (plenary)	
11.45-13.00	Lunch & discussions	
13.00-14.30	Workshops in parallel sessions (choose 1 of 5)	
14.30-15.00	Fika	
15.00-16.00	Keynote 2 & summary	<i>Johan Lithner &amp; Bert Jonsson, Umu</i>

### Workshops to choose from:

- See/Do/Learn: Re-designing education through perspectives of sustainability
- 3D visualisation in chemistry - what about your subject?
- Assessing beyond the facts
- Teaching Sabbatical
- Group exercises and changing attitudes towards mathematics



## KEYNOTES, SESSIONS AND WORKSHOPS – BRIEF DESCRIPTIONS

- **KEYNOTE 1: *How can one learn about the "hidden world" – about visualization, AI and "exploration"***  
(Lena Tibell, Linköping University)

With "the hidden world" I mean, for example, chemical reactions, or quasars in space, biochemical integrated processes, ecologic networks, complex connections between systems and to be able to connect levels of organization. In short, large distances, and very big things as well as extremely small things, the type of knowledge that is common in natural science but is outside our reach or perception. It is knowledge that is not necessarily abstract, but many times are considered to be "abstract". This is a content where interactive applications, augmented reality and bodily experiences can help learners to make it perceptual and to grasp the unimaginable.

What if you can not only feel the heat, but also see the heat transfer? What if you in deed can feel the molecular forces, but not only feel the forces, you can also sense the shapes of the molecules. What if you can not only see a planet, but also virtually travel there.

I will talk about the possibilities that exists today, what is shown in science centers, give some examples from our own studies, and maybe speculate about the future.

- **PLENARY SESSION: *Does group work work?***  
(Maria Berge, Department of NMD)

Currently, universities all over the world move towards implementing project-organised courses with the aim of fostering better team-working skills as well as better learning outcomes. The aim of our research project was to explore learning and shared knowledge as being established in the project groups, but also what identities are favoured and disfavoured in relation to the project courses. The presentation will outline the project's main results.

- **PLENARY SESSION: *Teaching teachers about sustainable development***  
(Jon Moen, Department of EMG)

Universities should promote a sustainable development, according to the Higher Education Act. This includes ensuring a healthy and good environment, economic and social welfare, and justice for both the present and coming generations. To teach students about sustainable development, we must first learn what that means and discuss how we can incorporate sustainable development in our courses and programs. We developed and implemented a pedagogical development course for teachers as a pilot project at the faculty for science and technology during the autumn of 2018. Based on the experiences from that course, we have developed a new course together with UPL intended for all faculties. This talk will describe the reasoning behind the courses and our experiences of giving the pilot course. I will touch both on sustainable development as a subject and on education for sustainable development as a set of key skills that we should give our students.

- **WORKSHOP 1: *See/Do/Learn: Re-designing education through perspectives of sustainability***  
(Maria Göransdotter and Monica Lindh-Karlsson, Umeå Institute of Design)

What would it mean for how we teach and work as teachers if we were to fully integrate perspectives and practices of sustainability in our educations and our pedagogical practices?

This question will be one that practically all of us in academia need to address in how we teach, and in how we support students and teachers, given what we see happening in the world in general as well as in the worlds of higher education. In this session, we will begin with presenting an ongoing PUNKTUM-funded development project at Umeå Institute of Design, aiming to develop a new BFA program in industrial design in which aspects and perspectives of sustainability is fully integrated. After that, we will workshop collaboratively on what an integration of sustainability perspectives might mean in our teaching and education in terms of what we need to challenge, change, strengthen and learn more about in our respective areas of work, with a starting point in the UN Sustainable Development Goals.

• **WORKSHOP 2: 3D visualisation in chemistry – what about your subject?**

*(Dan Johnels, Chemistry department; Karolina Broman, Department of NMD; Eva Mårell-Olsson, Department of TUV)*

In this workshop, we discuss how students' spatial ability is practiced by applying two digital tools; Virtual Reality (VR) and Augmented Reality (AR). Spatial ability in chemistry is the move between 2D and 3D when visualising representations of for example atoms, molecules, and reaction mechanisms. In a project with engineering students taking a course in organic chemistry, they have studied stereochemistry using both analogue and digital tools. We will present students' perceived value of these tools and will give participants at the workshop the possibility to try virtual and augmented reality. We will also discuss how tools like these can be applied in contexts besides chemistry; therefore, it would be good if you consider a course where a 3D thinking might be valuable.

• **WORKSHOP 3: Assessing beyond the facts**

*(Pedher Johansson and Marie Nordström, Department of Computing Science)*

We will give a hands-on demonstration in using the SOLO taxonomy for assessing the structure of complexity in a student's work. The taxonomy is a great tool when assessing outcomes beyond facts and knowledge. We will present several practical examples of how it can be used in teaching and grading, but also how we used it to evaluate the effect changes of an education program had on bachelor theses. We will prepare material for the workshop, but if you recently read a bachelor thesis (or equivalent) please bring a copy.

• **WORKSHOP 4: Teaching Sabbatical**

*(Thomas Mejtoft, Department of TFE)*

It has become increasingly important for our students to get international experience during their time at the university. There are, however, still few teachers that take the opportunity to go abroad to get experience from teaching at other universities. During this workshop we discuss the personal experiences of moving abroad with the family to work as a teacher at a foreign institution and how this experience can benefit our students. Furthermore, we will talk about what to focus on to write a successful application to the STINT Teaching Sabbatical program.

• **WORKSHOP 5: Group exercises and changing attitudes towards mathematics**

*(Olow Sande, Department of Mathematics and Mathematical Statistics)*

Students are often expected to develop their understanding of mathematics primarily by solving textbook problems. Some amount of exercise is needed to develop a basic proficiency in problem solving but how does this provide sufficient scaffolding for the development of the deeper understanding, skills and attitudes that are expected outcomes according to our course syllabi?

During the last few semesters we have been using group exercises during the Mathematics Basic Courses given for the Preparatory Year in Science and Technology. These exercises shift the focus from simply finding the right answer to how to properly test, present and argue for your solution. The activity has been very popular among students and teachers and has helped improve the alignment between learning and assessment appreciably.

The technique is exemplified with a similar group activity during the workshop. Some results and experiences are presented and the role of student and teacher attitudes towards mathematics is discussed.

• **KEYNOTE 2: Learning and brain research – a mathematics education example**

*(Bert Jonsson, Department of Psychology; Johan Lithner, Department of NMD)*

Included in the fundamental cognitive skills an individual has to learn to master during development are the abilities to reason logically and solve problems, for example in mathematics. In fact, the ability associated with mathematical competence during school age is highly predictive of success later in life while poor mathematical skills can have negative consequences for the individual. This talk will focus on learning mathematics using creative problem solving as opposed to the in school common way of teaching, the imitation of given standard procedures. We will present behavioral and neuroscience evidence for using creative problem solving as a means to facilitate learning. However since cognition is intimately associated with all higher cognitive functions, such as math, we will also discuss the importance to include individual differences in cognition in the analyses.