

Discussion on **NordNICE** further development

Fredrik Heintz

Department of Computer Science

Linköping University, Sweden

fredrik.heintz@liu.se @FredrikHeintz

Purpose and Aims

- Purpose:
 - Expand collaboration between school teachers and researchers in the fields of computing education and teacher education.
- Aims:
 - Enhance the quality of computing education of teachers in the Nordic and Baltic area, reaching the highest international levels.
 - Reorganise aspects of the teaching process for computing and computational thinking by developing innovative instructional approaches, new didactic methods and a framework for computing teacher education and training.

Objectives

- Identify and define the teacher education in computing area, both for preservice and in-service;
- Initiate critical reflection on computing teacher education;
- Collaborate in the teacher training in computing;
- Initiate computing teacher collaboration among Nordic and Baltic countries;
- Initiate development of shared approaches to teaching computing and computational thinking in teacher training.

Work packages

- WPO. Project organization
- WP1. Building understanding of what computing is at different K-12 educational levels
 - 1) Workshop to develop, in co-design, a joint understanding of what teaching computing and computation thinking involves in the educational levels K-12 based on existing standards and curricula.
 - 2) Develop, distribute and collect data through a survey tool and online interviews to document the present state of computing teachers' education and approaches to teaching computing and computational thinking in the Nordplus countries. Benchmark the challenges experienced by teachers in regard to national curricula.

Work packages, cont.

- WP2. Guidelines for computing teacher education and competencies
 - Arrange a workshop on computing teacher training, which focuses on available technologies, especially in teaching and learning programming and analysis of good practice in using technologies in computing teachers pre-service and in-service training.
- WP3. Dissemination of year one project results
 - 1) Develop and maintain the project's web resource
 - 2) Prepare and deliver a report on guidelines for the implementation and development of computing teacher education drawing on NordNICE research and workshop activities.

Work packages, cont.

- WP4. Development of framework for computing teacher training
 - 1) Arrange an online meeting for all partners to plan second year activities
 - 2) Arrange a workshop on creating activities for introducing computing on its own or in conjunction with different subjects together with teachers.
 - 3) Run a workshop transferring pedagogical techniques for teaching computing to teachers, leveraging the activities created in WP4/1.
- WP5. Dissemination of project results
 - 1) Prepare and deliver a report on the project results.
 - 2) Arrange local teacher seminars/workshops in conjunction with suitable teacher events (e.g. fairs, exhibitions, conferences).

Mechanisms

1. Mentoring platform.
2. Workshops.
3. Annual roundtable (meetings) discussing new questions and methodologies within computing teacher education.
4. Sub-networks. We encourage the network participants to form smaller thematic sub-networks on national computing or ICT teacher education questions;
5. Publication culture.
6. Collaboration with HEIs and schools with other educational institutions within each partner country.

Discussion

- What are the possible futures and how can we react to these?
- Development of a framework for computing teacher training
 - What should such a framework achieve?
 - What would be components of such a framework?
 - What would progression through the framework look like?
- Guidelines for computing teacher education and competencies
 - What type of guidelines are you as teachers and educators interested in?
 - How are these guidelines related to the framework?
- How can we develop and leverage the mechanisms?

What are the possible futures and how can we react to these?

- The first 5 years are critical! The preconditions at all levels will change every year due to changes in the previous years. The curriculum has to be agile and flexible.
 - Education will change very fast, computers are rapidly affecting our future, so frameworks should be modular and ready to be upgraded easily.
 - Who is responsible for updating the modules and the curricula?
 - It is important that the official documents and curricula are written in a general and broad way to allow to meet future changes without changing the official documents.
 - Use IFIP committee 33 to put pressure on countries.
 - There is a new ACM/IEEE committee on computing and computer engineering.
 - It is important to change in-service teacher training.
 - We should react to these challenges using research data and results. Show to concrete effects these new methods can have on learning compared to traditional ways.
 - **We should write a white paper on the state of research in computing education.**
 - Balance between the new, progressive, and more traditional parts of curricula, both for teachers and students.
 - Security and quality of information and changes.
 - Self studies, a critical skill is to learn to learn and to do this on your own.
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A framework for computing teacher training

- There must be two strands: pre-service and in-service training
- In-service training must be based on the existing teachers and their education, they do not have subject matter knowledge. They have to be convinced about the value and purpose of these changes.
- Pre-service training, the education and higher education departments have to be synchronized/coordinated to pull in the same direction. Otherwise we can't introduce the appropriate learning outcomes in both.
- In-service training, good examples in mathematics (matteflyttet), then it was a subject/discipline, how will a cross cutting subject be treated?
- We should engage the school management, including principals.
- There should be a series of workshops, that successively gives teachers concrete actionable things to do in their classroom, committed to doing something until next time, when it should be reported back.
- In-service training in relation to industry. Important to show real examples, solve real tasks with real tools.
- Components: programming, technology: robotics and 3D-printing, phenomena teaching, smart phone pedagogy, candy technology (first computers, then internet, now robotics/3D-printers, what is next?)
- Leverage modern technology to support the teacher training, e.g. MOOC and resource collections,
- We should involve media to spread the word of importance and good examples, get the society more engaged and put positive pressure on schools. Reach teachers. Increase the positive attitude towards schools and teachers.

Guidelines for computing teacher education and competencies

- Teaching education needs to be more networked and less discipline based. It has been hard to get collaboration between didactics research and teacher training, it is getting better. Collaborate across faculty boundaries.
- Talk both about disciplinary and didactic competencies.
- Involve the didactic researchers in our network.
- Connections between different subject teachers, think about these relations and how/why convert to CS/informatics teachers?

How can we develop and leverage the mechanisms?

- Lennart is trying out a mentorship program in Uppsala where teachers and CS students pair up to help teachers develop.