

CHANGES IN WORKING LIFE CREATE CHALLENGES TO ENGINEERING EDUCATION

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Introduction

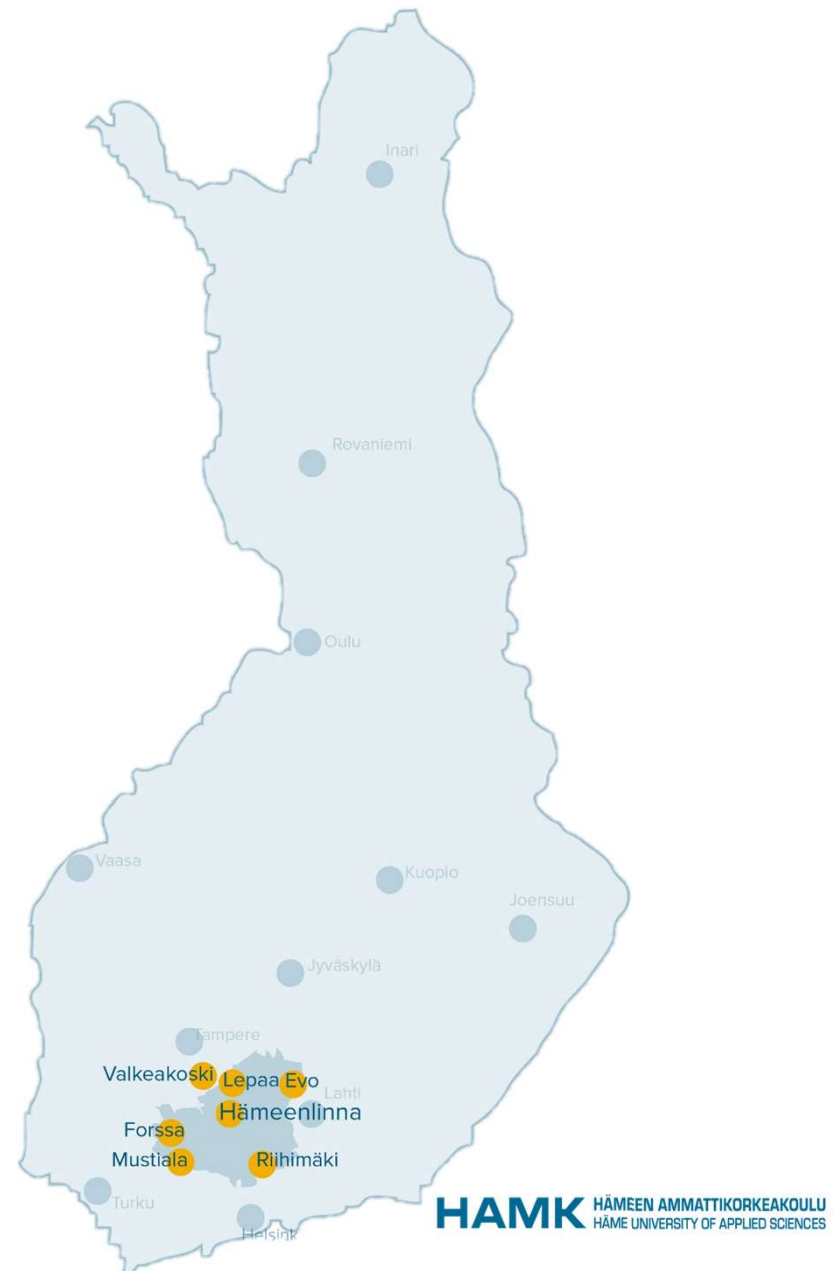
- The purpose of this presentation and our article is to present an example how the meta skills are being taught in the Häme University of Applied Sciences Electrical and Automation engineering study programme:
 - the methods that have been used and
 - the feedback collected from the students.
- The main question is:
 - Is it possible to develop better meta skills by assigning students to very heterogeneous groups based on their backgrounds and how do students feel about this?

Where do we come from?



HAMK in Finland

Situated centrally in the greater Helsinki metropolitan area of southern Finland at 7 campuses





What kind of skills are needed to be employable in future?



According to our literary review

- Technical skills, but also teamwork and communication skills...
- Ability to lead and influence; a sense of entrepreneurship; skills in public speaking and be self-confident; ability to work in teams; have strong project management skills; being able to work with people from different cultures; critical thinking...
- Judgement and decision making; fluency of ideas; active learning...
- Learning and developing him/herself and adaptation to changes; interaction, communication and cooperation skills...
- Ability to network, knowledge of digitalization and robotics; multilingual; negotiation skills; basic knowledge of economic indicators; computer skills; teamwork skills; communication and influencing; ability to adapt to changes...

How can you teach
that kind of skills?



HAMK's framework

- The vision of Häme University of Applied Sciences (later: HAMK) is to offer the most inspiring higher education and the most customer-oriented applications of research. The students are a central part in all activities. CBE, the competence-based education and student-centered approach are in the focus of pedagogical approach and teaching methods to be developed with the intention that they support the prerequisites of changing working life competencies. [5] Teachers work in teams and the education carried out in modules consisting of 15 credits.
- Team teaching reinforces a teacher's ability to cope with constant changes, provided there is trust between the members. In good atmosphere preparedness to try different pedagogical solutions increases.

Description of the implementation

- The programme for both English and Finnish language electrical and automation engineering studies begins once a year. Students may have a high school degree, a vocational degree or both.
- Traditionally, education for educational programs in different languages has been organized separately.
- For the student groups that started in the autumn of 2018, a pedagogical experiment was organized.
- It integrated
 - an automation project
 - English
 - Finnish language teaching for foreign-language students and
 - Finnish communication course for Finnish language programme.

Description of the implementation

- The studies were centered around a joint technology project lasting about four months.
- Students were assigned to groups of 3 to 4 students consisting of different nationalities and educational backgrounds.
- They were given a challenging project and while completing it they had the possibility for peer learning as well as encounter differences.
- They were encouraged to find the team's strengths and create a spirit of communion where they help others and learn together.

The aim of the project

The aim was that through a joint project the students would naturally learn

- how to work in projects
- teamwork
- problem solving skills
- internationality
- reporting and interaction skills both in English and in Finnish.



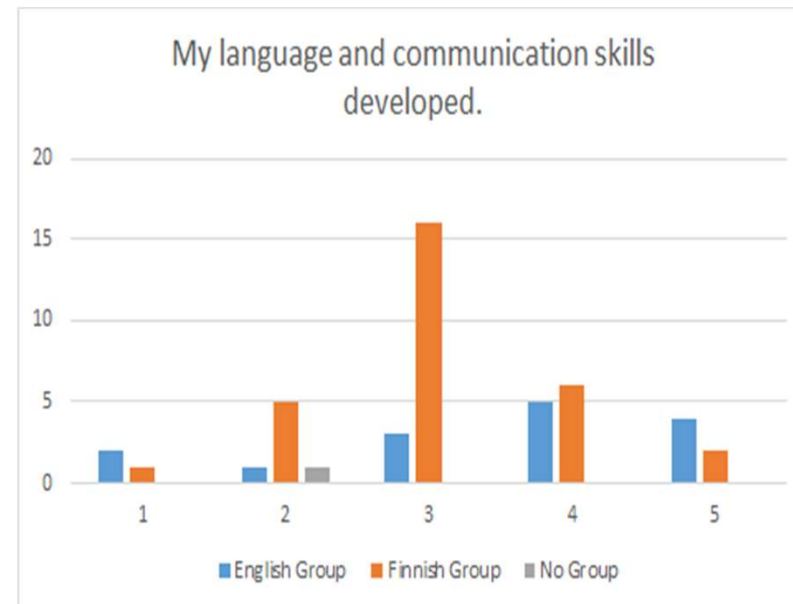
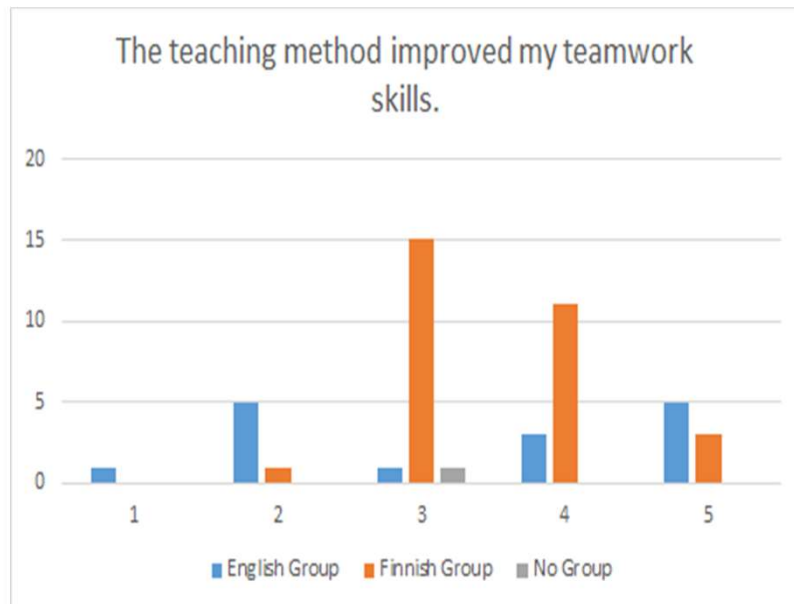
The survey

- The survey conducted for students with the intention to find out about students' experiences about pedagogical experiment.
- It was conducted about two weeks before the final presentations and the deadline of the reports.
- The survey was answered anonymously. Only recognizable was the language of education:
 - 30 answer from Finnish programme, 15 from English. One of students did not want to share background information.
 - Of the 51 students, 46 responded to the survey, so the response rate is 90%.
 - There were 6 questions.

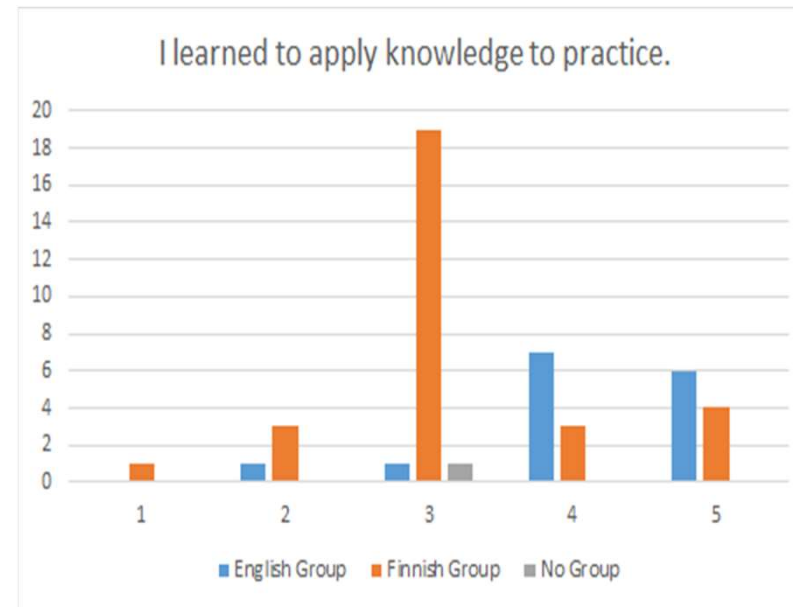
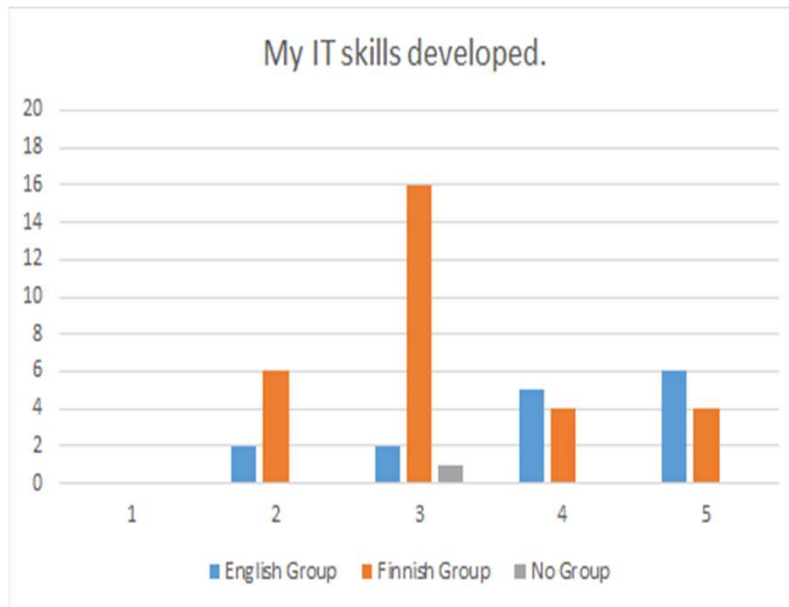
The results



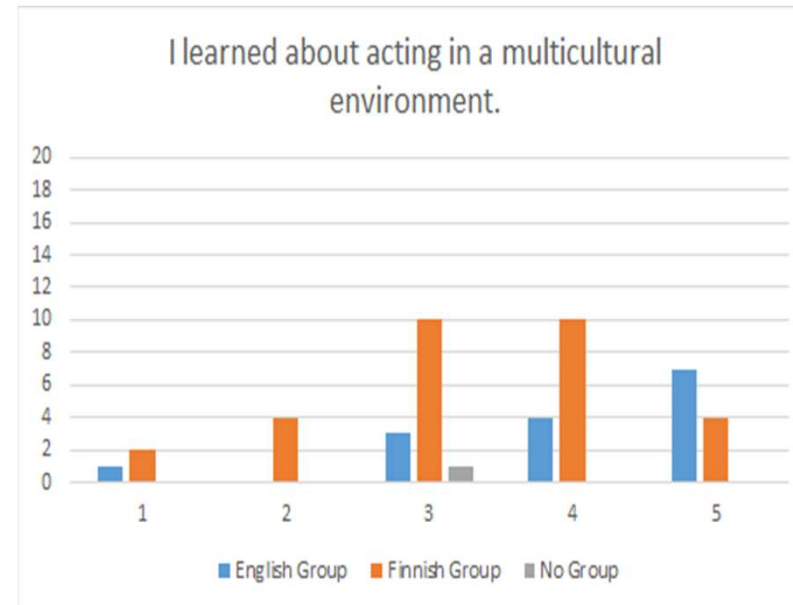
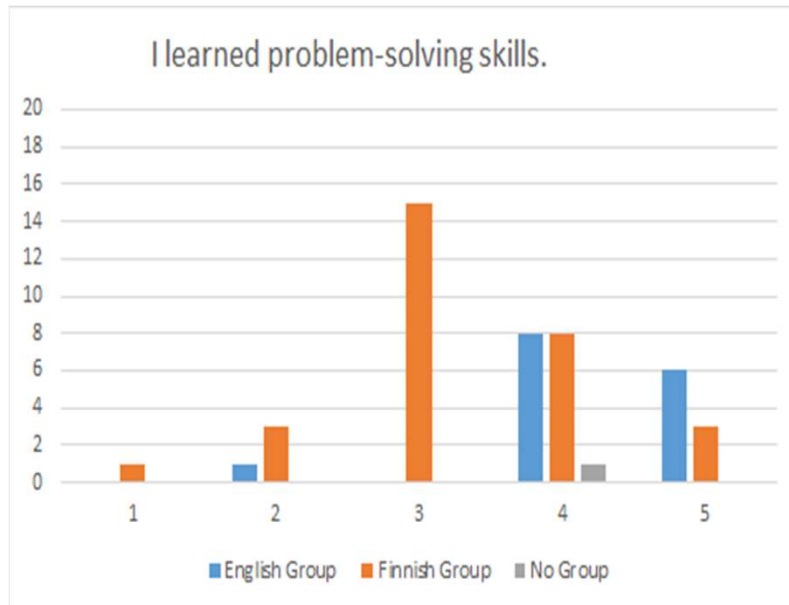
Figures 1 and 2



Figures 3 and 4



Figures 5 and 6



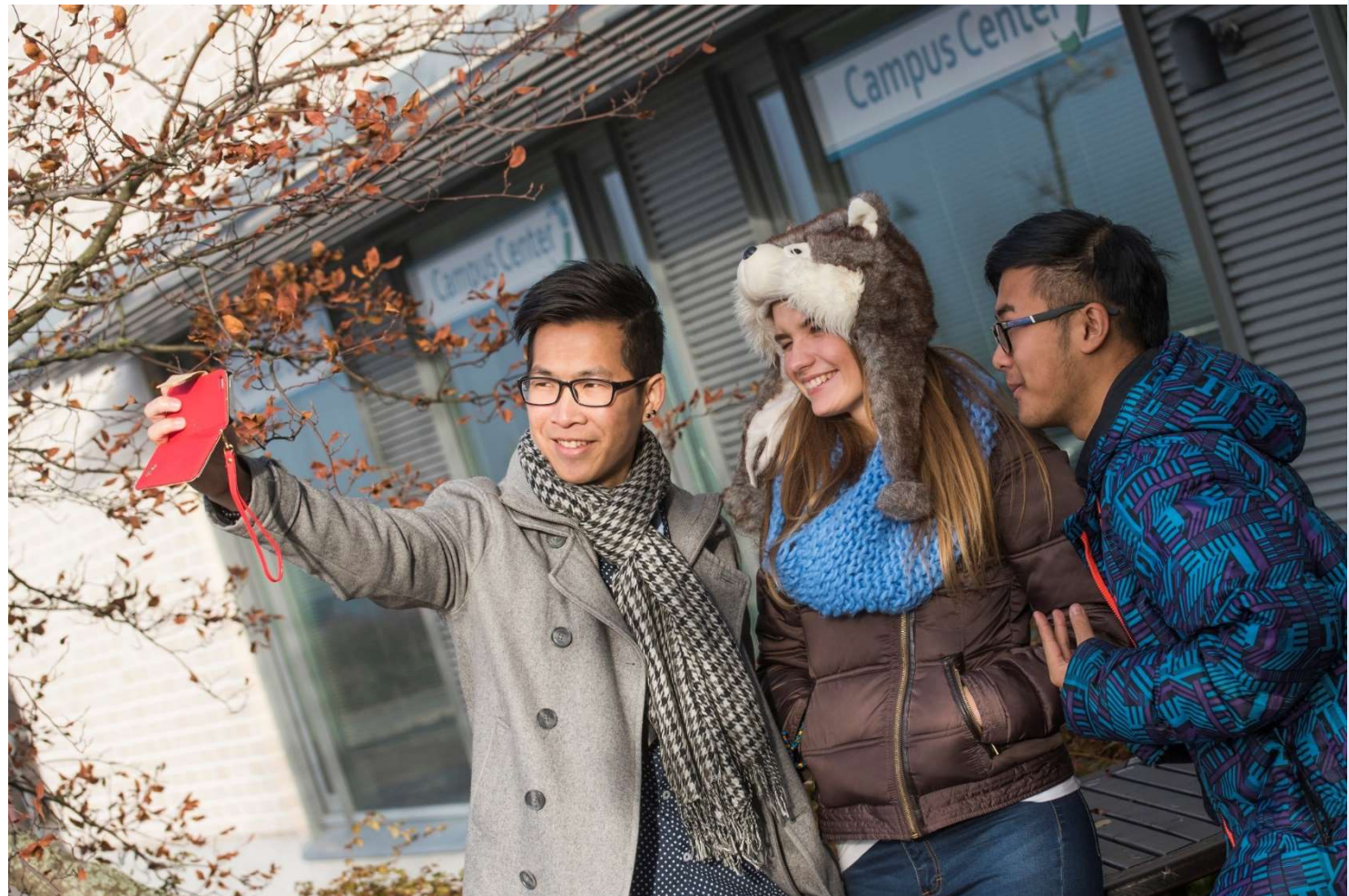
The results

The positive feedback can especially be seen in questions 6, 5 and 1.

Attention must be placed on the fact that the responses of English-language education students were more divided into extremes, while the Finnish-speaking group had more reviews of 3 and 4.

In free comments, the module received both positive and negative feedback; for some students the module was either "super great!" or "not wise". The majority was positive feedback.

The conclusions



The conclusions

- Based on the results, it is recommendable to organize such implementations in the future as well. This was just the beginning.
- The method of implementation proved to be motivating for both students and teachers.
- For teachers, a new way of implementing means more work than before, because the student teams should be closely monitored, and time should be reserved for guidance.
- The survey may have been carried out too soon after the competition. Later in guidance discussions, it turned out that Finnish students were really anxious about the final presentation, that was held two weeks after the survey. After the presentations, the students seemed to be relieved and happy. If the survey had been held at that time, the results would probably have been even more positive.

Experimental culture is needed!

- The implementation as whole showed that it is possible to develop the meta-skills needed in working life through pedagogical means.
- Skills cannot be taught by lecturing or reading books.
- Development requires readiness to move to an area where there are no routines or ready-made responses that have been developed over the years.
- Above all it needs implementation of experimental culture by the teaching staff.

Thank you!



The Finnish education system and its success factors:
<https://www.youtube.com/watch?v=oZkPgsGLnP4>