Work done in Estonia for increasing society’s commitment in ICT

15.15-16.30
Schedule

• Overview (probably incomplete)
  – Eno Tõnisson (20 min)

• Practical example about school and industry collaboration in ICT sector
  – Doris Põld and Jüri Jõema (10 min)

• Educational Robotics in Estonia
  – Heilo Altin (15 min)

• Robotic Teaching and Learning Concept
  – Raivo Sell (15 min)

• Programming in school computer club (Scratch)(Python)
  – Tauno Palts (15 min)
Eno Tõnisson

- 2001 - ... University of Tartu, Faculty of Mathematics and Computer Science, Institute of Computer Science; Lecturer
- 1994 - 2000 University of Tartu, Faculty of Mathematics and Computer Science, Institute of Pure Mathematics, Chair of Didactics of Mathematics; Assistant
- 1990 - 1998 Tartu Tamme Gymnasium; teacher
Overview

• ICT, CS education in Estonia
  – Bachelors’ study, professional higher education
  – Need for labour market in ICT sector (2020)
    • Report (2013)

• School
  – in curricula
  – additional activities
    • courses
    • school visits, doors open days ...
    • competitions
    • teacher training
    • ...

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Conceptual framework for increasing society’s commitment in ICT
The first level of higher education
ICT, CS admission 2012/13

• Bachelor’s study
  – Tallinn University of Technology (490 students)
  – Tallinn University (84 students)
  – University of Tartu (198 students)

• Professional higher education
  – Computer College (42 students)
  – Estonian Entrepreneurship University Mainor (53 students)
  – Estonian Information Technology College (297 students)
  – Tallinn University of Technology (54 students)
  – Tallinn University (22 students)
  – Võru County Vocational Training Centre (22 students)

• Vocational education
  – different levels
Vastuvõetute arv õpete lõikes

Admitted
Year 2020

• Taavi Kotka
  – Ministry of Economic Affairs and Communications
    • Deputy Secretary General for Communication and State Information Systems
  – BSc (Informatics), University of Tartu, 2013

• Year 2020
  – ICT sector is leading branch of economy
  – number of employees is **doubled** compared with present
Mapping the status of and need for the Estonian labour with ICT competences

- Report 2013
  - Praxis, Center for Policy Studies
- 2013
  - 16,287 ICT professionals in Estonia
    - 8,474 work in ICT sector
    - 7,813 in other areas of activity
- 2013 → 2020
  - Higher education graduates
    - needed is 4,200-5,600
    - in case of a more optimistic scenario, the shortage of specialists may increase with the current teaching volumes
  - The focus should be on the preparation of software developers
    - developers, test specialists, analysts, architects, relevant field managers
Gender

- ICT employees
  - 78% male (92% of software developers)
  - 22% female
Priority

• 2013
  – ICT, CS Students
    • 25% more than in 2009
    • More foreign students
  
  • Programs
    – IT Academy program
    – ICT program
      • our project
Slogans

• More students!
  – right students!

• Gender equality!?

• How to select the students?
  – How to inform the students before decision-making?
    • considered decision

• How to help them keep the course?
What should they know for considered decision-making?

• About programming, algorithms
  – software developers!
• About life in ICT companies and elsewhere
• About use of computers
• ...
What do they know?

• Most probably
  – skills for basic use of ICT
    • texts, spreadsheets …

• Probably
  – some experiences with educational software
    • biology, mathematics …

• Almost nothing about programming
  – at least from regular curriculum of secondary school

Depends on the school and the student!
National Curriculum of Upper Secondary Schools

• 1996 – optional course “Informatics” (4*35 hours)
• 2002 – cross-curricular topic “IT and media”
• 2011 – interdisciplinary optional courses (35 hours)
  1) ‘Natural Science, Technology and Society’
  2) ‘Mechatronics and Robotics’
     – TUT, UT
  3) ‘3D Modelling’
  4) ‘Technical Drawing’
  5) ‘Using Computers for Inquiry’
  6) ‘Basics of Programming and Development of Software Applications’
     – Jüri Vilipöld, ... TUT
     – Scratch, Python, Visual Basic
Optional?

• Why
  – lack of qualified teachers?

• Still many schools have ICT lessons
  – but programming???
Teacher training

• Complete curricula
  – Teacher of Mathematics and Informatics
    • University of Tartu
  – Teacher of Computer Sciences, School ICT Manager
    • Tallinn University
  – Technical Teacher
    • Tallinn University of Technology
Teacher training

• In-service Courses
  – TUT
    • Programmeerimise õpetamine koolides, programmeerimissüsteemi Scratch abil
    • Scratch edasijõudnutele
    • Scratch kasutamine õppematerjalide ja esitluste loomiseks
    • VBA kasutamine rakenduste loomisel ja programmeerimisel
    • Arendustöö (modelleerimine, analüüs, disain)
    • Rakenduste loomine ja programmeerimise alused
    • Mikrokontrollerid ja praktiline robootika
    • ...

  – UT
    • Programmeerimine huviringis (Scratch)
    • Programmeerimine huviringis (Python)
For students

- Afterschool activities, in schools
  - Computer clubs
    - Robotics
    - SmartLabs (NutiLabor)
      - 2012/2013 school year
      - more than 600 youth participated in Smartlabs
      - 36 Smartlabs across Estonia

- At all in Estonia 68 000 pupils
  - 1,1% technology
  - 40% sports
  - 38% art, music
  - nature, culture
For students

• At universities
  – TUT
    • Tehnoloogiakool (‘‘Technology School‘‘)
      – Robot igaühele!
      – Kraapurid - sissrejuhatus programmeerimisse (Scratch)
      – Rakenduste loomine ja programmeerimise alused (*Basics of Programming and Development of Software Applications*)
    – ...
  – UT
    • Teaduskool (‘‘Science School‘‘),
      – Programmeerimine keeles PHP
      – Programmeerimise alused I
      – Programmeerimise algkursus
    • Institute of Computer Science
      – Teeme ise arvutimänge – algus
      – ...

Competitions

• *Informatics olympiade*
  – only ca 60 participants (less than 10 years ago)

• *Beaver. International Contest on Informatics and Computer Fluency*
  – 2012 in Estonia
  • 1961 + 1343 + 708 participants

• Robotics competitions
School visits

- Different activities
  - Tagasi kooli, Back to School
  - Association of Information Technology and Telecommunications (ITL)
  - Universities

- Duration
  - 1 lesson
  - all day activities
  - ...
Open doors days, Excursions at Universities

- TUT
- IT college
- UT
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