

Joint Study of Teaching and Learning in Coding Skills in China and Finland

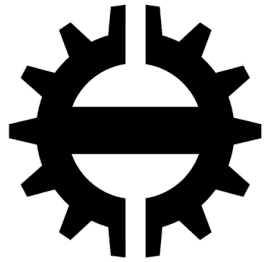
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University Consortium of Pori

- Four universities collaborating in the city of Pori.
- Emphasizing societal interaction based on research and education and reciprocal partnership.
- Increases the level of educated citizens in the region, internationalization and entrepreneurship.



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Outline of the talk

- University Consortium of Pori
- The aim of the project
- Background
- Definition
- ICT in Schools in Finland
- Research Problem and Method
- Examples of teaching & learning coding

The aim of the project

- The project compares the Finnish and Chinese educational systems from the point of view of *computational thinking* and *coding skills*.
- Future school 2030 should teach the wide variety of coding skills in the best and effective ways.

Background

- Digitalization
 - substantially affecting the transformation of work life
 - *building digitally literate citizens* who have gained the skills of being active members of the digital society

Defining Coding Skills

- A combination of problem solving, logical thinking, computational thinking, and design skills.
- Denning (2009): computational thinking can be defined as the ability to interpret the world as algorithmically controlled conversions of inputs to outputs.
 - learning to think about, represent, and solve problems that require a combination of human cognitive power and computing capacity

ICT in Schools in Finland

- The teaching of ICT was introduced to the Finnish curriculum in the 1980s.
 - the amount of computers in Finnish schools was not adequate
 - After school computer clubs after school.
- ICT was not a subject
 - schools had computer classrooms, intended to use in all subjects
 - Computer classrooms were difficult to keep up to date and thus on very low use.
- The ICT skills of the teachers were mixed.
- Introduction of programming in the latest National Core Curricula 2016.

Research problems

- The aim of the study is to find and classify the different approaches and methods of teaching and learning coding skills in Finland and China both in formal and informal settings (i.e. in school and outside school environments).
 - Does teacher's conceptions of technology affect on the teaching/learning coding skills?
 - Is there a difference on how coding skills are taught/learned in China and Finland?
 - What are the teachers conceptions of learning 21st Century Skills?

Research method

- Data collection: a questionnaire both in Finland and in China
 - In Finland we use Google Docs, still searching the best method for China

Instrument development

- Teachers Conceptions of Coding Skills in Finland and China (TCCS)
- The questionnaire includes
 - background information (5 items),
 - the use of ICT as a part of teaching (9 items), attitudes (8 items),
 - the impact and adaptation of technological change (14 items).
- Four or five level Likert scale variables.

Background material for the instrument development

- Gagnon, M-P., Orruño, E., Asua, J. & Emparanza, J. (2011) Using a Modified Technology Acceptance Model to Evaluate Healthcare Professionals' Adoption of a New Telemonitoring System. *Telemedicine and e-Health* 18(1):54-59
- TIA (Technology and Internet Assessment).
http://www.hhpublishing.com/_assessments/TIA/scales.html
- Jacobs, J.,C., Van Luijk, S.J., Van Berkel, H., Van der Vleuten, C.P., Croiset, G. & Scheele, F. (2012) Development of an instrument (the COLT) to measure conceptions on learning and teaching of teachers, in student-centred medical education. *Med Teach.*34(7):e483-491.
- UNESCO Institute for Statistics (2009) Guide to Measuring Information and Communication Technologies (ICT) in Education. Technical Paper No 2.

Examples of after school activities

INITIATIVE	COUNTRY, PRICING	TARGET GROUP	MISSION	ACTIVITIES
Ro5an kood1	Finland, free.	From 7 to 12.	To support the learning of coding in primary schools.	Online gaming, museums, and libraries (4.10.2016 to 31.01.2017).
CoderDojo	Global, non-profit.	From 7 to 17.	An understanding of programming languages is important and nobody should be denied the opportunity to do so.	Dojo events
Raspberry Pi's Code Clubs	UK, global.	After school, from 9 to 11.	To put a Code Club in every community in the world.	Club activities.
School Robot Challenge 2016	UK, free.	School children and students.	A competition to inspire schoolchildren and students by robotics and nature.	Designing own virtual robot bug and teaching it to move.
FabLab@School	Over 150 FabLabs over the world, low-cost.	Middle and high school students.	Educational digital fabrication labs that put cutting-edge technology for design and construction into the hands of middle and high school students.	Workshops: designing and making digital hardware and software projects (e.g. FabLearn).

Examples of non-profit and commercial organizations providing activities for learning coding

Initiative	Country, pricing	Target group	Mission	Activities
Codecademy	Global, free, online.	Everybody.	Learn to code interactively for free.	Interactive courses, with projects and online coding tools.
Scratch	Global, free, online.	From 8 to 16, everybody.	Create stories, games, and animations to share with others around the world.	Coding tools, sharing of scratch programs.
Decoded	Global, commercial.	Everybody.	To prepare all employees for a future where the majority of jobs will require digital know-how.	Classes (UK, US, AU, NL).
FreeFormers	UK, commercial.	Mainly adults.	Help companies and teams drive digital transformation.	Workshops, events, campaigns, and content that get people embracing digital products and skills.
Raspberry Pi: #YesWeCode	US, non-profit.	Underrepresented minorities in tech, 18 to 30.	A national initiative to help 100,000 young women and men from underrepresented backgrounds find success in the tech sector.	Coding courses and training.
Picademy, Raspberry Pi Foundation	UK, non-profit.	Teacher at all levels.	To give educators the experience and tools they need to teach computing with confidence.	Teacher training, workshops, etc.

Maker culture and larger coding events

Initiative	Country, pricing	Target group	Mission	Activities
Hour of Code	Global, free.	Everybody.	A one-hour introduction to computer science.	Students and teachers can choose from a variety of activities, for kindergarten and up.
EU Code Week	Global, free.	Everybody.	Aims to bring coding and digital literacy to everybody in a fun and engaging way.	Workshops, online courses, taster sessions, code clubs, hackathons, theme based-events
European Maker Week	Europe, free.	Everybody.	To create awareness about the importance of the maker culture to foster an education of creativity and innovation in all schools across Europe.	Maker fairs, FabLabs, Makerspaces, Hackerspaces, and the Hardware Startups.
Year of code	UK, free.	Everybody.	To encourage people across the country to get involved in coding for the first time.	Hosted events about coding.
Raspberry Pi Jam's	Global, often small entrance fees.	Everybody.	Organized by the community for people to share knowledge, learn new things, and meet other Pi enthusiasts.	Hands-on style event, practical workshops, technical talks, show-and-tell.

Examples of recent Finnish approaches to learning coding skills

Initiative	Country	Target group	Mission	Activities
Innokas network	Finland, non-profit.	Children and teachers, everybody.	To guide and encourage students, teachers, school administrators, and other stakeholders to be creative and innovative in the use of available technology.	Robotics workshops, teacher training.
Kodarit	Finland, commercial.	From 7 to 14.	Aims to bring coding to everybody in a fun, visual, and engaging way.	Camps, courses, events.
Koodioulu	Finland, free.	6 to 10, coding for children; and 10 to 15, coding for youth.	To create awareness about the importance of the maker culture to foster the education of creativity and innovation in all schools across Europe.	Code clubs, camps, robotics workshops.
Käsityökoulu Robotti	Finland, free.	Primary and elementary school students.	To combine coding and art.	Camps, clubs, courses, events.
Koodaustunti.fi	Finland, free.	Everybody.	A one-hour introduction to computer science (Finnish version of Hour of Code).	Students and teachers can choose from a variety of activities for kindergarten and up.
Koodikirja.fi	Finland.	From 4 to 120, everybody.	Mission to gather all the coding training and guidebooks in to one place. Offers coding competence for every age.	Website that offers coding tasks (to be done individually, at school, with parents, etc.).

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Thank you!



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