



Aalto University

Applications of computer-aided assessment in mathematics education

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Abstract

Computer-aided assessment system (CAA) is a piece of computer software, which can be used for assigning the homework (or a part of it) in the Internet. The solutions is then graded by the computer, which also may give the student immediate feedback on his work [5]. Automatic assessment can be used in e-learning or together with traditional teaching (this is called blended learning). In this presentation, I will discuss experiences of CAA at Aalto University [1,2,3,4] and potential future applications of such systems.



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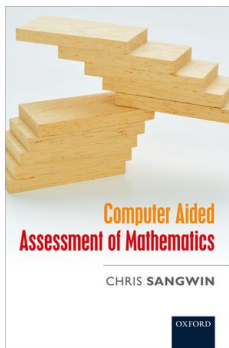
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- Automatic assessment can be used in e-learning or together with traditional teaching (this is called blended learning).
- The assessment process can be very simple (e.g. multiple choice questions), or very complex involving an artificial intelligence system. I will focus on the latter case.

CAA at Aalto University



The CAA project at Aalto University was started by me in 2006. We have been mainly using a modified version of an open source software STACK originally developed by Chris Sangwin at University of Birmingham.

There is a very recent book about this topic, which contains a comprehensive review of my project:

Chris Sangwin, *Computer Aided Assessment of Mathematics*, 200 pages, ISBN 978-0-19-966035-3, Oxford University Press, 2013.

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- Cost savings, less work to teachers (in the long run).



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- More realistic assignments.

Case: European Union project S3M2

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 - Bridges into B/MSc programs for STEM students and sets a benchmark for successfully studying at leading European universities.
 - Geared towards students from high school, students having completed a bachelor degree at a European or Non-European university as well as persons interested in furthering their professional education.
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 - Game-like assignment flows (i.e. demonstrating competences through simulation).
- Large scale computer-guided online courses.
- Weak/slow interactive information flows.

References

- [1] H. Majander, A. Rasila: Experiences of continuous formative assessment in engineering mathematics. In Tutkimus suuntaamassa 2010-luvun matemaattisen aineiden opetusta, 197–214, Tampere University Press, 2011.
 - [2] K. Linnoinen, Does Practice Make Perfect? M.Sc. Thesis, University of Helsinki, 2013.
 - [3] A. Rasila, M. Harjula, K. Zenger: Automatic assessment of mathematics exercises: Experiences and future prospects. In ReflekTori 2007, 70–80.
 - [4] A. Rasila, L. Havola, H. Majander, J. Malinen: Automatic assessment in engineering mathematics: evaluation of impact. In ReflekTori 2010, 37–45.
 - [5] C. Sangwin, Computer Aided Assessment of Mathematics, Oxford University Press, 2013.
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Links

- <http://stack.tkk.fi/demo/>
- <http://stack3.aalto.fi/>
- <http://math.aalto.fi/en/research/matta/>
- <http://www.s3m2.eu>