Advise-Me

Plans for the future

Bastiaan.Heeren@ou.nl

Multiplier Event

October 19, 2018

Heerlen

erasmus+
meer perspectief

Erasmus+

Open Universiteit
www.ou.nl

Introduction

Timeline: September 2016 – August 2019 (1 year remaining)

- Slightly behind schedule with implementation (software development and modeling), but we can catch up
- I will present our plans for the future

Please Advise Us about how we should proceed:

1. Connecting learning environments
2. Dashboard and adaptive testing paths
3. Evaluation studies
4. Scientific output
5. Second multiplier event
6. Dissemination opportunities

Connecting learning environments

The project plan emphasizes reuse of the assessment technology by connecting multiple learning environments

- The assessment services should facilitate easy integration
- Numworx (a.k.a. the Digital Mathematics Environment) is connected to the assessment software, and was used in the pilot studies

- Future plans:
  - Connect the French Pepite system (on a WIMS server)
  - Improve interoperability by adding support for QTI standard

Dashboard and adaptive testing paths

Not discussed today (but work in progress):

- A dashboard/reporting module that presents the assessment
  - Reporting about groups and individuals
  - Targeted at teachers and pupils
  - Will be inspired by similar dashboards in the DME and Pepite

- We want to make testing paths adaptive
  - Task sequencing: order and selection of tasks depends on answers
  - Selection based on ‘unknowns’ in user model

Evaluation studies

- Main activity in third year: design and execute a larger evaluation study
  - We aim at approximately 300 pupils
  - Three countries
  - Preferably, involving different learning environments
- Evaluation from a technical and a quality perspective

Scientific output

The main project results so far are described in our EC-TEL 2018 paper

- Comments about the paper?
- Recommendations for follow-up research?
- Related work we missed?
- Other ideas?

We are planning to write a second paper after the evaluation studies

Fine-grained Cognitive Assessment based on Free-form Input for Math Story Problems

Bastiaan Heeren[1], Johan Jeuring[1,2], Sergey Sosnovsky[2], Paul Drijvers[3], Peter Boon[3], Sietske Tacoma[3], Jesse Koops[4], Armin Weinberger[5], Brigitte Grugeon-Allys[6], Françoise Chenevotot-Quentin[6], Jorn van Wijk[1], and Ferdinand van Walree[1]

[1] Faculty of Management, Science & Technology, Open University of the Netherlands, P.O.Box 2960, 6401 DL Heerlen, The Netherlands, bastiaan.heeren@ou.nl
[2] Dept. of Inf. and Comp. Sciences, Universiteit Utrecht, Utrecht, The Netherlands
[3] Freudenthal Institute, Utrecht University, Utrecht, The Netherlands
[4] Cito, Arnhem, The Netherlands
[5] Dept. of Educational Technology, Saarland University, Saarbrücken, Germany
[6] Laboratoire de Didactique André Revuz, Université Paris Est Créteil, Paris, France

Abstract. We describe an approach to using ICT for assessing mathematics achievement of pupils using learning environments for mathematics. In particular, we look at fine-grained cognitive assessment of free-form answers to math story problems, which requires determining the steps a pupil takes towards a solution, together with the high-level solution approach used by the pupil. We recognise steps and solution approaches in free-form answers and use this information to update a user model of mathematical competencies. We use the user model to find out for which student competencies we need more evidence of mastery, and determine which next problem to offer to a pupil. We describe the results of our fine-grained cognitive assessment on a large dataset for one problem, and report the results of two pilot studies in different European countries.

Keywords: Math story problems · Step-based assessment · Free-form input · Solution strategies · User modelling

1 Introduction

Competence in mathematics has been identified at EU level as one of the key competencies for personal fulfilment, active citizenship, social inclusion, and employability in the knowledge society of the 21st century.[7] In 2009, concerns about low student performance led to the adoption of an EU-wide benchmark in basic skills, which states that 'by 2020 the share of 15-year-olds with insufficient abilities in reading, mathematics and science should be less than 15%'.[8] An extensive

[7] Mathematics Education in Europe: Common Challenges and National Policies, 2011.
[8] Strategic Framework for European Cooperation in Education and Training, ET 2020.

Open Universiteit
www.ou.nl

Second multiplier event

- Workshop about final project results (including evaluation)
- Summer 2019, exact date to be decided
- OUNL campus, Heerlen, the Netherlands, or co-located with a related conference
- Similar to today's event, but perhaps somewhat less technical

You are cordially invited to also attend this workshop

Open Universiteit
www.ou.nl

Dissemination opportunities

- Advise-Me is a Strategic Partnership in the Erasmus+ programme
  - International collaboration
  - Multi-disciplinary (Computer Science, Math Education, Psychometrics)
  - Research and applied technology

- Do you see opportunities for future collaboration?

Open Universiteit
www.ou.nl

http://advise-me.ou.nl

Advise-Me | Summary | Tasks | Events | Members

Advise-Me

Automatic Diagnostics with Intermediate Steps in Mathematics Education

Project details:

- Start: September 1, 2016
- End: August 31, 2019
- Duration: 36 months
- Funding: € 442.895
- Programme: Erasmus+
- Action: Strategic Partnerships
- 2016-1-NL01-KA201-023022

Partners:

- Open University of the Netherlands (coordinator)
- Utrecht University
- Cito
- Saarland University
- Université Paris-Est Créteil

Contact information:

bastiaan.heeren@ou.nl

Advise-Me

On Friday October 19, 2018, we are organising a multiplier event in Heerlen, the Netherlands. On this day, we will give an overview of the results of the project, and have asked two international experts to give their view on assessment in mathematics. You are very welcome to attend (registration is required).

Our research paper Fine-grained Cognitive Assessment based on Free-form Input for Math Story Problems was accepted for the European Conference on Technology Enhanced Learning (EC-TEL) 2018.

Interested?

Feel free to contact the project coordinator, dr. Bastiaan Heeren, about the Advise-Me project.

Fifth project meeting

April 20, 2018

Paris, France

Fourth project meeting

November 27, 2017

Arnhem, the Netherlands

Third project meeting

April 18, 2017

Paris, France