



A tutorial-based learning portal in basic mathematics

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Overview

- ▶ The project is funded by the Finnish National Agency for Education
- ▶ Our goals:
 - ▶ To overcome learning difficulties in the basic syllabus of mathematics
 - ▶ To increase interest in learning mathematics
- ▶ What you will hear today:
 - ▶ Short introduction to the learning tool
 - ▶ Learning analytics: the data and how it can be used

ViLLE

- ▶ ViLLE is a collaborative and tutorial-based learning tool developed at the Centre for Learning Analytics at the University of Turku
- ▶ Material is developed collaboratively for all levels of education and for multiple subjects
 - ▶ Researchers, future teachers and schools are all involved in development of this tool
- ▶ We have created courses for six basic mathematics courses in upper secondary education
- ▶ The courses form a basis for learning further skills and strengthen those already learned
- ▶ We use ViLLE in various ways to support learning:
 - ▶ Rounds of exercises
 - ▶ Tutorials
 - ▶ Peer review

The basics

- ▶ The rounds strengthen basic mathematics skills
- ▶ The tool provides immediate feedback based on the students' answers
- ▶ The feedback guides the students through the exercises and gives explanations

Step 1 / 5

Give a number ...

... that is in between numbers $\frac{3}{10}$ and $\frac{2}{5}$:

Check again

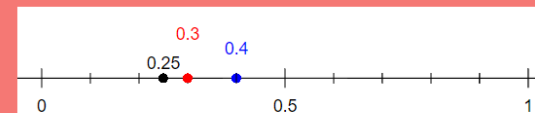
Be careful!

$$\frac{3}{10} = 0.3$$

$$\frac{2}{5} = 0.4$$

$$\text{Your answer} = \frac{1}{4} = 0.25$$

Your answer is not between the numbers.

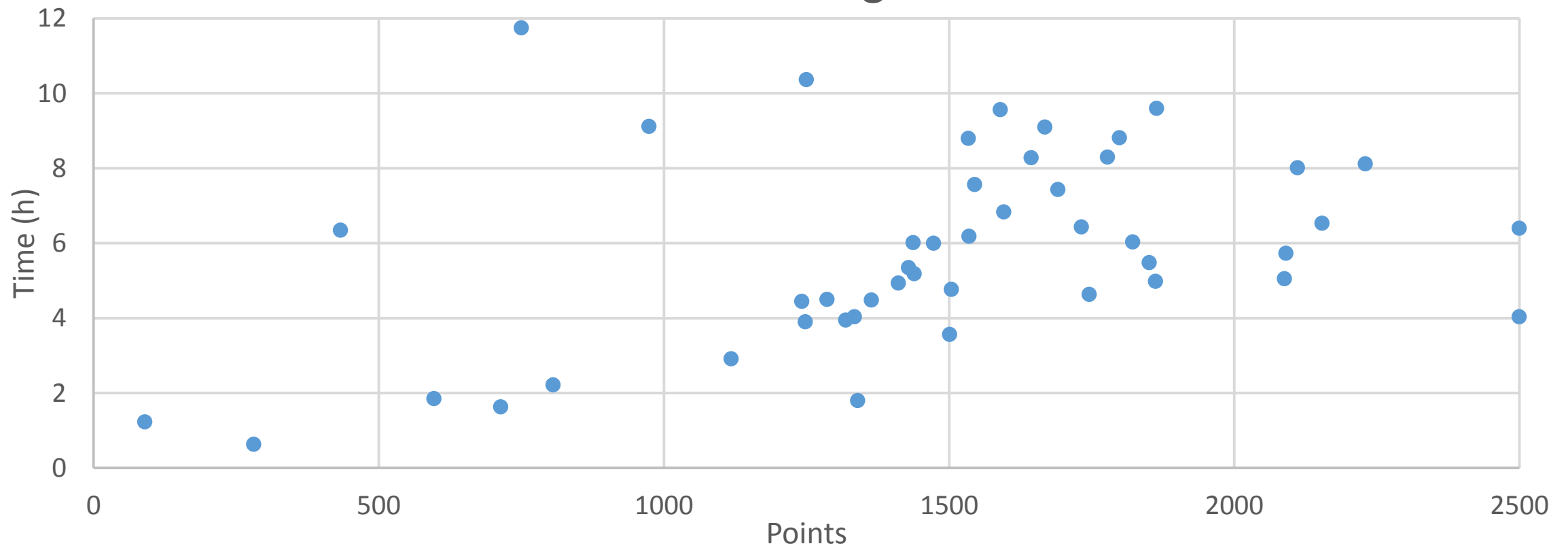


Immediate feedback and interactive material

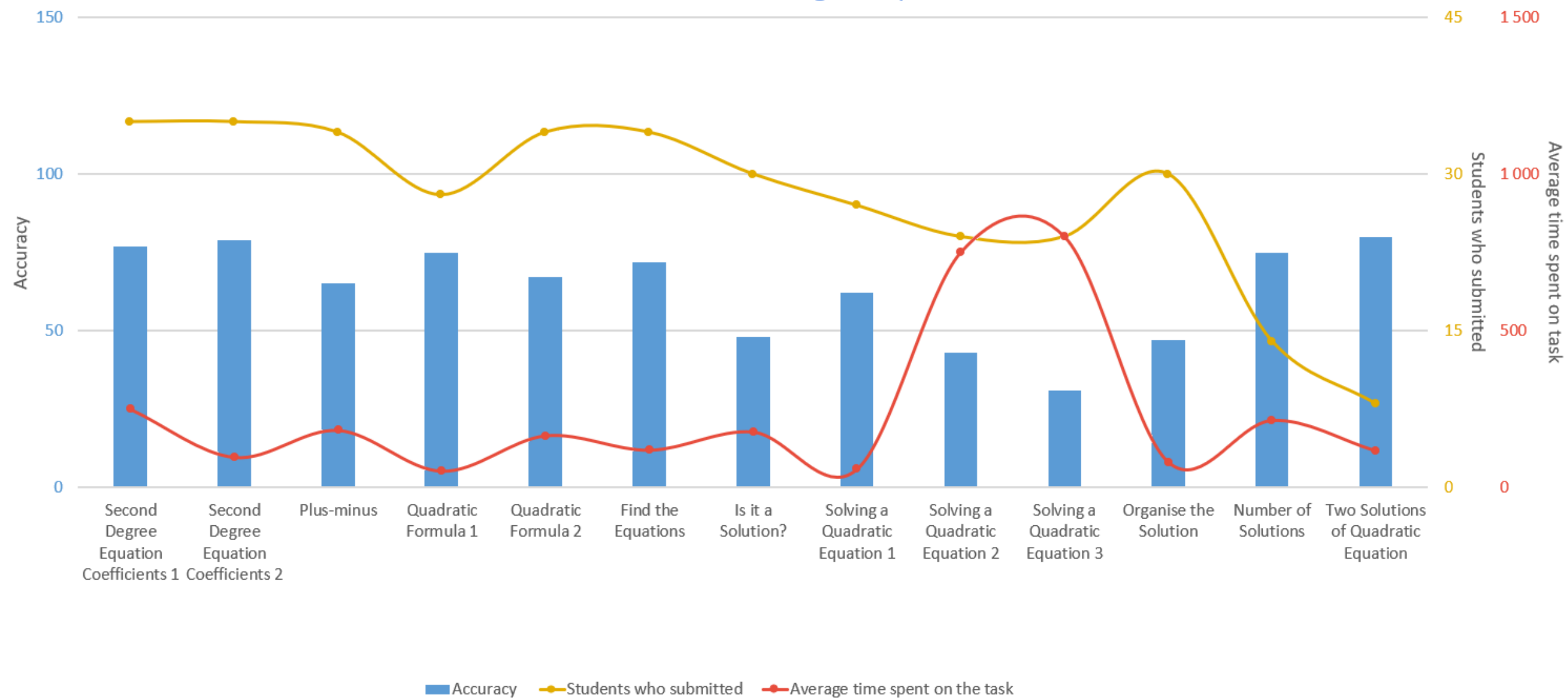
- ▶ Students get immediate feedback based on their answers
- ▶ The exercises guide students if they get stuck
- ▶ The exercises may also contain
 - ▶ Study material to help students revise
 - ▶ Interactive content to help with the exercise or to make it possible to investigate the subject

Learning analytics support the teacher

Student diligence



Statistics for Round: Second Degree Equation



Research

- ▶ A research was conducted during the first mathematics course in upper secondary education
- ▶ The goal was to determine whether the exercises had an impact on learning mathematics
- ▶ The general attitude towards mathematics decreased in both groups, but significantly less in the group that did the exercises ($p=0,035$)
- ▶ Learning results were about 14 percent better than in the control group ($p=0,000$)
- ▶ Confidence seemed to be better among the group that did the exercises ($p=0,070$)

Future

- ▶ The courses are being used all around Finland
- ▶ The courses are currently available in Finnish and Swedish
 - ▶ In addition, the environment has been translated to English, Chinese, Lithuanian, Russian and Spanish
 - ▶ Material for lower stages of education is ready in most of these languages