

# FEEST

## FEedback on Exams for Students and Teachers

Projectaanvraag Onderwijsinnovatiefonds

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### Abstract

A course often ends with a final exam. This exam should test how well a student understands the various topics discussed in the course. An analysis of the work of an individual student, as well as, the the work of the whole class, provides valuable information for the student and for the teacher.

Informed students will be aware of their strong and weak points. For students that passed the course, this can be of importance when starting new courses in which pre-knowledge on topics of the exam is used, and, for those that failed the exam, when they are preparing for the resit.

Informed teachers will not only get a better idea of the quality of the exam, but will also be able to offer better support to students preparing for a resit of the exam.

The goal of this project is twofold:

- provide teachers with a tool to analyze exams and report this analysis to their students;
- use the analysis of the exam to guide students preparing for a resit of the exam.

## 1 Background

The performance of a student on an exam is usually captured by the partial scores he or she obtains. These scores lead to the final grade for the student, and he or she is informed about this grade. Sometimes a student will make use of the opportunity to look into his graded work, but often this does not happen.

The information hidden in the partial scores, however, is valuable for the students. Especially when they are not only provided with the partial scores they obtained in the exam, but also with information on how they performed on the various topics tested in the exam.

In this way a student becomes aware of his or her strong and weak points. This can be of importance when he or she starts a new course in which pre-knowledge on topics of the exam is used, and, of course, if he or she has failed the exam, and wants to prepare for the resit.

Also teacher and the educational management can profit from the information hidden in the partial scores of the exam. An analysis of the exam provides them with information on the quality of the test and the various parts of it.

## 2 The experiment

The courses Lineaire algebra (2WF20), Verzamelingenleer en Algebra (2WF40) and Calculus (2WAB0, 2WBB0, 2WCB0) are taught in the first quarter. (The courses 2WF20, 2WF40 and 2WCB0 are the three courses of the first quarter of the Bachelor Technische Wiskunde.) The exam results of these courses will be analyzed. A report of the analysis will be provided to the teachers and education management.

Moreover, we use the information to help students that failed the exam in their preparation for the resit exams planned at the end of quarter 2:

- Students will be provided with the information about their performance. They will not only get information on how well they performed on the individual items of the test, but also on the various topics covered by the test.
- They get an advice to pay extra attention to those topics on which their performance was bad.
- They are offered extra homework mainly focusing on the topics in which they did not perform well.
- If they hand in this homework, they also are offered an extra tutor meeting or instruction, to prepare for the resit.

The two courses Lineaire algebra (2WF20), Verzamelingenleer en Algebra (2WF40) attract about 85 students each. In previous years, about 30% of the students take part in the resit.

The Calculus course has almost 2400 students this year. In previous years about 35 – 40% of these students take part in the resit.

So, in total we expect that close to 1000 students will be informed about their performance at the exam and will be offered an extra tutor/instruction meeting, provided they hand in extra homework. Experience with similar forms of help (without the proposed exam analysis tool and feedback) in the basic Calculus course shows that about 10 – 15% of the students take advantage of this extra opportunity for help.

The resit of the exams will also be analyzed and the intervention will be evaluated.

### 3 Expected outcome

In this project we expect the following outcome:

**For Teachers and management** In the project we deliver an easy to use tool that enables teachers to analyze their exams and report the analysis to the educational management. Indeed, we develop a spreadsheet that allows the teacher to automatically create an analysis of his/her exam out of the data of partial scores on the exam. This analysis will be based on the methods of de Gruijter, Toetsing en toetsanalyse <sup>1</sup> and on input from the TU/e-experts on testing, G. van de Watering and L. van Meeuwen.

The analysis of the exams helps teacher to improve their exams and gives them a better view on how students perform on the various topics of the test and course.

The spreadsheet will be made available to the TU/e community, so that all teachers have an easy to use tool that automatically creates an analysis of their exams.

#### **For students**

Moreover, the spreadsheet will also provide the information on how well a particular student performs on special topics, compared with his or her peers.

The teacher can give the student feedback on his work. This can be of importance when he or she starts a new course in which pre-knowledge on topics of the exam is used, and, of course, if he or she has failed the exam, and wants to prepare for the resit. In the latter case, the teacher can provide the student with personal advice on how to prepare for the resit.

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<sup>1</sup><http://media.leidenuniv.nl/legacy/toetsing-en-toetsanalyse.pdf>

## 4 Work plan

The team consists of the three responsible teachers of the courses Lineaire algebra (2WF20), Verzamelingenleer en Algebra (2WF40) and Calculus (2WAB0, 2WBB0, 2WCB0). These courses are all in the first quarter. This means that their exams are in the beginning of November.

So, the data of the exams of these courses will be available around November 15. In the first few weeks of that months we will pay the most attention to the development of the spreadsheet that provides us with an analysis of the exams. A prototype already exists. The exams will be analyzed.

In December we will work on the tool to provide students with information that can be extracted from the analysis. Moreover, the teachers organise extra homework and plan the extra tutor-meetings.

Before the Christmas holidays students will be informed. In the second week of January they have to hand in the homework, which was assigned to them, based on the analysis of the exam. This can be done electronically through Oncourse<sup>2</sup>. Those students that submitted homework can visit the extra meetings, which will be planned around one week before the resits.

By the end of January all resits will be analyzed and we will evaluate the experiment. This evaluation will be part of the end report of the project.

The tools developed in the project will be made available via a webpage, and we will report on our experiment at meetings within our own department and the TU/e.

### Actors

name	role
Hans Cuypers	project leader/ict developer/teacher
Emiel van Berkum	teacher
Hans Sterk	teacher
Jan Willem Knopper	ict-developer
Student assistant(s)	ict-developer, help for teachers
Tutors	tutors

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<sup>2</sup>[oncourse.tue.nl](http://oncourse.tue.nl)

### Time line

Time	Task	Actor	hours
November	Design for the tool analyzing the data	ict-developer	20
	Design for the tool to report to the students	ict-developer	20
	Make plan for extra help to students preparing for the resit and collect study material	teachers	3 × 10
December	Grade exams and collect all data	teachers	pm
	Implementation of tool to analyze data	ict-developer	60
	Implementation of tool to provide information to students	ict-developer	60
	Create and implement personalized study plans for preparing for the resit	teachers	3 × 10
	Communicate personalized study plans for preparing for the resit to the students	teachers	3 × 5
December-January	Check whether students follow their plan and organize extra tutor meetings	teachers and tutors	pm
January	Resit	teacher	pm
January-February	Analysis of resit and evaluation	teachers	3 × 10
February	Finishing of the tools	ict-developers	2 × 20
February - ...	End Report Dissemination	project leader	20

### Risks

A potential risk for the project is, of course, that the tools will not be ready in time. However, at the moment we already have started to work on a prototype of the spreadsheet. This prototype can be used to analyse the exams, if necessary, but is not very user friendly and not suitable for distribution among the teachers of the TU/e.

If the tool for automatically informing students about their performance at the exam is not ready, one can do the work by hand. This is, of course, time consuming, but can be done in a pilot.

Another risk is that only very few students could participate in the extra tutor/instruction meetings. However, our experience with similar forms of help (without the proposed exam analysis tool and feedback) in the basic Calculus course shows that about 10 – 15% of the students take advantage of this extra opportunity for help. Here we expect around 100 students. The students of the courses 2WF20 and 2WF40 are mainly students in mathematics. We can (and do) approach them personally. This will almost certainly increase the participation in the extra tutor/instruction meetings.

## 5 Deliverables

Within the project we envision the following deliverables:

<b>Deliverable</b>	<b>Description</b>
Tool for analysis	spreadsheet
Manual for tool for analysis	document
Tool for informing students	software
Manual for tool for informing students	document
Analysis of exams	document
Analysis of resits	document
Evaluation and end report	document