

E-homework with individual feedback for large groups

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Status quo and prior experience

- Up to 1600 students per course, i.e. up to 1000 active students/exams
- hardly any individual feedback for students and teachers about students' performance during the semester
- few students actively participate in lectures
- several bachelor programmes (economics, business administration, social sciences)
- very different prior knowledge and heterogeneous abilities of the participants
- various learning levels, e.g. beginners mixed with higher semesters



Status quo and prior experience

- students started studying only a few weeks or even days before the final exam
- final exam: high failure rates and low grades in some groups
- Earlier trials on homework and mid term exams with bonus points:
 - labour intensive correction of submissions
 - students copy homework from their fellows



Our e-homework project with STACK

Two year project „Individuelle E-Hausaufgaben mit sofortigem Feedback“ funded by central QVM of University of Cologne

- Prof. Dr. Jörg Breitung (project leader)
- Dr. Christoph Scheicher (project coordinator, lectures mathematical methods)
- Dr. Julia Fath, Prof. Dr. Oliver Gürtler (lectures microeconomics)
- Dr. Bastian Gribisch (lectures descriptive statistics)
- Prof. Dr. Rainer Dyckerhoff (lectures statistical inference)
- Philipp Hansen, Tim Umbach (STACK question programmers)
- Marc Kusserow (head of CCE, system administrator)
- Mario Josupeit, Eva Mix (CCE, support, STACK training courses, manual STACK for ILIAS)
- some student assistants



Our e-homework project with STACK: contents

Contents of our project:

- Implement e-homework in five first and second semester courses (Mathematics, Microeconomics and Statistics)
- Programming STACK assignments
- Support and some further development of STACK

Why STACK?

- students collaborate to find ideas for the solution
- difficult to cheat, because of different random numbers
- students already work during the semester
- easy feedback for and from hundreds of students

Further information (in German): <https://www.portal.uni-koeln.de/13398.html>



New teaching concepts with STACK

Mathematical Methods for Economists (Scheicher) summer term 2018:

- lecture
- 14 weekly, voluntary STACK e-homework with following sample solutions
- STACK exercises partially replace classroom exercises, i.e. the easier examples become e-homework, more time in classroom for the more difficult exercises
- tutorials in small groups



New teaching concepts with STACK

Mathematical Methods for Economists (Scheicher) as of winter term 2018/19:

- additional weekly e-homework with bonus points
- 13 tests, about 5 questions each, online Thu. 7.30pm to Mon. 7.30am, 42 attempts per test, best attempt counts
- students should repeat the lectures and practise successfully, no matter how many attempts they need
- direct feedback what is wrong and right,
- sample solution afterwards,
- random numbers make cheating difficult.



New teaching concepts with STACK

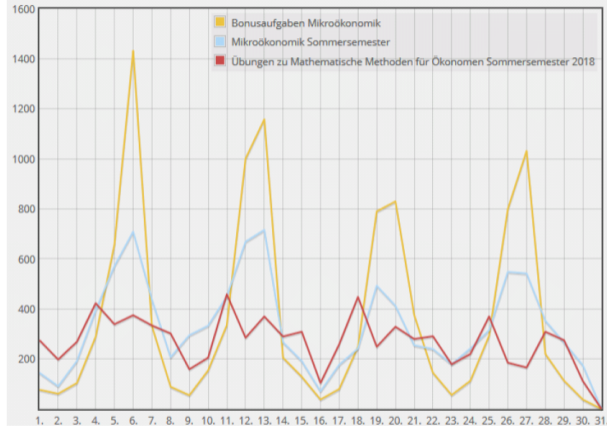
Introduction to Microeconomics (Fath) as of summer term 2018

12 units, each:

classroom lecture (large groups)	→	online exercise (STACK) classroom exercise (small groups)	→	e-homework (STACK) with bonus points, one attempt	→	final classroom exercise
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First experiences: User traffic (June 2018)

Juni

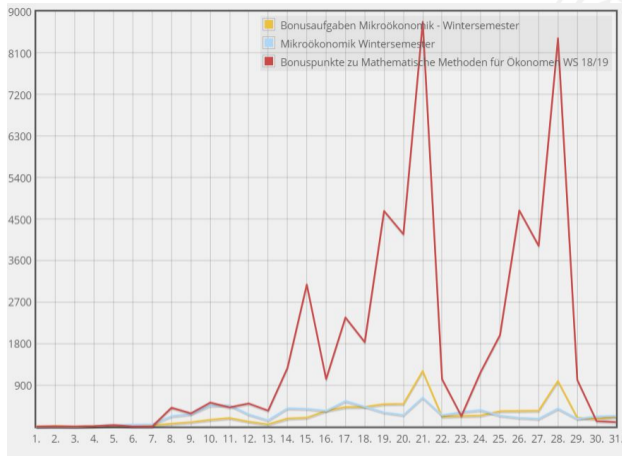


500 students per course, exercises...

...in Microeconomics with bonus points for the final exam (yellow) and without bonus points, no limits of access (blue)

...in Mathematics without bonus points and paper solutions (red)

First experiences: User traffic (October 2018)



500 active students in Microeconomics with bonus points for the final exam (yellow) and without bonus points, no limits of access (blue)

1000 active students in Mathematics bonus points, max. 42 attempts (red)

First experiences: This week's questionnaire, 1006 participants

1. I do my e-homework. . .
35% on my own, 53% first try on my own, then ask other students, 10% with my learning group, 15% with online help and social media, 2% others
2. If I need help I ask/look at. . .
76% the slides, 7% the textbook, 2% the lecturer, 54% other students, 59% the internet, 4% others
3. I do my e-homework
76% always, 12% often, 7% sometimes, 4% rarely, 2% never
4. If there were no bonus points, I would do. . .
4% more e-homework, 22% no difference, 74% less e-homework



First experiences: This week's questionnaire, 1006 participants

- 5a. Do you like bonus points model? 96% yes, 4% no
- 5b. 'Bonus point models influence my learning behavior.' 83% yes, 17% no
- 6. How does it influence your learning behavior? (no predefined answers)
more regular learning 58%, more motivation 15%, more learning/understanding 12%
- 7. How can we improve e-homework technically and substantially? (no predefined answers)
simpler input 16%



Conclusion and further developments

- E-homework with bonus points triggers active participation in the other (online and classroom) parts of the same course and therefore improves continuous learning
- As a consequence, bonus points in Mathematical Methods were introduced this winter term.
- Many students are well prepared for the lessons, participate more actively and give much more questions and feedback.
- E-homework therefore might be a good precondition to introduce inverted classroom elements in large groups
- Further investigations of the effect on final grades and failure rates.
- E-exam with STACK?



Thanks for your attention!

Please do not hesitate to contact us:

- Project coordinator and maths:
- Microeconomics:
- STACK question design:
- STACK support team:
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