### Report 4tucee PROJECT: Blended learning *improves* workload, feedback, and students’ motivation in USE courseS.

**Short Description**

The USE courses (the [USE basic course](https://educationguide.tue.nl/programs/bachelor-college/basic-courses/use-basic-course/) and the [USE course sequences](https://educationguide.tue.nl/programs/bachelor-college/use-learning-trajectory/)) at Eindhoven University of Technology (TU/e) make students aware of, reflect on and model User, Society and Enterprise aspects of technologies. Some of these courses received lower-than-average student evaluations in 2015-2016. Students indicate that they are less motivated in the courses and spend less time studying. Students’ engagement seems low, impeding the courses’ efficiency.

One countermeasure is a project on peer feedback via blended learning to increase students’ study time, perception of relevance and motivation. Alongside workload increase, we want to see if peer feedback can partially replace tutor feedback in order to decrease the tutor workload without losing rigor.

We applied our project to two courses.

* In their first year, students take a USE basic course (USEb) on ethics and history of technology. This 8 week 5 ECTS course is provided to almost 2000 first year students in 8 lecture groups and 32 tutorial groups. They make an assignment in groups of 3.
* The *Decision under Risk and Uncertainty exploratory course* (DURU) is an 8-week course for 150 2nd and 3rd year students providing a multidisciplinary perspective on risk and decision making.

In the ***USE basis course***, tutorial meetings were increased between the 2015 and 2016 version from 1 to 2 hours a week and the per-group student number reduced from 5 to 3. Four small separate assignments were merged into a single larger assignment to enable students to incorporate feedback in ongoing work.

Students receive explicit written information on how to give feedback. Peer feedback is only briefly introduced in the tutorials. Students have to describe how they interpret a particular contribution of a peer. They have to use the rubric to judge the grade of the peer. And they have to propose what their peers can do to improve their work to a higher grade. Students post ongoing work in a wiki where peer groups can give their feedback. Due to time constraints, this was neither explained nor practiced explicitly during tutorials.

In the ***DURU course***, in both 2015 and 2016 there were feedback sessions in which students assumed the role of peer reviewers and commented on others’ group assignment. In 2015 students were explicitly asked to give at least one comment in those sessions, but were not guided how to do so. Students received a grade for asking a question. After the session, peer reviewers provided more detailed written feedback on argumentation and use of scientific sources. This was used by the instructors as extra qualitative feedback, but there was no opportunity for students to improve or respond to this feedback.

In 2016:

* The topic of the group assignment was more open.
* Group members had individualized roles in the assignment. Final grades were partially based on individual work, partially on group work of 4 students.
* Students received a more extended rubric and a full tutorial session on giving feedback and why. They were asked to *grade* the peer group’s interim work by means of the detailed rubric. They had to precisely mention “In your paper, you write X”, according to the rubric, this is a Y. You could improve this part if you do Z”
* Students had to prepare their feedback for a feedback meeting in which the group presented and the peers gave their feedback. This probably helped them to improve their individual written feedback.
* Every student had to give 2 extended feedbacks. As such, every group of 4 students received 8 feedbacks from different groups. Assuming that some feedbacks are better than others, on average every group received some decent feedback from their peers. Tutors did not give interim feedback.
* Students also had time to revise their work based on the feedback.
* The feedback was not anonymized.
* The feedback was done on OASE. Grades were collected with survey monkey as work around.

**Objective**

In the beginning of the project, we formulated the following SMART goals for the basic courses on students’ motivation, tutorials and feedback.

1. Lean and in-depth feedback with blended learning for (very) large groups. (SMART goal: students say they have sufficient opportunity for feedback in the basic course =3.5)
2. High student motivation of TU/e bachelor students (SMART goal: students say to enjoy the course=3.5)
3. Student work load (compared to a course of 5 ECTS) fits the ‘ideal’ of 3 on a 5-lickert scale. If students score this question higher/lower, they consider the course too heavy/too easy.
4. The specific Agora system should be adapted and be used as input for the TU/e broad LMS in order to give much more in-depth feedback for very large groups.
5. Increased insight in blended learning to optimize the above outcomes.
6. The lessons learnt will be collected in a report. The results will be disseminated at 4TUCEE sessions.

**Evaluation**

As our data show, the USE basic course did not yet meet the *first objective* of sufficient peer feedback. Improvements in the DURU course made us achieve the goal. The results also indicate that students are not strongly in need of tutor feedback to know if they are doing well. This indicates that there is room to decrease the role of the tutor.

The use of peer feedback is not importantly linked with motivation. The motivation for the courses remains below 3.5. We conclude here that *objective 2* is not achieved. Other analysis (not shown here) indicates that there is little influence of peer feedback on motivation, slight on basic needs autonomy and relatedness. (Bombaerts and Nickel, 2017)

|  |  |  |
| --- | --- | --- |
| Question | USE b | DURU |
|  | N | M | SD | N | M | SD |
| I got sufficient peer feedback on how I am doing. | 634 | 2.94  | 1.13 | 82 | 3.65 | 0.89 |
| The peer feedback helped me to understand things better. | 633 | 2.67 | 1.10 | 82 | 3.61 | 0.97 |
| I used peer feedback to improve my assignment. | 630 | 3.15 | 1.15 | 82 | 3.95 | 0.98 |
| After the peer feedback, I am still in need of TUTOR feedback to know if I am doing well. | - | - | - | 82 | 3.10 | 1.00 |
| Did you enjoy taking the course? | 638 | 2.6 | 1.1 | 81 | 3.27 | 0.99 |

Table : Means (M) and standard deviation (SD) of USE basic course 2015-2016 and Decision under Risk and Uncertainty exploratory 2016-2017 course.

*The third objective*, increasing students work load, has been achieved. We had a significant increase of the workload in the USE basic course. The work load in the DURU increased as well. Discussions with students and the open questions illustrate that the feedback contributed (next to other course elements) to a significant increase in perceived relevance.

|  |  |  |  |
| --- | --- | --- | --- |
| Question | First design | After redesign |  |
|  | N | M | SD | N | Mean | SD | ΔM | p | d |
| Number of credits (5ECTS = 140h) corresponds effort USEb? | 585 | 2.70 | 0.77 | 634 | 3.00 | 0.87 | 0.30 | <0.001 | 0.36 |
| Number of credits (5ECTS = 140h) corresponds effort DURU? | 76 | 2.64 | 0.72 | 82 | 2.87 | 0.70 | 0.22 | 0.053 | 0.31 |
| Contributes to development engineer DURU | 76 | 2.74 | 1.20 | 81 | 3.35 | 0.91 | 0.61 | <0.001 | 0.57 |

Table : T-test differences between means (M) of USE basic course 2014-2015 and 2015-2016 and between Decision under Risk and Uncertainty exploratory 2015-2016 and 2016-2017 course giving mean difference ΔM, significance p and Cohen’s-d effect size.

Our next aim (*objective 4*) was to adapt the learning platform Agora and include it in the learning management system that was to be introduced. Since the introduction was stepwise, we agreed with the project manager to use another platform, the TU/e internal OnCourse system. OnCourse has no sufficient functionalities for student groups to grade each other. We decided to use wiki’s. This was not an optimal choice, since students did not like to work in the wiki’s because of technical specifications. We will continue the project to find ways to introduce the feedback in the current learning management system.

We gained more insight in blended learning to optimize the above outcomes (*objective 5)*. With the current systems, instructors do not experience that the current learning management system supports peer feedback very well. Instructors gain time from introduction peer feedback, but seem to lose it again in finding work arounds and doing administrative tasks that should be done by the LMS.

The lessons learnt are collected in this report (*objective 6)*. The results will be disseminated at 4TU.CEE sessions. The insights will also be present in more detail at conferences (see Bombaerts and Nickel, 2017; Bombaerts, Vaessen and Spahn, 2016). These elaborations also deal with the self-determination theory, motivational types and basic needs.

**Recommendations**

The peer feedback method seems promising to elaborate further. Students seem to accept and appreciate non-anonymized peer feedback as method. For USE basis, the peer feedback should be elaborated more. The smaller (150 students) DURU course gives ideas about the 2000 students course. For DURU, the peer feedback in itself is well organized. The USE basic course is of course different, dealing with first years and being a much bigger and diverse course. One could look for ways to integrate it in other learning activities that intrinsically motivate students more.

The current LMS does not support grading automatically. Idea is to develop this further. If not, part of the gain of the tutor work load (reading papers) is lost in doing administrative organizations. Since it is useful for the TU/e as a whole, this should be strongly supported.Short description of innovationThe content of the course is divided into small blocks. Each block is a separate topic which is supported by the computer programme.  There are homework assignments that the students have to do and it is always directly related to the theory which was taught in the course.  It is a small unit,  unit of one or two lectures, covering the chapters in the book. The system is open for reviewing  your own efforts. There is no extra bonus or extra credits for the final grade. However, we give credits to show students their performance. We have low threshold because we have found out from previous experience that only low threshold works. If a student finishes the homework with 35% – 40% it is enough to follow the classes and to stay in the system. This threshold shows that students do homework seriously with or without success. Below this threshold you can really see that these students drop out.The system is all about regular participation. The final grade is completely covered by a written exam. In addition to digital homework assignments we have also 5 times digital test. It is a small test which is administrated by a computer. It is not compulsory but all students take this test. I also stress out the importance of these tests to find out their weak points, where they miss some knowledge. They can see where to return and start again to fix the problems. We do these 5 tests we combine with a workshop. The students work on their assignments for an hour in the computer room. We walk between them and assist them with tips and tricks. They can ask questions, too. Then we start the clock and they can do 20 min. test. We want to show them after studying one hour in this way what they can do. If you don’t work in this 1 hour, if you don’t ask questions, you will lose this hour. This year we did this approach second time and it was better than the last year. We have chosen the topics that are really trouble for the students to help them.

**Sources referred to:**

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**For civil engineering mechanical education digital exams are used.**

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