Proposal for the TU/e Education Innovation Funds 2020/21

1. **Project title and details of applicants:** Corona transition and student learning: what works, what doesn't work, and what needs improvement?

Applicants:	Collaborators:
Dr. Uwe Matzat (HTI, IE&IS, TU/e)	Drs. Rian Zusterzeel (Teacher Support IE&IS)
Dr. ir. Ad Kleingeld (HPM, IE&IS, TU/e)	Drs. Lonneke Aalpol-Keeris (Teacher Support IE&IS)
Prof. dr. Chris Snijders (HTI, IE&IS, TU/e)	

2. **Background and justification of the project**

The Corona transition at TU/e led to an abrupt and very fundamental change in the form of teaching and student learning. All interaction has shifted to online. This has consequences for student learning and staff teaching that we should monitor closely and improve wherever possible.

There certainly are reasons to act now. We lack detailed knowledge about how students experience the new form of learning and what problems they face. A first TU/e student survey of courses at the end of Q3 suggests that many students did not feel well-prepared for their exams, given forms and content of online teaching as offered in Q3. This is likely only the tip of the iceberg of problems that we can respond to quickly if we have reliable and representative information. We don't know to what extent students suffer from issues such as a reduced learning motivation and engagement, how these problems relate to different forms of online learning, or to their housing situation (imposing constraints on learning), or to mental health issues because of feelings of isolation. Problems may accumulate during the next coming months with a potential downward spiral of reduced motivation, and the high failure rates that go with it. The existing monitoring measures (Q4 course evaluations, end-of-year curriculum survey) do not suffice (also see 3: outcomes).

Given these uncertainties about the educational consequences of the Corona-induced course changes, we aim to find out the following: **A)** To what extent do students experience drawbacks in their learning outcomes (including reduced affective and cognitive outcomes) as well as in their mental well-being. **B)** Which course elements and student characteristics (e.g., housing) relate to these undesirable outcomes and which elements relate to desirable outcomes?

We translate these insights into recommendations for educational adjustments. These may include avoidance of undesirable course characteristics ("do many deadlines, under the condition of home-learning, relate to increased feelings of test anxiety and burn-out?"), the provision of additional contacts with student advisors or teachers to specific groups of students ("do international students working in isolation feel overwhelmed, making them fail more often in the longer run?"), or the intensification of desirable course elements ("do many video-lectures lead to more student engagement?").

For measuring the educational consequences of the changes, we combine survey data of students, teacher interviews, and grades in specific courses with the corresponding Canvas data of the students, as the latter are indicators of behavioral changes that offer additional insights beyond the insights that surveys offer.

3. **Objectives and expected outcomes of the project**

A: Set-up an application of an "Educational alarm system" consisting of three types of indicators:

- *(1.)* (several types of) self-reported student problems in surveys: *E.g.: high proportion of students who report about reduced learning motivation and engagement: The faculty anticipates problems to show up and can plan arrangements.*
- *(2.)* Changes in learning behavior in Canvas: *E.g.: in addition to (1) high proportion of students with shortened Canvas login-periods: The faculty knows this has already behavioral consequences. High priority of quick reaction.*
- *(3.)* Changes in achieved learning outcomes (course evaluations, adjusted grades): *E.g. in addition to (2) a significant decrease of achieved learning outcomes compared to one year earlier. The faculty needs to learn from failure to prevent problems in future courses.*

B: Reports with recommendations on educational adjustments and student support + practical guidelines:

We analyze how specific student problems (e.g., reduced engagement, increased fatigue) relate to the characteristics of different types of online courses offered (course size, amount of synchronous student-teacher interaction, amount of individual student feedback, videos offered, Canvas elements offered [e.g., quizzes]), to the students' housing situation, or to other psychological issues. The reports provide recommendations on, e.g.,:

Which types of courses are sustainable (without adverse learning outcomes) in the long term?
Which types of courses are likely to have adverse learning outcomes and need to be adjusted?
Which course characteristics are related to undesirable and desirable learning outcomes and can the latter be transferred to various types of courses?
What kinds of student support are needed in which phase? For example, do students need more student buddies (to reduce isolation), more student-teacher interaction (to increase motivation), or more psychological support (to reduce mental health issues)?

4. **Project design and management**

The project consists of the collection and analysis of the following types of data. For all IE&IS Bachelor & Master courses we collect and then analyze:

1.) Questionnaire data, 2.) Student grades, 3.) Online traces of student behavior in the Canvas learning management system, 4.) Course characteristics (interviews with teacher and teacher support).

The enrolled students will be asked to complete questionnaires with regard to their housing situation, mental health issues, learning motivation, course engagement, and several other personal characteristics. In addition, Learning Analytics on Canvas log data will be used to create measures of their online behavior. These data (surveys, Learning Analytics) will be matched with student grades and information about course characteristics, and then anonymized. See the section on privacy and ethics further down the document.

Measures

Since we examine which types of educational activities are sustainable and which ones are related to undesirable learning outcomes and mental health issues, we measure course characteristics in detail.

Course characteristics (examples):
Course size, amount and types of online resources including videos and interactive quizzes, degree to which they allow for student discretion in determining their own paths through the course, amount of synchronous student-teacher interaction, amount of personalized teacher feedback, number of intermediary assignments and exams, type of final exam, etc..

Characteristics of students', their well-being, and their home situation (examples):
Study engagement, learning motivating, degree of self-regulated learning, learning goal orientations, academic self-efficacy, time management, depressive symptoms, fatigue, feeling of isolation, social contacts online and offline, contact with student advisor, technical and social restrictions for learning at home, demographic characteristics etc..

Privacy and ethics

The project will be conducted in line with the TU/e Learning Analytics Code of Conduct, the GDPR, and the standard ethical guidelines of the Code of Ethics of the NIP (Nederlands Instituut voor Psychologen). For managing access to the data and privacy considerations, we take into account the learning experience during the "Everybody's a winner?" project of Matzat/Kleingeld/Snijders.

Time frame of and activities within the project

The project lasts for one year: June 1st, 2020 – May 31, 2021. Since we propose a close monitoring of educational and mental health issues, we will deliver regular reports to the educational board and teacher support about the most pressing issues so that they can implement improvements. Together with the teacher support staff, we will regularly develop guidelines for educational adjustments and psychological student support.

Work packages:
Data collection Q3 2019/20 (retrospective): June 2020, 1st half
Data collection Q4 2019/20: June/July 2020
Data collection Q1 2020/21: Sep/Oct 2020

Data collection Q2 2020/21: Jan 2021

<u>Deliverables (see Appendix for complete overview):</u>
- continuous reports leading to guidelines for teachers and for student support per quartile

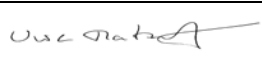## 5. **Dissemination and sustainability of the project**

The results of the project will be shared with a) the IE&IS teachers during IE&IS Educational Innovation lunches, b) with the educational board of the faculty, and c) with IE&IS teacher support to translate them into practical guidelines for blended teaching (also after the Corona crisis). In collaboration with the educational faculty board we will disseminate relevant findings to the educational boards of other faculties and support them to extend the monitoring to their students. For instance, we will offer to present to them our findings and conclusions, share survey materials, tools and routines to use the Canvas data, etc..

6. **Project budget**

Matzat, Kleingeld and Snijders will together design the surveys, combine the survey data and grades with the Canvas Learning Analytics data, guide the analyses of the resulting data set, and write the reports. An additional researcher will coordinate and monitor the actual survey data collection, conduct the data analyses, and support the report writing. A programmer will support the programming of the large number of surveys, the data administration, and the swift processing of the Canvas data.

	hours/year	hourly	amount/year	Total
dr. U. Matzat	80	65	5,200	5,200
dr. ir. A. Kleingeld	80	65	5,200	5,200
Prof. dr. C. Snijders	80	113	9,040	9,040
Additional researcher	1100	44	48,400	48,400
Student assistants	400	23	9,200	9,200
programmer			25,000	25,000
Vouchers survey participation			9,900	9,900
			Total	111,940

7. **Signing**

Dr. Uwe Matzat	
Dr. Ir. Ad Kleingeld	
Prof. Dr. Chris Snijders	
Prof. Dr. Tom van Woensel	

Appendix: Deliverables:

July 2020: Deliverable 1A: Express report on a) students' well-being, study engagement, motivation, and housing situation, and b) the relation between study engagement and motivation on the one hand and important course characteristics on the other hand (short-term effect of transition, Q3/Q4 data).

July 2020: Deliverable 1B: In collaboration with the teacher support staff: Guidelines and recommendations for potential educational adjustments to be taken into account for Q1 of 2020/21, to be distributed via Canvas and email to all teachers. If needed, recommendations for supportive actions to tackle students' mental health issues.

September 2020: Deliverable 1C: Report on relationship between course characteristics and student learning behavior on Canvas, using the Q3 and Q4 survey and Canvas data (short-term behavioral effect)

October 2020: Deliverable 2A: Report on a) students' well-being, study engagement, motivation, and housing situation, and b) the relation between study engagement and motivation on the one hand and important course characteristics on the other hand (mid-term effect of transition, Q1 data).

October 2020: Deliverable 2B: In collaboration with the teacher support staff: Guidelines and recommendations for potential educational adjustments to be taken into account for Q2 of 2020/21, to be distributed via Canvas and email to all teachers. If needed, recommendations for supportive actions to tackle students' mental health issues.

December 2020: Deliverable 2C: Report on relationship between course characteristics and student learning behavior on Canvas, using the Q1 survey and Canvas data (mid-term behavioral effect)

Feb 2021: Deliverable 3A: Report on a) students' well-being, study engagement, motivation, and housing situation, and b) the relation between study engagement and motivation on the one hand and important course characteristics on the other hand (long-term effect of transition, Q2 data).

Feb 2021: Deliverable 3B: In collaboration with the teacher support staff: Guidelines and recommendations for potential educational adjustments to be taken into account for Q3 of 2020/21, to be distributed via Canvas and email to all teachers. If needed, recommendations for supportive actions to tackle students' mental health issues.

March 2021: Deliverable 3C: Report on relationship between course characteristics and student learning behavior on Canvas, using the Q2 survey and Canvas data (long-term behavioral effect)

May 2021: Final Deliverable (Deliverable 4): Final report with educational recommendations for the long-term adjustments of the IE&IS education and student support, taking into account the TU/e 2030 strategy.