# Project Title and Applicants

**Title:** Automated personalized e-mail feedback to students with mailR

## Main applicant

Name, title(s) : **Chao Zhang, MSc.**

Position : PhD student

Institution : Technische Universiteit Eindhoven (TU/e)

Faculty : Industrial Engineering & Innovation Sciences

Department : Human-Technology Interaction (HTI)

Address : Postbus 513, 5600 MB EINDHOVEN; IPO, Room 0.19 Telephone number : 06-2479479

E-mail : [C.Zhang.5@tue.nl](mailto:C.Zhang.5@tue.nl)

## Co-applicants

Name, title(s) : **Dr. Daniël Lakens**

Position : Associate Professor

Institution : Technische Universiteit Eindhoven (TU/e)

Faculty : Industrial Engineering & Innovation Sciences

Department : Human-Technology Interaction (HTI)

Address : Postbus 513, 5600 MB EINDHOVEN; IPO, Room 1.33 Telephone number : 06-24613918

E-mail : [D.Lakens@tue.nl](mailto:D.Lakens@tue.nl)

Name, title(s) : **Dr. Karin Smolders**

Position : Assistant Professor

Institution : Technische Universiteit Eindhoven (TU/e)

Faculty : Industrial Engineering & Innovation Sciences

Department : Human-Technology Interaction (HTI)

Address : Postbus 513, 5600 MB EINDHOVEN; IPO, Room 1.30 Telephone number : 040-2474491

E-mail : [K.C.H.J.Smolders@tue.nl](mailto:K.C.H.J.Smolders@tue.nl)

The project team consists of three researchers from the Human-Technology Interaction (HTI) group at Eindhoven University of Technology, Chao Zhang, Daniel Lakens and Karin Smolders. We will receive assistance from the HTI technical staff (Lab manager: Martin Boschman) and one student assistant. The team has excellent teaching experience, as well as experience implementing new technological solutions to challenges in education, and has received previous grants to implement ICT innovations in teaching.

# Background and justification

Sending feedback emails to a large student group is a common educational task for many teachers. Often, it might be desirable to send personalized variants of an email to each different student based on the student’s personal data or study performance. The advantage of personalized feedback over one-fit-all feedback in educational setting is intuitive and was supported by empirical studies (e.g., Gallien & Oomen-Early, 2008). It is likely that students perceive such feedback to be more personally relevant, richer in information, and useful for social comparison (cf. Huguet, Dumas, Monteil, & Genestoux, 2001). Despite the potential benefits, sending personalized feedback emails is rarely applied by university teachers because manually adjusting email contents is not practically feasible - with the number of students easily exceding 200 at the TU/e a manual approach would take many hours. Indeed, personalized education is under stress with continuously growing numbers of students. Thinking about the benefits of personalized feedback, we explored possible solutions to this challenge. We found that the open source [mailR](https://github.com/rpremraj/mailR) package in the [R](https://www.r-project.org/) programming language might be an ideal tool to automate the work. This would allow us to generate a personalized report based on some data (e.g., grades, answers), generate a personalized word document or PDF file, and e-mail this file to individual students. The application of mailR is not widely known, and we have seen no applications of the mailR package to an educational context.

Although there are many technical solutions to automate emails, the real advantage of using mailR is its natural integration with the data analysis power of R. As the development of digital technologies in education, more and more data from students are collected and stored in digital forms. Moreover, student evaluation is now based on much more diverse information and criteria, including exam scores, professional skills, assignments, and peer reviews. By using mailR and other functions of R, a teacher can loop through a dataset with student names, emails, and performance data, to generate personalized results and then send the results to students in personalized emails. This is an efficient way to raise the quality of feedback for students without increasing the workload of teachers. We believe that this approach with mailR is worth examining in detail, testing in specific user cases, and spreading it to other teachers at the TU/e and 4TU. Some exemplar applications are listed below:

* Personalized feedback of exam results: As teachers now get MC exams in an excel spreadsheet, it is possible to provide personalized feedback of exam results to motivate students, potentially using average performance as a reference. Given the default data structure of scanned exams, we can create a single script every teacher at the TU/e should be able to use at the click of a button.
* Personalized requests to students: A typical teacher-student interaction is for teachers to remind students with certain tasks and assignments. It is possible to send different emails to students based on their relevant variables in the dataset. This personalized approach may increase compliance to the request. In addition, such personal e-mails can be used to contact students who have not performed an assignment, or scored a low grade, motivating them to complete the next assignment, or score a higher grade.
* Personalized feedback of experiment data: For many courses on social and behavioral sciences at TU/e (e.g., Introduction to Psychology, 0HV10), participating in studies/experiments is a common way for student to learn. It is desirable to provide feedback based on personal data in the experiments. With R and mailR, teachers can automatically analyze data, and send students individualized feedback.

# Objectives

The objectives of the project are threefold. Firstly, we plan to test the technical feasibility of the approach and to evaluate from the teacher’s perspective whether the intended effects and efficiency can indeed be attained. Secondly, we aim to evaluate the benefits of personalized feedback from the student’s perspective, e.g., whether it is perceived to be more relevant and useful, in a questionnaire. Thirdly, we intend to create more awareness and adoption of the new approach among TU/e and 3TU teachers by producing a step-by-step tutorial of using mailR.

# Expected outcomes

Two outputs are expected from this project. First, we will produce a step-by-step tutorial of using mailR to provide personalized feedback emails to students. This document will be shared on TU/e and 4TU websites. Teachers without much programming skills should also be able to perform the tasks easily. Second, we will report what we learn from our experience of using mailR in educational applications and the results obtained from the small experiment. The report will be shared internally and potentially as scientific publication.

# Project Design & Management

To achieve our goals, we will start by learning mailR and R Markdown by ourselves and trying out the idea in the context of the course Introduction to Psychology (0HV10). There are over 200 students participating in an experience sampling study as a course assignment. The idea is to use R markdown to produce personalized reports based on the data and to use mailR to send personalized emails. Once the first application is successful, we will attempt to make the workflow standardized to be able to easily share the code with other teachers. We will test the three exemplar applications listed above in three courses that the co-applicant Karin Smolders is involved in: OGO Quantitative Research, Sport Motivation and Sport Performance, and Psychology of Light and Time. One student assistant will help to incorporate a questionnaire in the courses to test the potentially beneficial effects of personalized feedback on students. Supervised by the grant applicants, the student assistant will be responsible for the design and analysis of the experiment. Finally, with the help of the student assistant, we will work out the step-by-step tutorial to be shared. The whole project is expected to take 6 months.

1. **References**

Gallien, T., & Oomen-Early, J. (2008). Personalized versus collective instructor feedback in the online courseroom: Does type of feedback affect student satisfaction, academic performance and perceived connectedness with the instructor? *International Journal on ELearning*, *7*, 463-476.

Huguet, P., Dumas, F., Monteil, J. M., & Genestoux, N. (2001). Social comparison choices in the classroom: Further evidence for students' upward comparison tendency and its beneficial impact on performance. *European journal of social psychology*, *31*, 557-578.