Progress Report EEMCS Quality Agreements

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History

2018

In response to the request of the Ministry of Education, Culture and Science (Dutch: OCW), the University of Twente developed agreements on the quality of education (Dutch: kwaliteitsafspraken). These so called Quality Agreements will be effective until the end of 2024.

In line with the above mentioned process, in 2018 EEMCS was expected to: (i) come up with actions to improve the quality of education financed with the WSV money (Dutch Wet StudieVoorschot) and (ii) to develop a long-term Quality Agenda (2019-2024) in which the vision on educational quality is given and the relation to the OCW themes is made explicit. Especially for the years 2019-2021, the Quality Agenda should be explicit and measurable, whereas for the years 2022-2024 the description may have a more global character.

For the Quality Agenda it was required to specifically identify how the proposed actions from EEMCS connect to the six themes prescribed by the Ministry of Education (intensity of education, study success, differentiation in education, teacher quality, guidance of students, educational facilities). In addition to these six themes, the UT formulated five programmes in line with the educational vision of the university: 'learning facilities', 'community building', 'teaching professionalization', 'talent development of students' and 'global citizens'. The proposed actions from EEMCS should also connect to these five UT programmes.

In line with the UT-approach, the individual degree programmes at EEMCS started a dialog with staff and students about the quality of the programme. The results of these discussions were collected at the faculty level, resulting in the improvement agenda 2018. This agenda was approved by the Faculty Council. In the course of 2018, the investment agenda for 2018 was translated into a quality agenda for the period 2019-2024, the emphasis of EEMCS was on the UT-themes of community building, learning facilities, teaching professionalization and talent development.

2019

As the available money for 2018 was not fully spent, the Programme Committees were asked to formulate additional plans to the amount of 269k Euro and these plans were collected in June 2019. At the same time in June 2019, the board of the university received a letter from the NVAO (Accreditation Organization of the Netherlands and Flanders). In this letter, the NVAO explained how they will assess the Quality Agreements. At that time the NVAO already visited 23 institutions, some of which unfortunately received a negative review. Based on this, the board of this university asked the faculties to specifically elaborate on:

1 How the investments specifically contribute to an increase in the quality of education. (It should be clear that investments concern additional or new measures).

2. What measurable and assessable results the faculty wants to accomplish by the WSV money and how the faculty intends to invest the money during the whole period of the quality agreements (until 2024).

This deviates slightly from the original idea that making the plans for the Quality Agreements should be *completely a bottom up process*. Obviously, there were consequences for the plans we formulated before (in 2018). Plans that did not entirely meet the above boundary conditions will be realized from our regular budget for education, rather than from the budget for the Quality Agreements. On the other hand, the additional plans for 2018 that met the above conditions better than the original ones, were inserted in our Quality Agenda for the years 2019-2024. Also from the wish list from the Programme Committees (& Student Associations), we selected a few common items that also fit well in the strategy of the faculty and that met the NVAO conditions for the Quality Agenda. Based on this all, we formulated ten measures for the EEMCS Quality Agreements.

For more information: https://www.utwente.nl/en/eemcs/educational-quality/qualityagreements/

The 10 measures: their progress up to and including 2020 and to do's for the coming year.

Measure 1:

Create additional project rooms, well equipped, including technical support staff & education support staff.

EE-lab

Intro/purpose EE-lab: Experimental and lab work is essential in the training of Electrical Engineers. The large general purpose lab needs to be upgraded with novel, robust equipment including remote date collection. In parallel we want to provide the students with equipment that allows them to execute labs/projects at home. Combined purpose: higher level of realized learning outcomes and more challenging/engaging education.

Results EE-lab: Regular lab room (W-zaal) upgrade realized. We also set up a dedicated lab (CR2531) with advanced soldering equipment. This room is for advanced projects, BSc/MSc-assignments and for projects via the study association.
In search of a new staff member to fill the 0.5 FTE budgeted for lab technician, we have outsourced some of that work to temporary staff.
Student home labs realized on the MYDAC (until 2020) or Analog Discovery2 (start2020) platforms.

To upgrade the education in several of the bachelor modules and master courses we have invested in :

- Software define radio (SDR) modules (radio that is transmitter and antenna at the same time) 15 ADALM Pluto modules for the use in several bachelor modules for EE and AT and a small amount of higher end SDR systems for dedicated master courses (HackRF). The frequency and modulation can be defined.
- 20x Arduino MKR Vidor modules used for a large integration project in module 11 enabling implementation of several FPGA and DSP aspects into the project. This increases the complexity that can be achieved in the project (within the given time boundary conditions).
- Analog Discovery 2, a platform used for labs and projects for home labs being able to act as function generator and measurement device with students own laptop. This is new starting academic year 2020 accompanied by a socalled EE-kit. For training purposes of the Teaching Assistants we have invested in 15 extra AD2 devices. These will also be used as well to be on loan to non-EE students e.g. minor and exchange.
- MiniVNA Tiny, devices to measure impedances and signal transmission (socalled 2-port S, Y and Z parameters to be used in a range of electronics courses throughout the program EE (AT M5, EE M3, AT M7, EE M4, MSc courses).
- 300 Wacom drawing tablets (for students to facilitate online communication with teachers).
- 20 iPads (pool for teachers and teaching assistants to provide good feedback).
- microphones (pool for staff to improve quality of video and micro lectures lectures).
- FPGAs, programmable chips (field programmable gate arrays) that are an essential element in digital hardware education (Module 5 of EE to facilitate digital hardware project in a (partial) online setting.

To do EE-lab: EE still needs a lab manager to ensure that the lab character remains also during non scheduled class hours. This will enable us to have more dedicated equipment on loan or for use under supervision (mini VNA, pluto). This will also enable expansion to more advanced methods (like

PCB design and use) and will enable that students re-use all the previously obtained skills in every subsequent project.
One of the tasks of the lab manager will also be in the continuing academic skills line with regards to group dynamics, training and supervision of teaching assistants and maintaining lab discipline

HMI-lab

Intro/purpose HMI-lab: It is important for the further development of I-Tech to have a well-equipped lab for our students, with a labmanager who is able to provide the students with advice when needed for their projects. Well-equipped also means that we need to invest continuously in new technology, as to provide our students with a challenging environment, up to par with recent standards.

Results HMI-lab: We hired a labmanager, he started per September. He is currently busy getting to know the people, and will present himself and the lab as part of the course Foundations of Interaction Technology. He has also come up with a list with additional technology to buy.

To do HMI-lab: Acquire new technology, develop a little infrastructure for lending technology to students, appoint a student dreamteam to support the labmanager, but also to support the student population.

Data Science Lab

Intro/purpose Data Science lab: The purpose of the data science lab is to allow students, graduates and Postdocs to work part time for different organizations on exciting projects, supervised and managed by data science researchers.

Results Data Science lab: The data science lab has been started in October 2019 by creating an access point for companies to get in touch with data science researchers. A researcher has been hired as director of the lab, to act as first contact point, to perform part of supervision of students and to execute some of the projects. A website (https://www.utwente.nl/en/eemcs/datasciencelab/) has been constructed.

To do Data Science lab: So far, no projects have been initiated through the lab. A single request from a company has come in through the website, but this did not result in a project. Currently, the purpose as well as the organizational form of the lab are being evaluated. Some of the key aspects that are evaluated are: relation to other labs and initiatives at UT, support from staff to be involved in projects, the needs from companies.

Measure 2:

Video lectures at EEMCS

Intro/purpose: The purpose of this project is making the best of video lectures at EEMCS. A video lecture is the recording of a lecture. This will take place in a standard/usual lecture room while the lecturer delivers the lecture as normal. Video lectures are usually used to support students, enabling them to revisit a lecture if they didn't grasp something first-time around or if they were unable to attend.

At the start of the project the video lecture were not intended to replace the live lecture for students, but would be a complementary service to students. Due to Covid live on campus lectures were not possible and therefore many lectures have been recorded because there was no other option. Not in a lecture room, but behind a computer/laptop. Sometimes using a webcam and slides/text, sometime only with slides/text and audio.

Results:

- Many recorded weblectures for students (more than 70%)
- Some video lectures contain interaction, like voting and working on small assignments in breakout rooms and/or chat to ask questions. Some video lectures are without any interaction (especially for large students groups).

To do:

- Researching the question "What did students learn from watching the video lectures?", what kind of video lectures do they prefer and what are the corresponding reasons.
- Find out the quality of video lectures, are they re-usable from the perspective of teacher and student.
- Look for a good platform to store videolectures.
- Find out how to make *attractive* online lectures, perhaps offer additional courses for lecturers.
- Invest in combinations of online education and education on Campus (a group is present on Campus and the remaining students are present online: how to organize it in such a way that the learning outcome is optimal for all?

Measure 3:

Micro lectures in math-line.

The goal is to produce micro-lectures (small 2-10 minute lectures, pencasts and screencasts)for the math line. The micro-lectures are provided to students as extra learning materials. This means that students can follow the weekly 'normal' lecturers as well. Due to Covid 'normal' lectures were replaced by online lectures and microlectures.

Results:

- One teacher did the microlecture training at the UT.
- The teacher recorded approximately 20 microlectures for the first 3 weeks of Q1, Introduction to Math
- Two teachers created microlectures and pencasts for the next weeks (4 -7)

To do:

- Researching the question "What did students learn from watching the microlectures?" and what kind of microlecture do they prefer, helps them with grasping the math topic. Do the micro-lectures engage students?
- Are there any active learning strategies incorporated in the micro lectures? What is the opinion of teachers and students on the integration of those kind of learning strategies.

Measure 4:

Hire additional technical staff to develop software that will be used for digital testing and programming education. This support staff will investigate available tools and integrate them in programming education.

Intro/purpose: The Bachelor of Technical Computer Science, in particular with respect to (but not necessarily limited to) programming education, depends on support software to administer and regulate the teaching process. Given the number of students involved as well as the dedicated nature of our educational model, this is not available off-the-shelf but needs to be developed and maintained by technical staff especially hired for this purpose.

Regarding digital testing: this is now an indispensable part of our education, which will only become more crucial in the near future. Not only the creation and administration of tests but also automatic assessment are topics that need to be addressed, and which require more investigation and development.

Results: Software developers as well as students have been employed for the development and maintenance of various systems, such as Horus, Hathor, Seshat, Maat, a project showcase web site, and a challenge-based learning system. The benefits have already been shown within the entire faculty EEMCS.

To do: Software support is a continuous process which needs to be secured for the future, to make sure that needed functionality can be integrated and the current systems can be maintained.

With respect to digital testing, the extended use of Remindo (in particular to enable the inclusion of sketches) and the adoption of CodeGrade (for automatic assessment of code) are being investigated.

Measure 5:

Hire additional staff for programme coordination/ Teacher support for modules

Intro/purpose:

- Analysis shows that the EEMCS coordination for the Master is too limited. Extra coordination will lead to more support for teachers and students. Teachers will have more time available for individual contact with students. Due to Corona this was even more important than we could realize by then (2018)
- Teacher support for modules means that a module gets an extra (non-)technical person to do all the administrative work (1 fte).This in order to give the teacher more time for students.

Results:

- Additional capacity for programme coordination (1 fte). Realised per 2018 and budgeted till 2022.We did hire additional staff (1 fte) for MSc-programme coordination.
- Guidance, teacher quality and intensity is improved. Realised and also evaluated as being successful. EEMCS actually expanded with an extra 1.4 fte. Each programme has his own dedicated module support person.

To do:
As education is changing therefor education support should be flexible to better support the programme management. Due to Corona we learned that we should invest in additional fte in regard to E-learning. This will be investigated further the coming year.

Measure 6:

Professional mentoring of students

Electrical Engineering

Intro/purpose: The goal is to formulate a flexible academic skills line which could be adapted to the needs of the educational programme; to better support students in order to develop academic skills; high responsibility of students to show growth in academic skills; to train mentors to maximize the learning results of the students; to help students getting familiar with our education system, culture, finding all resources they need.

Results:

- Within the EE curriculum the current skillsline is being researched and gaps are being identified. The aims of the educational programme EE related to academic skills are compared to the 'academic skills' learning objectives of the bachelor programme. Mandatory and facultative academic skills are being identified.
- Meetings with moduleteams have taken place.

To do:

- Next step is to make clear the vision on how to learn and master these academic skills.
- To visualize the academic skills line for students and teachers: where in the curriculum can students practice these skills and where in the curriculum are skills being assessed.
- Further research on the role of (student)mentors.
- Further research on the implementation of a portfolio to show progress on academic skills.
- Develop concrete learning activities related to the learning and improvement of academic skills for students .
- Develop a training programme for mentors and teachers to guide students to improve their academic skills

CreaTe:

Intro/purpose: Within Create we have a full-fledged professional development learning line included in the curriculum (with EC's attached). 1,5 years ago we made a change in staffing: hiring professional mentors for this, and not scattering the mentorship across a wide variety of people.

Results: The new organization of professional development has led to more professionalism, more unity amongst the approach to mentoring, and to better coordination of professional development. We now also have better opportunities to respond to student wishes, such as guestlectures by alumni, workshops on e.g. giving and providing feedback etc.

To do: In the future we need to invest further in additional workshops and creating opportunities for our students relevant for their future as creative technologists.

Measure 7:

Student assistants with educational competencies.

Intro/purpose: The main goal is to improve the quality of guidance of Teaching Assistants during tutorials and practicals and at the same time to increase the amount of teaching time of the professor. For the Teaching Assistants it will be beneficiary to develop educational competencies and also to develop professional relationships with staff that could benefit future success.

Results:

Although this EEMCS project officially started at October 2020, we already have some results because we gave it high priority as a Faculty and because it became clear that also the Faculties of TNW and ET have a similar interest to work on this matter. EEMCS did some research in regard to the current problems experienced by Teaching Assistants and we had a talk with the educational commissioners of the study associations. We designed a pilot training but had to cancel it because of the Corona Lockdown this spring. Luckily TNW had started a small-scale pilot before Corona with a group of what they called 'Learning Assistants', which eventually received a certificate from the Rector after finishing the programme. Currently CELT is offering a renewed version of the DISA training on demand and there are already students from AM and TCS participating.

To do:

-A new design for the 'Learning Assistants' for the Faculties of TNW/ET/EEMCS has been promised this summer by CELT/TNW. We have to see if this fits our demands as a Faculty and otherwise we have to develop something fit for EEMCS.

-As it is important to have a pool of well-prepared 'Teaching Assistants' to reach high quality in the guidance, it is also important that professors know who is available and students can mark their availability and preferences. For that purpose we will investigate the possibility of a registration tool.

Additional activities linked to this measure (to do):

- In the original plans in 2018 it was agreed with the study associations to support some courses for professional (soft) skills and competencies. The study associations came up with a plan for those courses and the faculty provided the financial support for this. Because this was considered a success from both sides, we would like to continue this cooperation with the student associations. The student assessor of the faculty board will come up with a plan for the academic year 2020-2021, in close cooperation with the study associations.
- Linked to the degree programmes there are student and teacher committees for the organization of the panel evaluations for BSc modules and MSc courses. The students in these committees will be offered a training for these activities. A good feedback quality assurance instrument will improve the quality of education. We will work together with CELT on this and offer a training (e.g. one afternoon) to reflect and improve skills even further.

Measure 8:

Stimulate professionalization of teachers

UTeachers'Academy@EEMCS

The objective of the UTeachers' Academy is the continuous improvement of the quality of education to increase student satisfaction and increase value of and reward employees dedicated to the professionalization of their teaching practices. Rewarding for teaching practice extends to the possibility to be promoted to the

next level, be it associate professor or full professor.

Results:

- A network that consists of 10 teachers with different UFO profiles (Docent, UD, UHD, HL)
- Several discussion-sessions with the participants of the UTeachers' group
- 4 Plenary hands-on sessions for all EEMCS teachers
- A start is made with 'Small groups' of teachers working on a specific topic (mentoring new employees, Blended Learning, etc.)
- Participants were invited to write and work on concrete plans to blend their course/module. 3 teachers are working out their concrete plans, 1 is orienting on possible and relevant ideas to improve the learning of students by using the blended learning concept. Teachers can free up time by hiring a PhD student who can take over some of their (educational) tasks.

To do:

- Give more publicity to the UTeachers' Academy
- Expanding the network with a few more teachers (approximately 15)
- Evaluating results achieved by the network

Measure 9:

Additional training facilities for teachers

Intro/purpose: It was our ambition in 2021 to have per year on average two staff members enrolled in the LOL programme (Dutch: Leergang Onderwijskundig Leiderschap), two staff members enrolled in the SUTQ traject, and one staff member enrolled in the SQE traject. The effect of this will be that students experience a professional educational environment.

Results:

- The LOL programme is mainly a course for (beginning) Programme Directors to develop their educational leadership even further. The last couple of years a lot of our Programme Directors already finished the course and currently (2020) CELT is offering a UT version of it. In this course, three recently appointed programme directors will participate.
- The SUTQ (Senior University Teaching Qualification) is the follow up of the UTQ (University Teaching Qualification) which all our teachers must obtain. The SUTQ fits in the UT policy of continuous development of teachers and during the SUTQ the teacher does a project to improve and/or innovate the own educational practice. The last couple of years several of our teachers participated in the programme

To do:

-Stimulate further participation of future Programme Directors, our lecturers and members of the Examination Board in the programmes and trajectories. As a result of the additional workload for our lecturers due to Corona it remains to be seen if we will reach the goal for the coming year but so far it looks good.

Measure 10:

Development of international curriculum in our Bachelor and Masterprogrammes

CreaTe

Purpose: Within CreaTe we want to educate students to become global-minded professionals, professionals who not only understand various cultural differences that may exist between people coming from various backgrounds and with various nationalities, but we also want them to be able to analyze challenges from an intercultural perspective, and coming up with solutions accordingly.

Results: We have developed, in close cooperation with an external consultant a set of tools to foster Intercultural Readiness, to make students aware of the topic, but also provide them with tools to reflect on the aspects of interculturality in teams, and create solutions with an open eye towards the global goals, and global differences in how to approach them.

To do: Invest further in these workshops, measure the effects.

Applied Mathematics

Purpose:

In the programme of Applied Mathematics, we are teaching in the setting of the "International Classroom". We want our graduates to be able to operate in an intercultural environment and apply mathematics in an international environment. We want to focus on incorporating different backgrounds and cultures in our curriculum, including designing projects where mathematical models and their applications are globally valuable.

Results:

Started out with a Project Team of five staff members. Team members attended workshops on "teaching in an international classroom" and "dealing with cultural differences". A learning line concerning intercultural competences is implemented in the curriculum. Plans are made for dressing up projects with a global character.

To do:

Improving and extending the learning line intercultural competences.
Designing projects having an international dimension regarding modelling approach and application.
Stimulate teachers to take part in workshops on "International Classroom".

Project Organization Overview

Responsible	**Stephan van Gils**
General Project Management	**Cynthia Souren**
Financial coordination	**Lucia Hans**
Projectmanager measure 1	Datascience-lab: **Jasper Goseling**
	HMI-Lab: **Alma Schaafstal**
	EE-lab (Welpzaal): **Cora Salm**
Projectmanager measure 2	**Karen Slotman**
Projectmanager measure 3	**Karen Slotman**
Projectmanager measure 4	**Arend Rensink**
Projectmanager measure 5	**Jolanda van Laar**
Projectmanager measure 6	**Karen Slotman**
Project manager measure 7	**Karen Slotman / Vacancy** Training on behalf of student associations: **student assessor FB**
Project manager measure 8	**Karen Slotman**
Project manager measure 9	**Karen Slotman**
Project manager measure 10	CreaTe: **Alma Schaafstal** Applied Mathematics: **Pranab Mandal (Jan Schut)**