1. Introduction

In response to the request of the Ministry of Education, Culture and Science (Dutch acronym: OCW), the University of Twente develops an agreement on the quality of education (in Dutch: kwaliteitsafspraken) in the Framework of the "Wet StudieVoorschot" (WSV). These so called Quality Agreements will be effective until the end of 2024.

In line with the above mentioned process, in 2018 the Faculty of Engineering Technology (ET) was expected to: (i) come up with actions to improve the quality of education financed with the WSV money 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.

The OCW themes are the following:

i. Intensity of Education: Relation and contact between teachers and students, small groups, creating communities;
ii. Study Success;
iii. Differentiation in Education: Talent development within and outside the curriculum, relevant education (relationship education and research, social impact, international and intercultural experience);
iv. Teacher Quality: Expertise and teaching skills, availability of and guidance by teachers, continuous professionalization, rewarding teachers' efforts, mutual sharing teaching materials end expertise.
v. Guidance of Students: Equal opportunities for students regardless of background or origin, learning how to study, proactive study guidance;
vi. Educational Facilities: Facilities to foster intensive and small-scale education, combination of physical and digital methods, future-proof facilities.

This report describes the action plans that ET has developed to improve the quality of education and how these plans fit within the educational philosophy of UT and ET, as well as the relation to the themes set by the Ministry of Education.

2. Context with UT and faculty

UT mission and quality agreement programmes

The UT mission is "High Tech, Human Touch". The UT educational vision is in line with this mission, and is translated into a UT-profile consisting of the following three elements: 1) Small-scale and interactive environment, 2) Entrepreneurial and 3) Crossing Borders.

The UT has formulated five university-wide quality agreement programmes, in line with its own educational vision:

1. Learning facilities
2. Teaching professionalization
3. Community Building
4. Talent development students
5. Global citizens

ET Educational philosophy and ambitions

The UT wide educational vision is further developed in the Faculty. The educational philosophy of ET can be characterized by the following three keywords: project-led education, bottom-up approach and a design and action-orientation, all three reflecting the entrepreneurial, interdisciplinary and interactive style of our education.

Firstly, The Faculty of ET has been at the forefront of project-led education for many years and has set the standard for other educational programmes at UT as well. Already in the 90's of the previous millennium the programme Mechanical Engineering implemented project-led education as the educational model. Project-led education is - so to speak - in the DNA of ET. Educational developments that took place at ET have always taken into account the project-based nature of education. Secondly, the fact that staff and students together shape this education; bottom-up, not top-down, is another characteristic of the educational vision that sets apart ET from other faculties around the country. Thirdly, educational developments have been always design and action-orientated. It is good to think before you act, but too many projects perish before they are implemented. Not so at the Faculty of ET, where designing solutions and "getting things done" is an important value. A good example of this, is the development of the joint Bachelor's programme on Mechanical Engineering with the VU University in Amsterdam. Within 1.5 years after this idea came up, it is implemented and already Bachelor's students from Amsterdam are flocking around the campus.

It is important that the awareness of the staff about project-led education, as well as a bottom-up approach of educational development and "design and action-orientation" is maintained and further increased. Awareness, therefore, plays an important role in the action plans as detailed in section 3.

The textbox on page 3 gives an impression of the educational culture at ET.

The educational ambitions of the Faculty are in line with the educational vision of ET. Summarized, the ambitions of the Faculty ET are to:

- Educate engineers of the future: Engineers who are global citizens and are able to acquire deep knowledge, apply this knowledge in a meaningful way in order to create innovative solutions for new complex challenges of the future;
- Stimulate development of T-shaped professionals;
- Stabilize the high inflow in BSc while maintaining our high quality of education;
- Increase inflow in MSc-programmes (by making sure that we do not loose BSc-graduates for wrong reasons, by attracting students from other universities (inside/outside NL) and from universities of applied sciences);
- Diverse inflow of students (at least 33% non-Dutch students);
- Graduation rates: 70% at N+1;
- Best programme compared to fellow programmes in NSE.

These ambitions are also reflected in the investment plan of ET for the Sectorplan Techniek.

The existing policy keeps in place:

- Keeping small-scale character of the programmes;
- MSc-programmes connected to research themes of the faculty;
- Stimulate students to develop their own talents (elective programmes in BSc and MSc, stimulate honour's programmes, other specific programmes in- and outside curriculum).

The relation between the UT profile, the Quality Agreement Plans and the ET Action plans is summarized in Figure 1. The action plans are also consistent with the educational vision and help to reach the ambitions of ET. Figure 1 also shows how the Action plans of ET fit into the themes that the Ministry of Education prescribed.
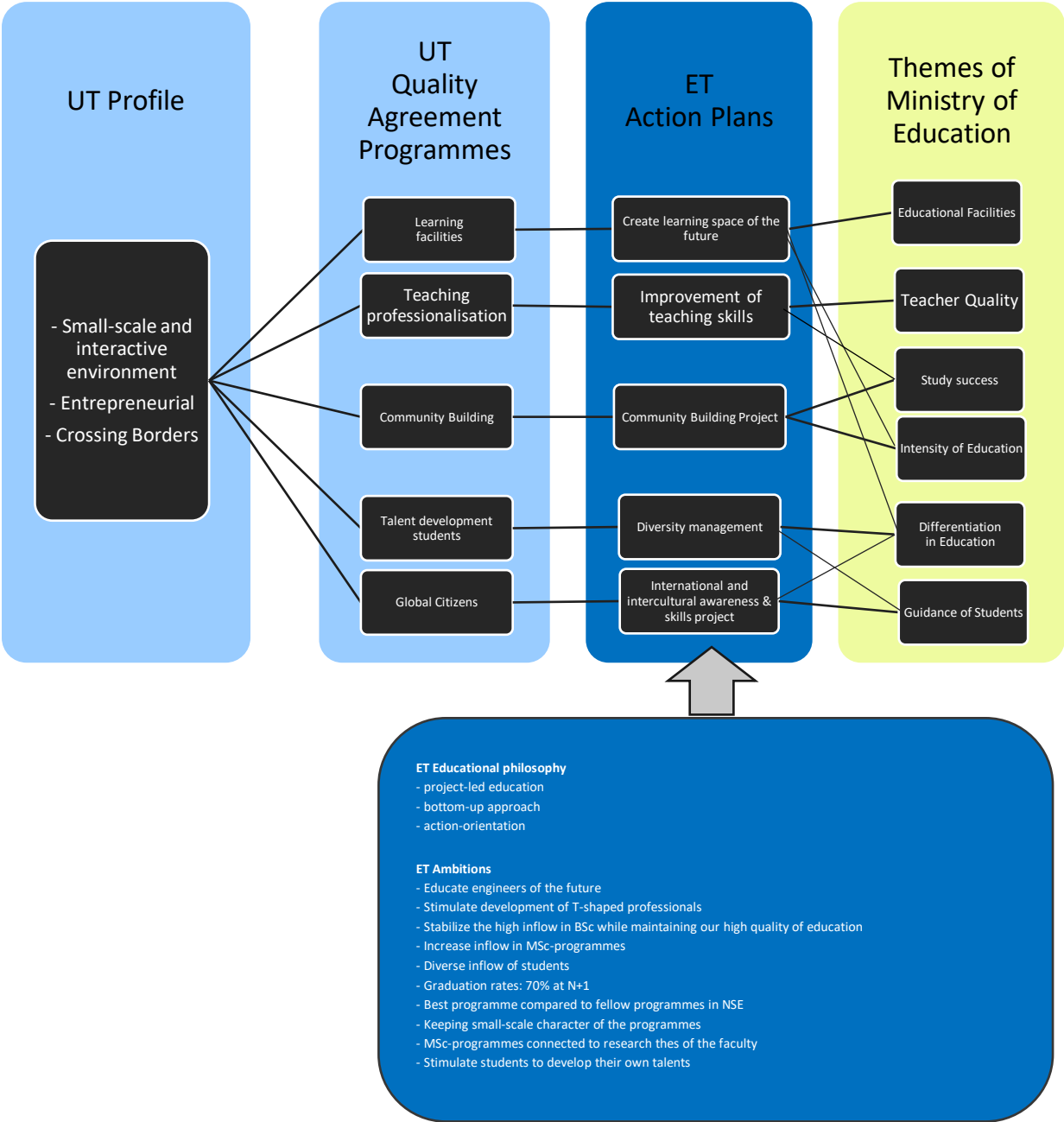

Figure 1. Relation between the UT-profile, the UT-wide Quality programmes and the ET Action plans. Also shown is the underpinning of the action plans by the Educational philosophy and Ambitions of ET.

An impression of the educational culture at ET

Interview with dr. ir. Farid Vahdatikhaki, Assistant Professor in Civil Engineering at ET and teacher of the year of the UT in 2018. Farid did his BSc in Iran, his MSc at the TU Delft, and got his PhD in Canada.

Farid:
"What is very striking about education at ET is, off course, the project-led education. Not the fact that the assignment of a course is a project – that can be seen at other universities as well – but how the entire course is project orientated. In the case of the BSc-programmes and the TOM-model (i.e the Twente Education Model), it is amazing to see that all courses are centered around a big project. With our projects, students are never left wondering: what is the use of this theory?

That said, we leave the project itself also very open, intentionally ill-defined. This stimulates creativity, innovative thinking and out-of-the-box thinking. Much is left to students to drive their own education.

And then we create a lot of feedback moments. By giving as much feedback as possible we give structure to students. This feedback takes place in the form of formative assessment. Whatever students submit during the project gets a dummy-grade, ie. this is the grade that you would receive giving the work done. The feedback gives students more clarity on what to do. Giving feedback in the way we do, means a lot of direct interaction between lecturers and students, which is really appreciated by students, but is also time-consuming. In order to give students this much attention it is important to maintain small groups, and small-scale education.

Most of the projects that students carry out are based on actual up-to-date cases. Moreover, every year an entirely new project is created. For example, we go the city-municipality and ask for a real problem. This gives students a lot of enthusiasm and motivation, since their solution might be eventually used to solve a real-life problem.

To work with projects means getting a lot of hands-on experience. Projects are design and action-oriented: students have to visit the site, do field observations etc. Eventually this leads to having more practical insights in how to solve problems. This is very much appreciated by the future employers of these students.

Another aspect of the courses at ET is their intercultural nature. Diversity is taking place at two levels: at the student level and at the staff level. International students have a different mindset, different ways of dealing with a situation. Both international students and staff bring in their own strengths, e.g. the foreigners' social perspective and the proactive perspective of the Dutch. By "marrying" those perspectives, students will be better prepared for their future (international) workplace.

Connections between education and industry are very strong and active. Take, for example, the currently 3D-printed bridge. The bridge has been produced by industry and is now being tested by ET. This follows a bottom-up approach: student groups are formed, (research) assignments are made by staff and students alike, to test this bridge in many different aspects. Students can make their wishes heard. The voice of the student is important and we act upon it in decision making."

3 ET Action Plans

The ET action plans are:
- Create the learning space of the future
- Improvement of teaching skills
- Community Building Project
- Diversity management
- International and intercultural awareness project

As explained in the previous section, all action plans fit in the ET educational vision and help reach our ambitions and faculty goals.

The Faculty ET structured their action plans according to five UT quality agreement programmes. See also figure 1. The action plans will now be described in detail.

LEARNING FACILITIES

Action plan: Create learning space of the future

Ambition: To create facilities that enable the small-scale character of our education with a lot of interaction; facilities enable competence of students to work in multidisciplinary teams; students get acquainted with state-of-the-art knowledge and technology

Context: This Action plan fits into the UT-profile: "Small-scale and interactive environment" as well as the UT-wide Quality Agreement programme "Learning facilities". It helps to fulfil the ministry of Education's theme "Educational facilities" as well as "community building". It also helps to fulfil the ET ambition to educate T-shaped professionals and keep the small scale character of the education. Lastly, this action plan perfectly fits the educational vison of working in projects.

To execute this plan and fulfill our ambition we need to: 1. Invest in additional teachers, 2. Develop a plan how the ideal learning facility should look like, 3. Invest in the learning space, 4. Recruit a e-learning specialist, 5. Do pilot projects and 6. Integrate digital technologies in learning. These measures are further detailed below:

Measure:
1. Investing in additional teachers (about 2.5 fte, i.e. about 0.5 fte per department). Student numbers are rising. This is a necessary measure, in order to keep our small-scale education small-scale as well as to manage project based learning.
2. Developing a comprehensive plan for ideal learning facilities. This plan is being developed at the moment. It focuses on extension of the Horst-building with integrated facilities for project-led education, practical workshops and flexible learning spaces. In addition, in collaboration with the facility manager of the faculty and with interactive input from teachers, students and study associations, plans are being developed on how to improve/extend existing learning spaces (e.g. more flexible lecture rooms, spaces to accommodate active learning methods and different types of education for different groups sizes, learning spaces for individual learning/self-study etc.). This measure is also related to the programme of Community Building, in which people as well as facilities play an important role. Budget-wise the realization of the building is not part of the Quality Agreements. However within the Quality Agreements we invest in specific facilities to facilitate learning (see also point 3)
3. Investments in learning spaces as developed in the plan (see measure 2). These investments are, amongst others: flexibles spaces, possibility of digital meetings with different stakeholders, Skype-facilities, the classroom of the future, visualization

technology, space-dividers to adjust spaces to the ideal working space, hybrid spaces that can be used for different purposes, e.g. conferences, design labs etc.
4. Investing in an e-learning specialist to support teachers to set-up digitalization in learning.
5. Pilot projects on digitalization in learning, such as digital testing, digitally supported peer-feedback, etc. The e-learning specialist will support/help teachers in these pilots.
6. Integrate digital technologies in learning. The e-learning specialist will support teachers in this. This may require additional facilities to facilitate e-learning. Some of them are already developed at the moment (e.g. facilities for digital testing in the NoordHorst).

Target until 2021: The investment in 2.5 fte additional teachers has been realized in 2018. Departments will keep this (limited) increased budget for additional teachers for the coming years. A more detailed planning of the building activities will be ready before 2021. Depending on the (UT-)planning of the extension of the Horst, building activities may have started in 2021. It will also be clear what adaptations to existing learning spaces are required and desired and which of those are possible given the budget and the physical limitations. This will include a planning of how/when the facilities can be adapted. Investment in an e-learning specialist to support teachers to set-up digitalization in learning has been realized as of June 2019. The intention is that this is a permanent position. In 2021 it will be evaluated if this position should indeed be continued. Pilot projects on digitalization in learning has been carried out – at least one in each cluster of programmes. Until 2021 at least one course/module in each cluster of programmes in which digital technologies are integrated in the course.

Intended effects for students: The taken measures will have the following impact on our students:
- A decrease of our student-staff ratio. Students will experience a (slightly) higher capacity amongst staff for education (in supervising project, getting feedback etc.)
- The students will experience a larger variety of, and more flexible, learning spaces, that are better aligned with the specific learning activities.
- Students will experience improved education because digital tools i) will enable a larger variety of teaching methods that are more in line with specific teaching activities and implemented in such a way that it fits with the intended learning outcomes, ii) will give teachers more time for personal contact with / feedback to students, because some aspects are handled digitally.

Budget:

	2019	2020	2021	2022	2023	2024
Ambition	**307**	**345**	**440**	**500**	**415**	**415**
- Measure 1	248	248	248	248	248	248
- Measure 2	pm	pm	pm	pm	pm	pm
- Measure 3			95	125		
- Measure 4	39	67	67	67	67	67
- Measure 5	20	30				
- Measure 6			30	60	100	100

Action plan: Improvement of teaching skills

Ambition: All teachers having the attitude to continuously improve their teaching. All teachers are familiar with and competent in student-driven learning and project-led education.

Context: It is important that the ET philosophy of student-driven learning and project-led education will continue to not only be part of the DNA of the faculty but it should especially be in the DNA of our staff. Improvement of awareness of project-led education and the skills of using this in the classroom, therefore, is paramount. We will request the Centre of Excellence in Learning and Teaching (CELT) of UT to make sure that ample attention is paid to project led education and student driven learning in the basic teaching qualification for new teachers (UTQ, i.e. "BKO") and in the Senior University Teaching Qualification programme (SUTQ). With this action plan we give new and current staff the opportunity to become (even more) familiar with the fundamentals of our educational philosophy and further expand their teaching knowledge and skills. Moreover, we will invest in didactic training of students (learning assistants programme) to give them some essential teaching skills and to make also them familiar with our educational philosophy of project-led education and student-centered learning.

This action plan fits in the UT Quality Agreement "Teaching professionalization", as well as the Ministry of Education's theme "Teacher Quality". Implementing the action plan supports our ET educational philosophy of project-based education.

To execute this plan and fulfill our ambition we need to: 1. Compensate teachers for time on professionalization, 2. Stimulate staff to participate in professionalization activities on education, 3. Develop educational career paths, 4. Support applying for educational grants, and 5. Setting up a learning assistance programme. These measures are further detailed below:

Measure:
1. Staff that are participating in a Senior University Teaching Qualification (SUTQ) programme, a Senior Examination Qualification (SEQ) programme and/or a Programme on Educational Leadership ("Leergang Onderwijskundig Leiderschap", LOL), will be compensated some of their time (i.e. about 0,2 fte) spent on these programmes.
2. Stimulate staff to participate in professionalization activities on education, e.g. lunch lectures, best-practices.
3. Develop career path for scientific staff with increased focus on education
4. Stimulate and support staff to apply for education grants
5. Setting up a learning assistants programme

Target until 2021: At least 5 staff members per year are participating in STQ, SEQ or LOL (compensation is available for 3 staff members in 2019, for 4 staff members in 2020 and for 5 staff members per year from 2021 onwards, i.e. about 1 fte compensation per year). We have organized at least four educational activities by (staff of) ET, e.g. lunch meetings organized by programme directors, educational meetings for professors organized by vice-dean of education, etc.). Each year at least 50% of the staff taking part in some sort of activity on professionalization of teaching (outside or inside UT; e.g. lunch meetings / workshops organized by CELT/4TU-CEE or by staff from ET or other faculties). We will have identified 5 potential staff members to follow a career path with a larger focus on education, and setting up a plan with them for this career path. The will be at least 3 staff members per year who apply for an educational grant (Comenius, 4TU-CEE, BIG). We stimulate this by offering support and awarding the candidate with some additional budget when prestigious grants are awarded (e.g. Comenius). A learning assistance programme is in place and at least 20 ET-students are participating in the learning assistants programme per year, starting from academic year 2019-2020. The target beyond 2021 is that all teachers develop to level 1 of Graham's teaching skills within 2 years after the start of their teaching career and level 2 of Graham's teaching skills within 5 years after the start

of their teaching. At least 15 % of teachers developing their teaching skills to level 3 and a few individuals to level 4 of Graham.

Intended effects for students: The taken measures will have the following positive impact on our students:

- Students will experience improved quality of teachers who are able to implement innovative teaching in their education and who learned from others about innovative teaching methods. Also, teacher quality improves because staff members with a passion for education / educational leadership will have more opportunity to develop their skills and implement this in the curriculum and in their own teaching.
- Students will experience improved assistance in learning by student-assistants, because an increasing number of student-assistants will have been trained in didactic skills and will participate in teaching in a more structural way.

Budget:

	2019	*2020*	*2021*	*2022*	*2023*	*2024*
Ambition	**99,4**	**108,2**	**128**	**128**	**128**	**128**
- Measure 1	59,4	79,2	99	99	99	99
- Measure 2	pm	pm	pm	Pm	pm	pm
- Measure 3	pm	pm	pm	pm	pm	pm
- Measure 4	15	15	15	15	15	15
- Measure 5	25	14	14	14	14	14

COMMUNITY BUILDING

Action plan: Community Building Project

Ambition: All students feel part of at least one community, formed by staff and fellow students of their programme, in such a way that it contributes to the well-being of students, and therefore to their study-success.

Context: One of the objectives of ET is to achieve high graduation rates. Being part of a strong community is a prerequisite for study success, as does an environment that stimulates interaction between teaching staff and students. It also helps to fulfill the ET ambition of educating engineers of the future as in communities there are ample opportunities to develop yourself, e.g. socio-emotional skills.

This plan also has a strong relation with the plan for ideal learning facilities, e.g. time table schedulers could schedule classes on preferred locations in order to facilitate community building. Moreover, the plan has a link to internationalization / global citizen, because it will include aspects on how all students feel part of the community, irrespective of their international background, for example by organize activities such a language café's, international food festivals. Lastly, as a result of the BaMa-structure, more community building is necessary because after three years a new inflow of students take place, where as in the past students stayed together for at least five years.

Our action plan fits in the Ministry of Education's themes "Study Success", and "Intensity of Education". As well as the UT-profile of "small-scale and interactive environment".

To execute this plan and fulfill our ambition we need to: 1. Develop a comprehensive plan for the "Community Building Project" and 2. Do investments to enhance community building. These measures are further detailed below:

Measure: 1. Develop a comprehensive plan for the "Community Building Project" that gives an answer to the question of what (type of) facilities/personnel/actions are needed to fulfil our ambitions "Community Building" and on "Learning Facilities" and how this can be realized over time.
2. Investments to enhance community building, as developed in the plan

Target until 2021: The plan on "Community Building" will be ready in 2021.

Intended effects for students: The taken measures will have the following positive impact on our students:

- Students will be informed that this plan is being developed and will be able to give their input. Eventually, the students will experience facilities in place to make them feel part of a community, as well as activities and organization, e.g. timetables that facilitate community building, accessible possibilities of interaction between staff and students, activities that facilitate contact and community building amongst all students, etc.

Budget:

	2019	2020	2021	2022	2023	2024
Ambition	**0**	**0**	**50**	**50**	**50**	**50**
- Measure 1	pm	pm				
- Measure 2		pm	50	50	50	50

TALENT DEVELOPMENT

Action plan: Diversity management

Ambition: It is our ambition to create a learning environment in which students from all over the globe have a place and can develop their talents. Therefore we aim to have a larger diversity of inflow of students, a strengthened small-scale and interactive learning environment for a diverse community, students that have a better overview of all the possibilities for developing their talents (within and outside the curriculum).

Context: Academic skills are very important. Because of the diverse inflow, there is a variety in skills of students when they enter the programme. Each student should have the opportunity to develop his/her talents – not only the top-5 percent of best performing students. For example by offering additional training on teamwork or other academic or professional skills for students who have not been educated in the TOM-model.

At UT and ET many arrangements are already in place to develop talent. An important goal is to communicate more clearly what opportunities already exist and how students can make use of the activities offered.

This action plan clearly has a relation with the educational ambition at ET of delivering T-shaped professionals, as well as the objective to stimulate students to develop their own talents. At UT level this action also has a link to the programme on Community Building and Internationalization / global citizen. At national level this action is connected with the Ministry of Education's themes of 'Differentiation in Education' and 'Guidance of students'.

To execute this plan and fulfill our ambition we need to 1. Invest in an additional programme coordinator, 2. Invest in additional capacity for teaching academic skills, 3. Increase capacity of student counsellors, 4. Hire additional capacity for student / learning assistants, 5. Facilitate

student teams who participate in projects that help to develop their talents, and 6. Make an overview of all possibilities of talent development. These measures are further detailed below.

Measure:

1. Invest in an additional programme coordinator (0.5 fte) to better facilitate the increasingly diverse inflow of students. For students it is important that the study programme matches their expectations and their skills. Therefore, this programme coordinator will initiate activities to facilitate a smooth transition to the university (e.g. by organizing activities to prepare international students to study in NL, specific matching activities, etc).
2. Invest in additional capacity for teaching academic skills (0.5 fte) to set-up a project for MSc-students, as part of their curriculum, focusing on specific professional/academic skills, necessary to be successful in the master (team work, project work, independent learning, problem solving, critical thinking). This project will be embedded in the disciplinary context of the MSc-programme of the student.
3. Increase capacity of student counsellors. For students to be successful in the programme, it is important that they get support in case of study or personal problems.
4. Additional capacity for student/learning assistants. This is a way for students to develop their talent as a teacher (while at the same time it fits with the small-scale character of our education, with a lot of interaction between educators and learners).
5. UT and ET are known for their active students, who grasp opportunities to develop their own talents further, both inside and outside the curriculum. We want to stimulate this further by facilitating student teams that set-up projects in which they develop their talents further. In 2021 we will determine what the best way is to facilitate these student teams which we will implement in the following years.
6. Make an overview of all possibilities of talent development available through the website and other information channels to students (e.g. Canvas programme-sites, through student counsellors).

Target until 2021:

The additional programme coordinator will be hired as of 2021. The additional capacity for teaching academic skills will be hired as of 2021. The new project for MSc-students will be set-up as of 2021-2022. As of 1-3-2019 we have hired an additional student counsellor. This is a permanent position, so there is structurally more capacity to support students in developing their own talents . Under 'learning facilities' we included budget to set-up a learning assistants programme and train at least 20 students/year. Here, we include some budget to hire additional student/learning assistants.

Intended effects for students:

The taken measures will have the following positive impact on our students:

- As a result of the additional capacity for a programme coordinator, students will experience that we are better able to prepare them before the start of the programme and facilitate them during the programme to match their needs.
- Students will experience that we will help them to develop their skills to such a level that they are better prepared for the rest of the programme and that all students have reached a certain minimum level early in the programme to facilitate fruitful cooperation amongst students.
- As a result of the additional capacity for student counselling, students will experience improved guidance during their study.
- In addition to the effects mentioned under "Teaching Professionalization", students will experience improved assistance in learning by student-assistants, because of the increased amount of student-assistant capacity.
- Students will have a good overview of all the different possibilities for talent development.

Budget:		2019	2020	2021	2022	2023	2024
	Ambition	**45**	**57**	**178**	**223**	**223**	**223**
	- Measure 1	0	0	33,5	33,5	33,5	33,5
	- Measure 2			49,5	49,5	49,5	49,5
	- Measure 3	33	40	40	40	40	40
	- Measure 4	12	17	25	50	50	50
	- Measure 5			30	50	50	50
	- Measure 6	pm	pm				

GLOBAL CITIZENS

Action plan: International and intercultural awareness project

Ambition: Students are global citizens that are familiar with an international working environment

Context: UT and ET want to educate students to become "global citizens", as can be derived from the UT-profile "Crossing Borders" and the ET ambition to educate engineers of the future, in which the international aspect plays an important role. This "global citizen" knows what it is like to work in an international workplace or to work together with international partners.

This action plan seamlessly fits in the UT Quality Agreement Programme "Global Citizens" as well as the Ministry of Education's themes of "Differentiation in Education and "Guidance of Students".

To execute this plan and fulfill our ambition we need to 1. Facilitate international experience for students, 2. Extend the exchange programme, and 3. Set up a training on intercultural competences and internationalization of the curriculum. These measures are further detailed below.

Measure:
1. Facilitating international experience for students, e.g. make it (even) more easy to study abroad, or do an international internship or graduation project.
2. Extend the exchange programme within ECIU to other programmes
3. Setting up training on intercultural competences / International Classroom teaching / Internationalization of curriculum for teachers. This also means facilitating the internationalization of courses, e.g. educational advisors that support teaching staff in adjusting courses to an international context.

Target until 2021:   50% of the students has substantial international experience, e.g. minor abroad, internship abroad, thesis project abroad, content-driven study tour abroad, extra-curricular activities abroad such as voluntary work. (Note that foreign students studying at UT automatically have this experience). The inventory of possibilities and required measures to set-up ECIU-exchange programme for Civil Engineering and for Industrial Design Engineering will be ready. The development of a training on intercultural competences will start after 2021.

Intended effects for students: The taken measures will have the following positive impact on our students:
- Student will experience that different possibilities are in place to gain international experience and exchange (after 2021) and that the faculty stimulates/facilitates this.

- In 2024 students will experience improved education, because teachers are better equipped to deal with the diversity in nationality and will experience a curriculum that prepares them better to work in an international context.

Budget:

	2019	2020	2021	2022	2023	2024
Ambition	**0**	**0**	**90**	**200**	**280**	**280**
- Measure 1			50	100	100	100
- Measure 2			40	50	80	80
- Measure 3				50	100	100