

UNIVERSITY OF TWENTE.

Redesign of the High-Tech Human Touch Minor From Idea to Prototype



University Teaching Qualification (UTQ)
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Introduction

1. Note from the author

My name is Kostas Nizamis and I am an engineer by profession. I experienced multiple programmes as a student (studied electrical and biomedical engineering) and also the educational systems of two countries (I studied for my first bachelor and master in Greece and for my second master in the Netherlands). Currently I teach mainly mechanical engineering students. My former experiences made me realize that teaching is an **essential** and also rewarding **responsibility** of any modern academic. Unfortunately, not realising the weight of this responsibility can lead to many



“Education is not a privilege of the few, but a right of the many”

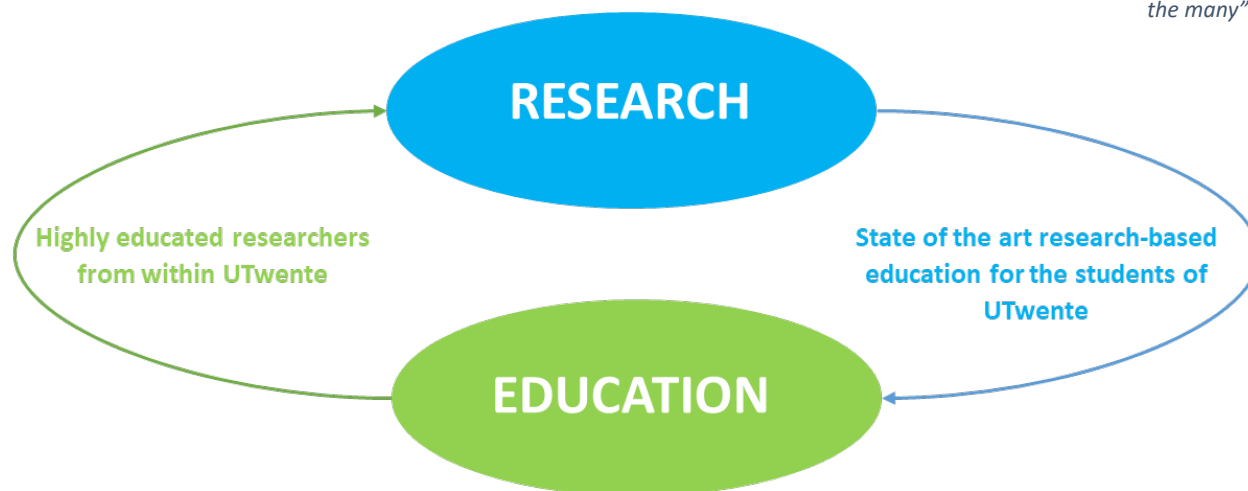


Figure 1 A simplified illustration of the interplay between Research and Education.

foreseen or unforeseen consequences for the society. Additionally, as I am myself juggling different disciplines, I firmly believe in the added value of multi-/inter-/trans-disciplinary education. Additionally, I have noticed that research and education are some times treated as two parallel things that never meet, however my experience showed me that they are intertwined and in dire need of each other. If education wants to stay relevant it needs to stay close to research developments and if research wants to continue being successful, it needs to be fuelled by competent individuals that followed a high-level education (Figure 1). Maintaining a high-level on both those components, a University ensures relevance, success and proper upbringing of the next generations. It is therefore not only a responsibility, but also a great **honour** to be an educator. I currently have the luck to be involved as a teacher to three University of Twente programmes and 2 High-Tech Human Touch (HTHT) minors that integrate all the current programmes at the University of Twente¹. The HTHT minor **From Idea to Prototype**² presented as a case study in this portfolio will attempt to highlight elements of interdisciplinarity and close collaboration between research and education as well as my personal vision on education and how that aligns with the current values of the University of Twente (UT). Besides teaching at the UT, I am also interested in the ECIU University (“ECIU University,” n.d.) participating on the CBL working group as one of the first teachers applying CBL (“Toolbox: Challenge Based Learning | Challenge Based Learning | Home CELT,” n.d.) and as an invited speaker for CBL for 4TU (“Webinar Series: Challenge-based Education at University of Twente,” n.d.). Additionally, in the European level I am member of COST Action CA16116 Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions (working Group 4 (“COST Action CA16116 – Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions,” n.d.; “MP-Konstantinos Nizamis – COST Action CA16116,” n.d.)) and the Erasmus+ project WeCoRD (“Consortium | Wearable and Collaborative Robotics,” n.d.). As a member of these organizations I am also involved in the development of educational activities and research in novel education (Kilic-Bebek et al., 2020).

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2. Intake

In the spring of 2019, when I started my work, I had an intake meeting with my (then) UTQ supervisor Charlotte Oude Alink (see the document [here](#)). Based on that assessment it was pointed out that competence 2c is my strong point, as I already had a lot of supervision duties as a Ph.D. student. Therefore, it was decided and drafted as a plan, that I should follow the courses related to the remaining

¹ For more details on the courses/modules/minors and the programmes I am involved with please look [here](#)

² Useful links:

1. <https://www.utwente.nl/en/education/electives/minor/offer/htht-minors/#htht-%E2%80%93-minor-packages-215-ec>
2. <https://www.utwente.nl/onderwijs/keuzeruimte/minor/uploads/htht/minor-market-science-2-society.pdf>
3. <https://www.utwente.nl/onderwijs/keuzeruimte/minor/uploads/htht/brochure-htht-science2society-module1.pdf>

competences (for a full list of all the courses/workshops/events I followed for my UTQ competence building see [here](#)). Based on my experience with those, I wrote this portfolio.

3. Background on the HTHT minor From Idea to Prototype

Before delving in the details of the five UTQ competence, let's introduce the case study used in this portfolio. This work is based on the redesign of the 15 EC (420 workload hours) **HTHT Minor From Idea to Prototype (FitP)**. This minor is part of the HTHT minor package **Science 2 Society (20 EC)**. I am the coordinator responsible for the first part and involved in the educational activities of the second part (**From Prototype to Society**). The premise of this minor package is that our society is confronted with many challenges in diverse fields. Fortunately, emerging technologies also give us many opportunities to overcome these challenges. New products allow us to feel safe in extremely crowded or remote places, to monitor our health status in real-time, to acquire knowledge independent of our physical location, or to transfer difficult tasks to intelligent robots. These products, however, are not developed within a single domain. To come up with successful solutions, combined expertise is required from different scientific fields. Product developers need to be creative and need to apply a wide variety of expertise in radically new ways while working in a structured, theoretically grounded and agile manner.

During the first 10 weeks (Module 1: From Idea to Prototype) the participating students are split into groups and delve into the state-of-the-art of the science behind a challenge provided by an external company or research department, and they look for novel ways to apply their knowledge in an extensive yet agile design process. In the meanwhile, the students are introduced to various scientific disciplines and aided in the development of relevant skills. This is done via a number of basic lectures and interactive workshops. The background knowledge and skills that are gathered allow the members of a group to share a common language and address the given challenge. All groups will walk the path from a general idea to one or more scientifically and practically grounded prototype(s) for the challenge at hand. In part 2 of this minor (From Prototype to society), the students will elaborate this prototype into a tested and evaluated solution. The minor under normal circumstances is fully conducted in the Design Lab and the students have full access in all the facilities of this vibrant and well equipped space. More details for the minor can be found in Appendix B – Documentation of the HTHT Minor From Idea to Prototype.

I am the coordinator of this minor since the academic year 2019-2020, therefore I successfully executed two iterations so far. The first part of this portfolio (competence 1) will focus on the redesign of the intended learning outcomes (ILOs) of the minor and the redesign keeping in mind:

- ❖ Constructive alignment
- ❖ Use of modern educational approaches for active learning
- ❖ Manageable from a logistics point of view
- ❖ The introduction of Challenge-Based Learning (CBL)
- ❖ The interdisciplinary (ID) nature of a minor that is open to all UT bachelor programmes

4. Multi-Inter-disciplinarity

Interdisciplinary education was introduced in order to create educated individuals, ready to tackle multifaceted societal challenges that cannot be optimally handled within one discipline (Lattuca, Knight, & Bergom, 2013). The University of Twente (HTHT multidisciplinary minors), the newly developed Master Insert, and the vision of Shaping 2030 are already very well oriented towards multi-/inter-/trans-disciplinary education (Petrová, 2020; "Shaping2030 | Mission, vision and strategy | University of

Twente," n.d.; "Transdisciplinary Master-Insert: extracurricular programme for UT students," n.d.; Uthrapathi Shakila, 2021). In the HTHT minor From Idea to Prototype, we invite students from all the bachelor programmes of UT to work together towards a common goal: ***Solving an actual challenge coming from various societal actors***. This way, we offer the opportunity to those students to develop essential 21st century skills (such as communication, teamwork, internationalization, critical thinking, creativity, cultural awareness, etc) (Beers, 2011). By being a member of a multidisciplinary, multicultural team our students are able to integrate insights and knowledge from at least 2 different disciplines and construct a new perspective on the topic (Czerniak & Johnson, 2014; Holley & Holley, 2017). In **Chapter Evaluating Teaching**, we will talk more about this aspect as the minor was evaluated from the interdisciplinary education perspective by the Comenius STRIPES 2021 project in collaboration with Jan van der Veen ("STRIPES2021: STructuring Interdisciplinary Projects for Engineering Students | NWO," n.d.). This work lead to a submission to the SEFI 2021 conference (Uthrapathi-Shakila, Nizamis, L. Poortman, & van der Veen, 2021).

5. Challenge-Based Learning

As mentioned earlier I am involved in the ECIU University and more specifically in the implementation of CBL within the curriculum of the minor From Idea to Prototype. CBL is a novel active learning pedagogical (dating back to around 2011) approach specialized for diverse teams working on solving real-life problems in a systematic method (Kohn Rådberg, Lundqvist, Malmqvist, & Hagvall Svensson, 2020). It combines the gains of both problem-based learning (PBL) and project-based learning (PjBL) and is especially useful for interdisciplinary contexts (Johnson & Adams, 2011). In CBL, instead of being provided with a problem, students have to define their own challenge from general problems provided by industrial or research partners.

CBL builds on experiences and lessons taught by PBL and PjBL and moves these active learning pedagogies forward to the 21st century. CBL has the potential foster 21st-century skills, by providing a framework that enables students to work within the context of real-world challenges. It cultivates

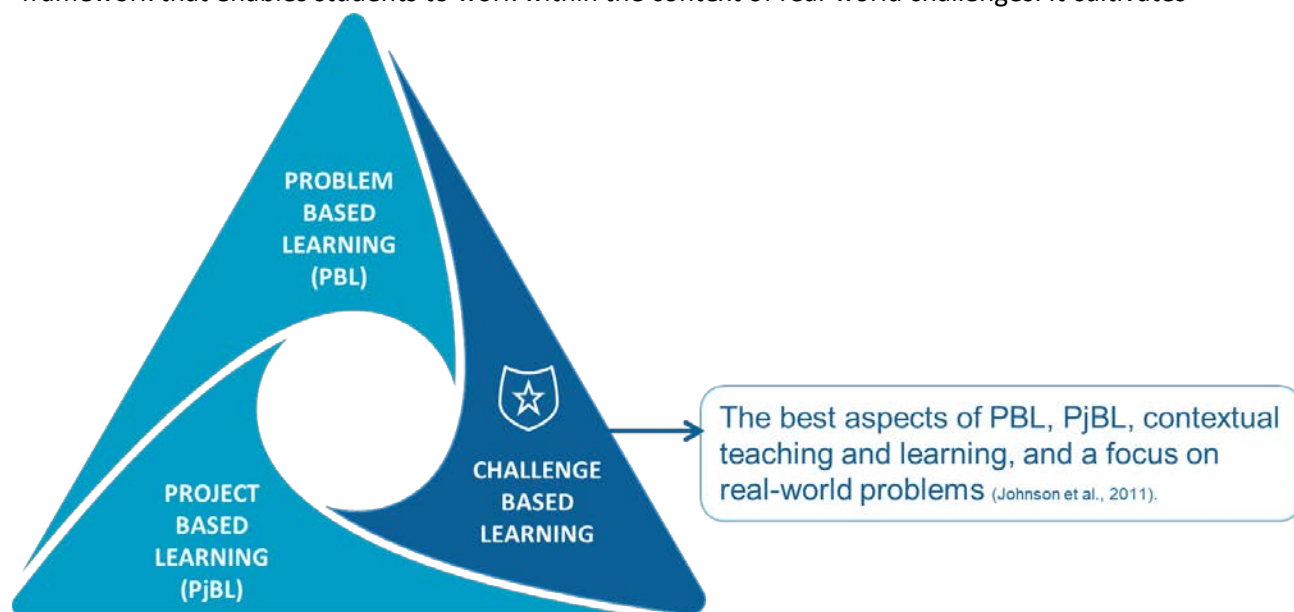


Figure 2 Challenge-based learning next to more traditional educational approaches such as Problem-Based and Project-Based learning.

creativity and communication by facilitating collaboration between students and non-academics within the context of real-life, multi-stakeholder situations towards solving complex problems (Kohn Rådberg et al., 2020). As real-world challenges are inherently multifaceted, CBL is useful for interdisciplinary education (Magnell & Högfeltdt, 2015). CBL is aiming to bring together the best aspects of PBL, and PjBL (Figure 2). A key factor for the implementation of CBL within the HTHT minor From Idea to Prototype is the opportunity for students to choose and define their own challenge based on a general problem. This way no matter the group composition, groups are able to fit the challenge to their own capacity.

6. COVID – 19 Crisis

It is necessary to mention the Covid-19 crisis and its subsequent consequences for education. Such a portfolio would be an incomplete work if it did not mention the extra challenges posed by this unexpected crisis and also the creative solutions that helped UT teachers maintain a high-level of educational standards. As many colleagues and modules, so did I and From Idea to Prototype were affected by Covid-19. In the different chapters of this document, when needed, covid-19 and its consequences will be mentioned. However, despite this crisis, the nature of the presented minor (in terms of teaching, assessment and support), allowed for creative solutions and minimal disturbance for the teachers as well as the students. The 2020-2021 version of the minor was performed in a hybrid way that will be explained further in the next chapters.

7. Structure of this document

This document is structured based on the competences for acquiring the UTQ (for more information please see [here](#)). Each chapter will describe one competence and analyse how acquiring this competence is highlighted via the case study (for example how the redesign of the minor From Idea to Prototype helped me become more competent in designing education). In Figure 3 you can see all the competences and the inter-relations between them. This document analyses the competences separately in different chapters, however, aims to highlight their synergistic behaviour and in the last [chapter](#) aims to bring everything together in a common, integrated vision. The structure and the content of the separate chapters is based upon the competences as presented in the UTQ manual (see **Appendix A – UTQ Competences**)

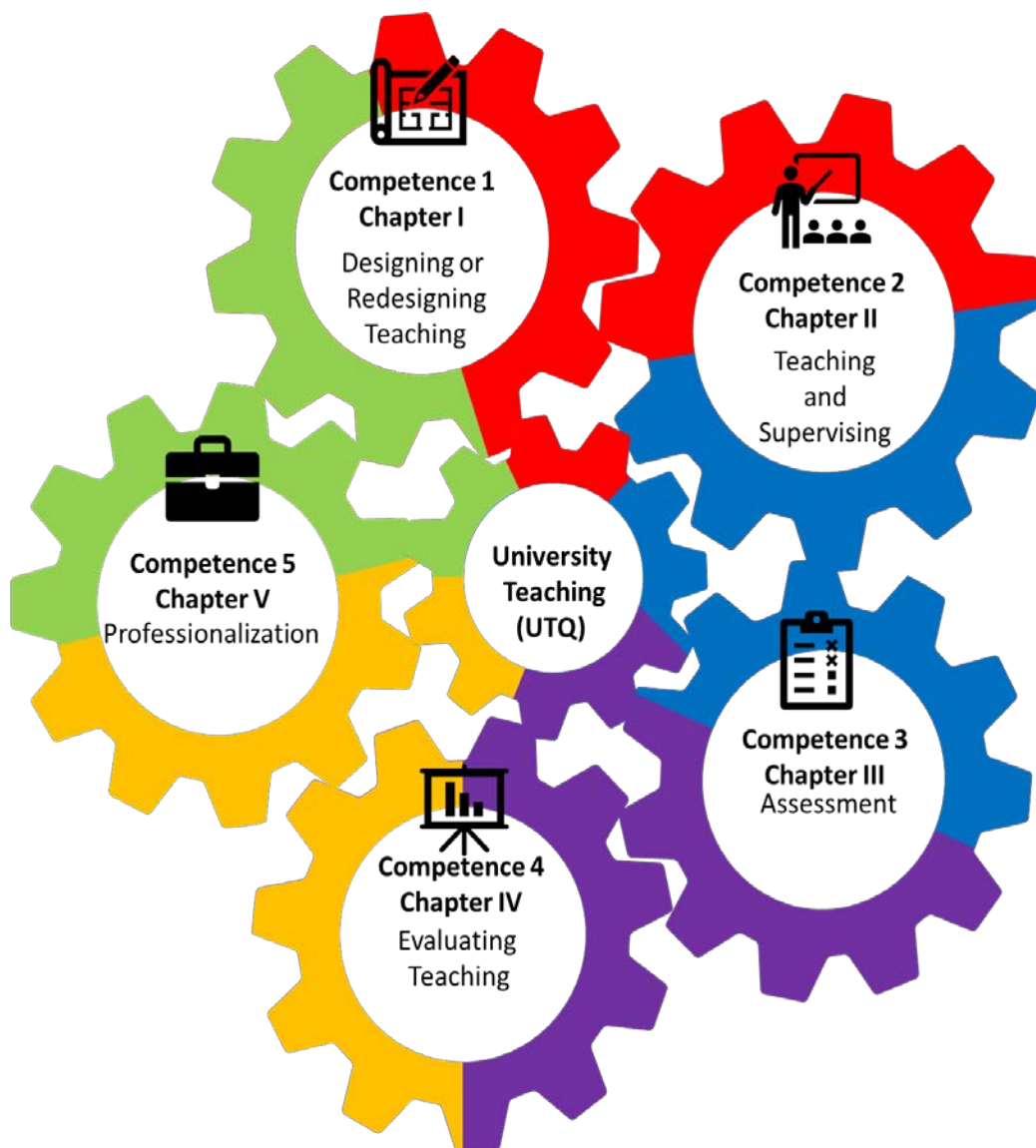


Figure 3 Highlight the synergy between competencies (direct adjacent to another competence and indirect, through the core teaching element). If this harmony is interrupted the gears break in their whole. So very important to take all competencies equally seriously into account.

I. Designing or Redesigning Teaching

In this chapter you will read about the redesign of the existing minor From Idea to Prototype (Part 1 of the minor package Science2Society), since the academic year 2019-2020. This is part of competence 1 (see Figure 4) and the ecosystem around it. The context description starts from a high-level (Shaping 2030, HTHT Minors, Industrial Design Engineering Bachelor Programme) to more low-level (ILOs, assessment and teaching). The alignment with the supersystem of the minor as well as the subcomponents result in this course being redesigned according to the constructive alignment principle (Biggs, 2014). Additionally, we further zoom in into the activating teaching methods used and the logistic constraints of this course. It is evident from Figure 4, that the interplay between education and research (Figure 1) is integral to my educational vision, as it can ensure the relevance of ILOs and the use of modern educational methods.

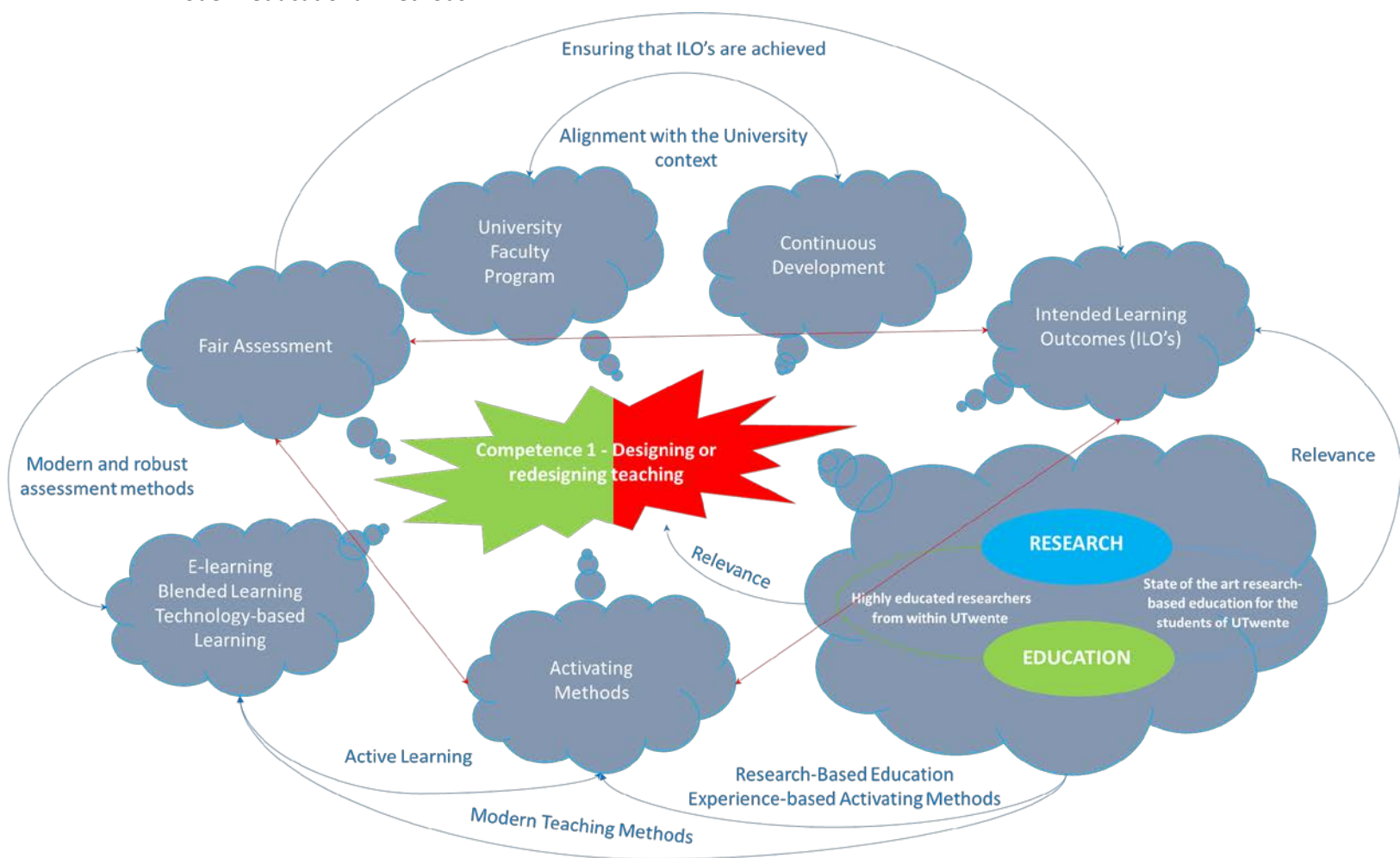


Figure 4 The above mindmap describes the ecosystem of Competence 1. Every component described in the clouds, interacts with other components and together ensure that design of education is in alignment with educational research, the context of application and maintains high quality. The red triangle shaped by assessment, ILOs and teaching methods is demonstrating the principle of constructive alignment.

1. Placing education within context

The minor From Idea to Prototype is one of the High-Tech Human Touch minors offered at the University of Twente to highlight the societal issues for which the UT is developing High Tech Human Touch solutions through state of the art research (“Offer - Tool of options | HTHT-minors | Minor & Electives,” n.d.). The macro context levels that encompass the minor include the University of Twente, The High-Tech Human Touch cluster of minors and the Shaping 2030 (Figure 5). Additionally, due to the affiliation of the minor coordinator, the minor is related to the industrial design engineering (IDE) bachelor program and its goals. The minor is also supported by a rich ecosystem of people and organizations. Those include all the support departments and people from within the University and the Faculty of Engineering Technology (ET) that ensure high quality education (i.e. BOZ, CES, CELT, Osiris, e-learning specialists, etc.). Additionally, within the minor there is a complex ecosystem (micro-view) of tutors, facilitators, experts, teachers and coordinators that directly constitute an integral part of the minor structure itself. In this chapter we will analyse them and their impact as shown in Figure 5. At the end of the chapter I also mention the context of my own research interest and how those are useful for the minor FtP and its redesign and sustainability.

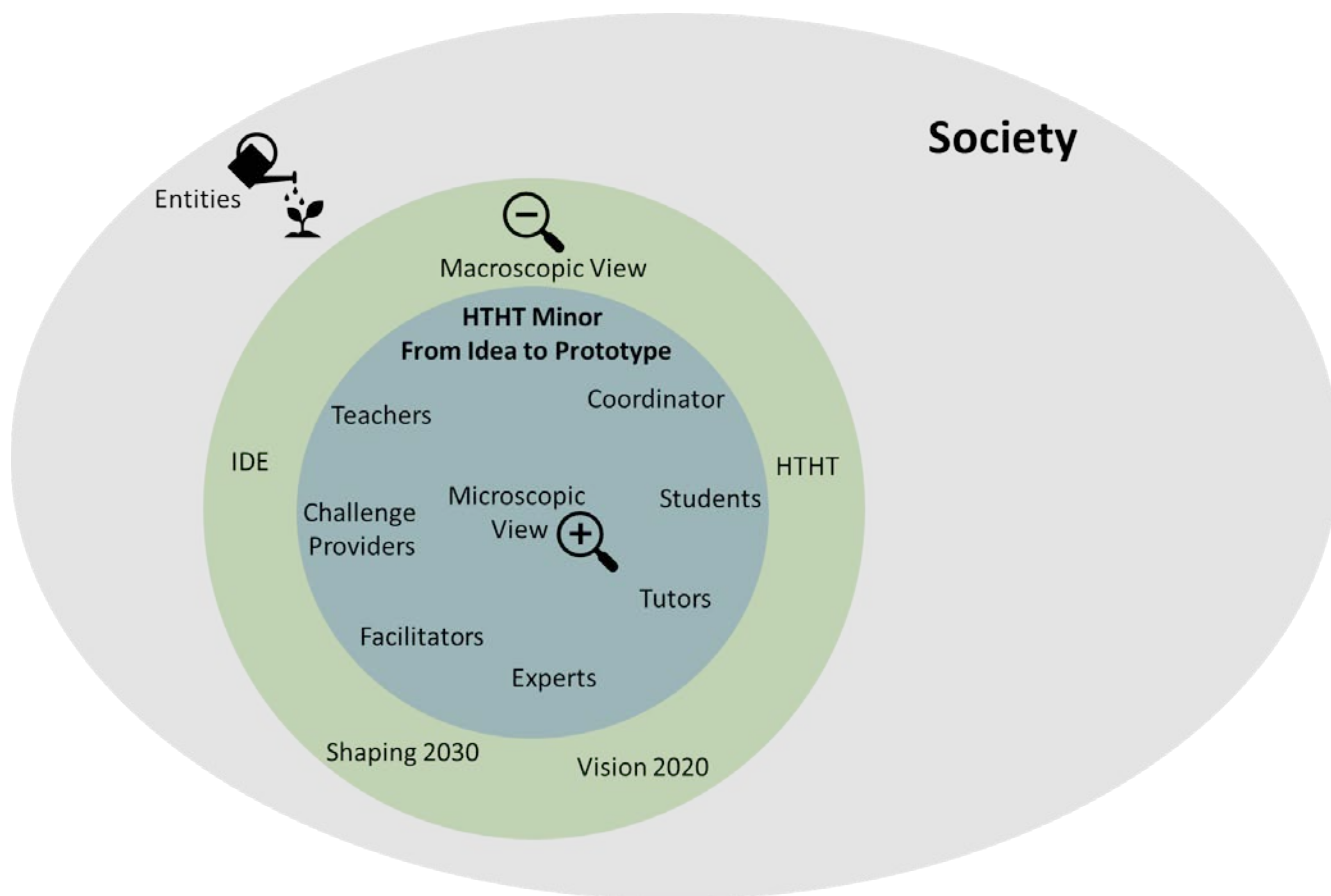


Figure 5 This figure shows the structure of this section. We will talk about the macroscopic context, the entities that support and ensure the smooth organization of the minor From Idea to Prototype, as well as the microscopic context (within the minor itself).

a. Macroscopic context:

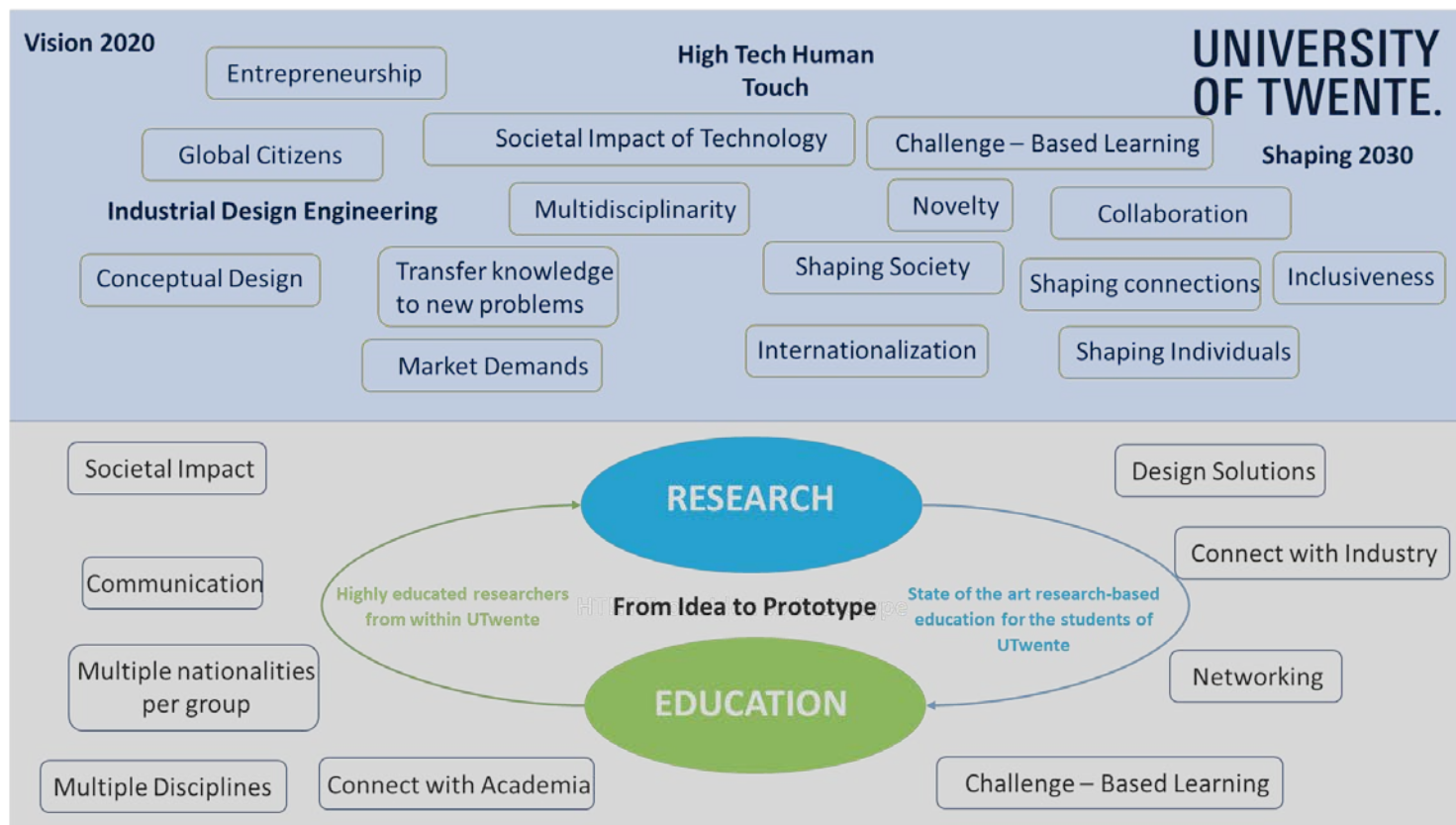


Figure 6 The values and learning objectives provided by the minor are aligned to the vision of UT and additionally complement my vision on the interplay between research and society (Figure 1)

All education within the UT is a part of its vision and at the same time help shaping the vision it self. Starting from vision 2020, we see that UT is a university that highly values entrepreneurship, global impact, and impact on society. These values together with inclusiveness, challenge-based learning, and novelty are transitioning to Shaping 2030 and include also the shaping of society and societal impact on innovation, research and education. All HTHT minors is tightly aligned with values and ideas such as the impact of technology in society, novelty, multidisciplinarity, and internationalization. Therefore, we see a clear alignment of the vision of the UT with HTHT minor education. Zooming in a bit further into the IDE program we find ILOs (Table I) closely related to link with the market demands and transferring existing knowledge into new problems and therefore driving impactful innovation.

The minor itself has its own values and objectives (Figure 6, bottom). Within it's time, students are encouraged to work with multiple disciplines and nationalities in order to address societal challenges and create impactful solutions. The students do work for a stakeholder, but work together with multiple external and internal stakeholders and are shaping and get shaped by them. Networking and connecting with the industry is also an integral part of the minor (with the recent example of one of our students groups negotiating the commercialization of their prototype with Volker Wessels). Therefore, it becomes evident that the minor FitP is well aligned with the vision of the University and the IDE program (the parent program of this minor) and strives to create ILOs that promote modern education.

Table I. Learning Objectives of IDE Bachelor (left) and Learning Objectives of From Idea to Prototype (right)

The students:	The students are able to:
1. Is able to analyse market demands and user needs along with technological and social opportunities	1. Collaborate & communicate with multi-disciplinary team members and stakeholders.
2. Is able to generate a (personal) vision on the design problem	2. Address a given design challenge by: <ul style="list-style-type: none"> a. Analyzing and breaking the challenge down to several specific research questions. b. Applying design-based research and other appropriate research methods. c. Composing requirements that integrate the needs of different stakeholders and different domains. d. Designing several concepts, and compare them based on the composed requirements. e. Using resource management to construct a prototype that considers the trade-off between various requirements in multiple domains (time, costs, personnel, facilities, marketing, etc.)
3. Is able to generate and select ideas and design concepts;	3. Validate and demonstrate the designed solution and elaborate on the design rationale.
4. Is able to transfer existing knowledge to new problems and to implement new knowledge	4. Evaluate and critically reflect: <ul style="list-style-type: none"> a. On the impact of the chosen prototype solution on its target group and society. b. On their own contribution to the team, based on their disciplinary knowledge and academic skills.
5. Can materialise a concept to the stage of a working model	
6. Is able to take into account the marketing and the product life cycle.	

b. *Entities context:*

Between the macroscopic and the microscopic view, the minor FtP is scaffolded by a number of entities (either people or departments/organization), which ensure the quality of the provided education, help with the modernization of teaching and the smooth organization of the minor every year. In order to create a reference for myself as a teacher to identify which people I need to consult with for every iteration of the minor. The result of this “mapping” of the unknown to me landscape led to the creation of a diagram that includes all the relevant entities and which I consult every time I need to start organizing the minor (Figure 7). This diagram includes all the people and organizations I interacted with regarding the organization of the minor FtP in the latest academic year (2020-2021). Those are an integral part of the context of the minor and should in all cases be taken into account during the annual decision making meeting regarding the organization of the minor.

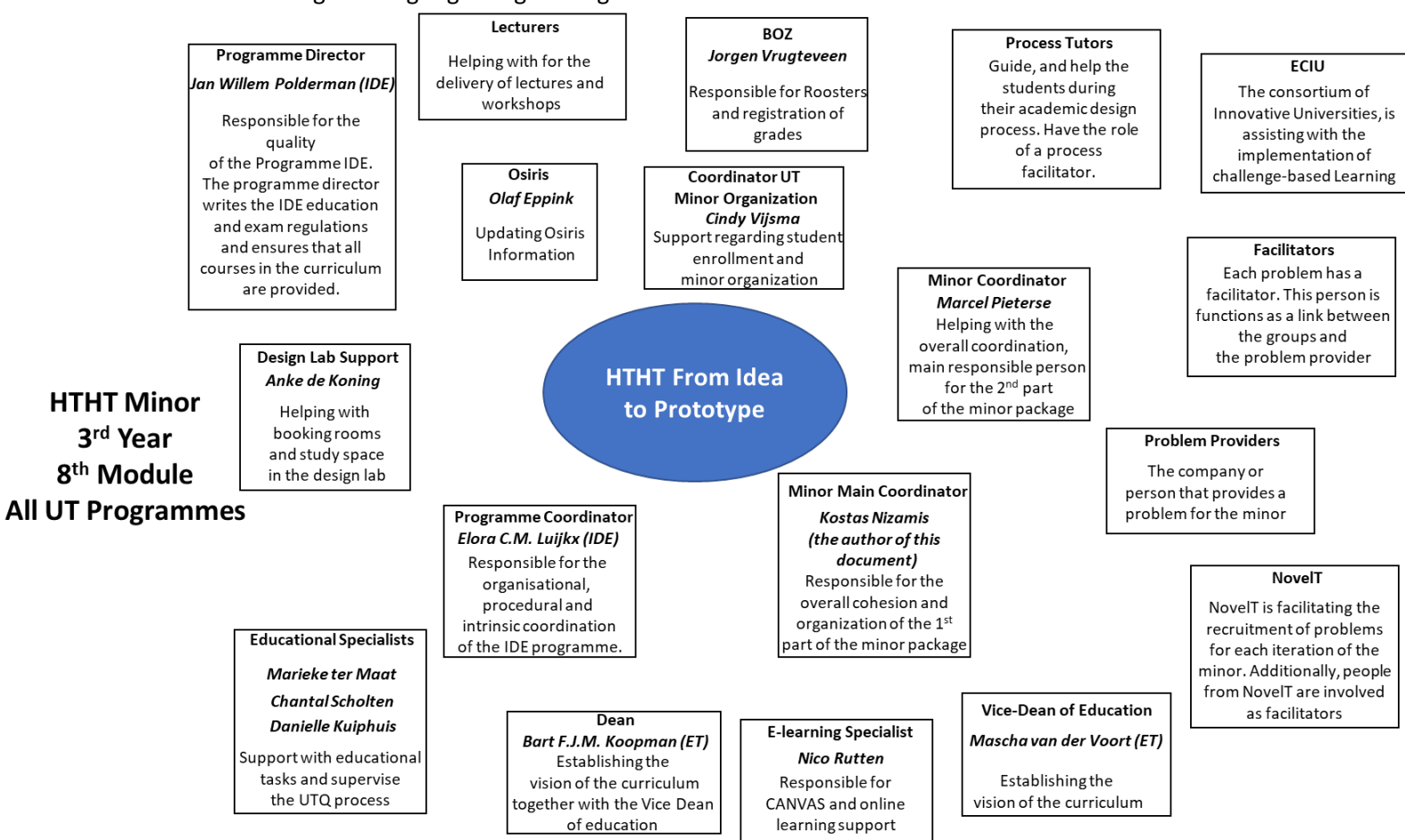


Figure 7 All the people and organizations/departments that are part of the ecosystem of the minor FtP. The role of each entity described in this diagram is clearly mentioned in the box text.

c. *Microscopic context:*

This context includes all the teaching staff and experts involved at the execution of the minor. It is the microscopic view as it refers to the context/entities within the minor itself (Figure 8). Every year the minor coordinator involves several organization (challenge providers), which are offering problems/challenges for our students to work on as their main assignment for the minor. The challenge

facilitator acts as the liaison between the provider and the students teams. The main stakeholder for us are the students (that is why they are placed in a larger ellipsoid), and the students of our minor come from all the programmes of the University. As we are open to student from other Universities in the Netherlands (via keuzegids) and to all the programmes of UT, the student teams are very diverse in backgrounds, disciplines and nationalities. Our students are further scaffolded by process tutors and a number of experts that offer lecture and workshops. The tutors receive training regarding CBL and tutoring before the start of the module as well as a copy of tutor guidelines developed by myself (see

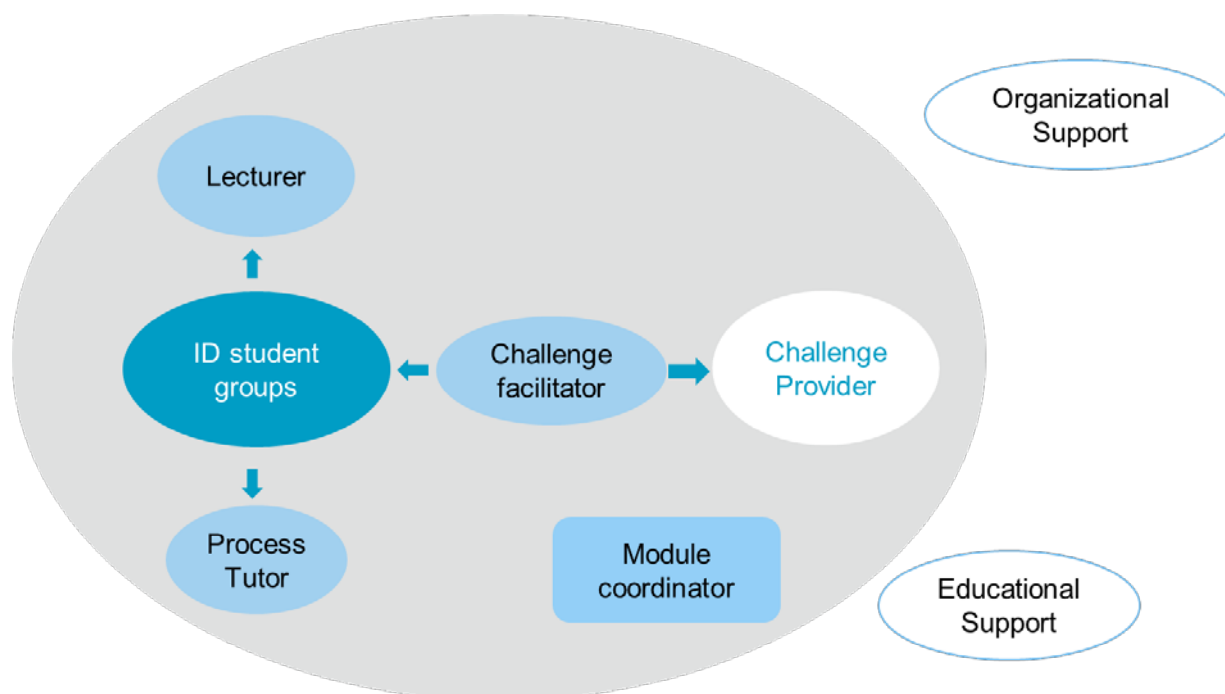


Figure 8 The major components that compose the educational scaffold of the students during the execution of the minor.

Appendix D – Tutor Guidelines). The module coordinator maintains a helicopter view of the whole process and interacts with all the aforementioned stakeholders.

d. Context of my research

My previous research was in rehabilitation robotics for people with Duchenne muscular dystrophy (Nizamis, 2019). The opportunity to work in such a diverse field gave me exposure to multiple interesting disciplines and led to the publication of work in the fields of robotics, philosophy and ethics, regulations, engineering, rehabilitation and bio-medicine. Currently, I am an assistant professor in multidisciplinary design (“dr.ir. K. Nizamis (Kostas) | University of Twente,” n.d.) and currently involved with the development of international multidisciplinary (“Consortium | Wearable and Collaborative Robotics,” n.d.; Kilic-Bebek et al., 2020) and Challenge-based education (“Webinar Series: Challenge-based Education at University of Twente,” n.d.). My research interest in multidisciplinary (as I am currently involved in building numerous multidisciplinary projects) serves as the basis for my vision for the minor FitP (Figure 1). Fresh perspectives from the literature help me keep the content relevant and up to date and my connections to the industry help with the provision of authentic challenges for my students.

2. Constructive Alignment

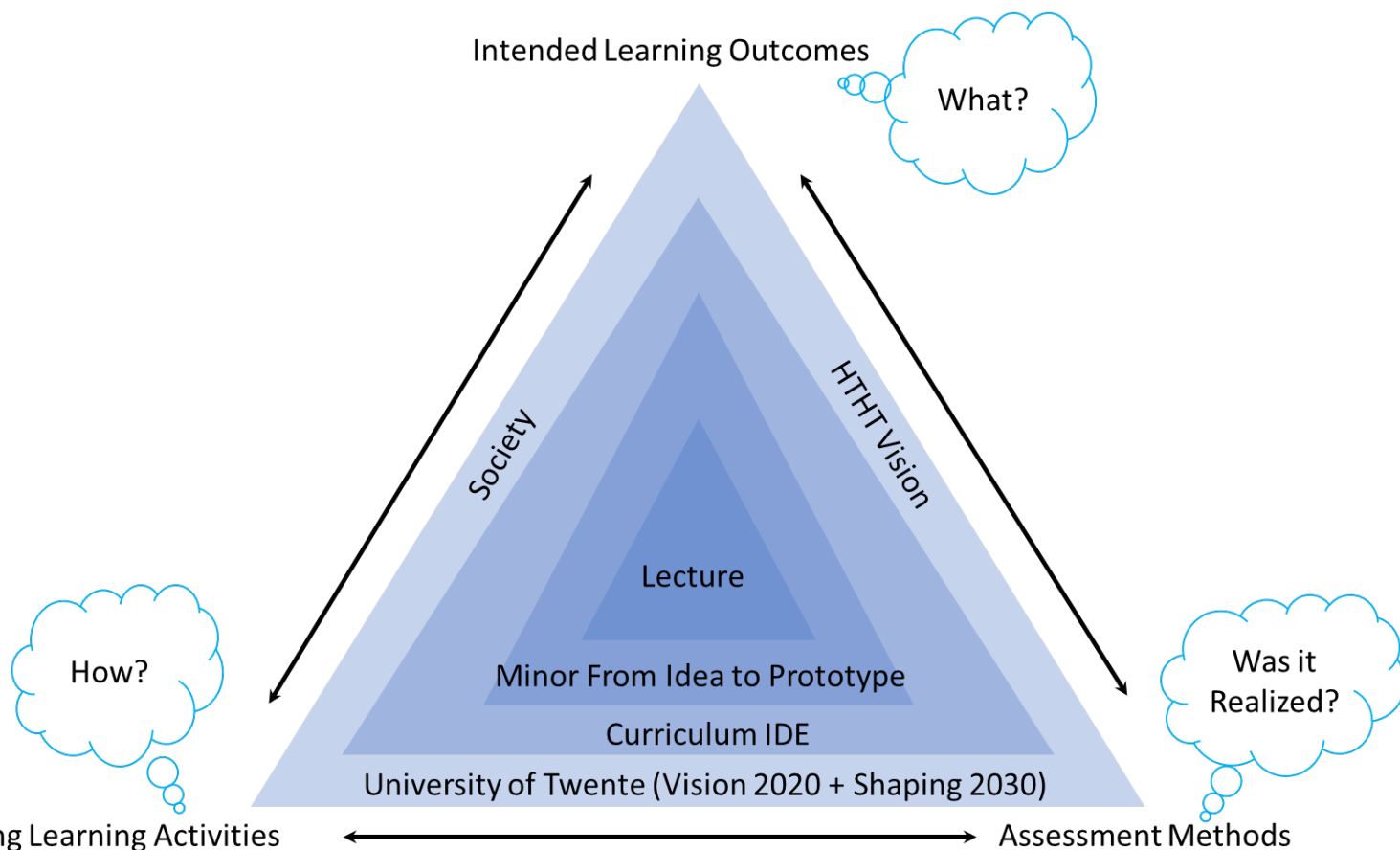


Figure 9 An illustration of the principle of constructive alignment. The Intended learning outcomes (ILOs) are asking what the student is expected to learn. This needs to be aligned with the teaching activities (how will the student learn?) and the assessment methods (Did the student learn?). The constructive alignment triangle can zoom out to more abstract ILOs (goals of UT, ILOs of a specific programme curriculum) and zoom in to a specific minor/module or course/lecture.

In the previous chapter (Placing education within context), bits and bites of the organization of the minor and the educational activities and teaching methods were mentioned. In this chapter, I will try to structure those in a logical flow and align them to the ILOs of the minor with respect to the constructive alignment principle (Biggs, 2014). Starting from the ILOs I will explain the teaching activities that support the students in their educational journey towards the ILOs and the assessment methods in place that ensure the students mastered the ILOs of the minor and to which degree that happened. Constructive alignment is a principle used for aligning teaching and learning activities, and assessment tasks, directly with the ILOs in a way not typically achieved in traditional education. Constructive alignment is the underpinning concept behind the current requirements for the design of education at the UT, as it has shown to be a key element for designing effective education (Smith, 2008). In the minor FitP, the constructive alignment has been implemented creating a direct interaction between the learning goals, the teaching methods and the assessment tools (Figure 9). Here we will talk about the transformation of the ILOs in the last 2 iterations of the minor. Their final form (Figure 10, bottom) is the basis for the

alignment of the teaching methods (discussed in chapter **Active, effective and efficient learning methods and materials**), and the assessment tools (discussed in the chapter **Assessment**).

a. ILOs

In Figure 10 (top), you can see the ILOs of the minor FitP for the academic year 2018-2019. I started as the minor coordinator for the year after. For the academic year 2019-2020m the ILOs had the form you can see at the bottom part of Figure 10. The modifications in the ILOs were performed for several reasons:

- ❖ The use of Blooms Taxonomy (Bloom & Krathwohl, 1956) to describe ILOs with different levels of complexity (Figure 10).
- ❖ Better use of the appropriate verbs for composing ILOs according to the UTQ course Designing a lesson and a Course.
- ❖ Create specific and measurable ILOs
- ❖ Better grouping of related ILOs in order to give a more compact list and enhance comprehension of the ILOs by the students.
- ❖ Reflect the changes occurred after the introduction of CBL and the impact this had on teaching methods and assessment.
- ❖ Eradicating ILOs or parts of ILOs that were no longer relevant due to slow changes in the implementation of the minor.
- ❖ Aligning the ILOs with the context described previously and with my own research.

After finalizing the minor From Idea to Prototype the student is able to:

- 1 • Analyze the problem/design challenge so he/she can formulate a specific research question which integrates multiple disciplines
- 2 • Communicate professionally with the target group and commissioner, and takes their needs into account when determining the requirements
- 3 • Describe the aspects of design-based research and can select an appropriate research method for the project
- 4 • Apply a design process while working in a multi-disciplinary team
- 5 • Design and compare several concepts and choose the best based on a set determined requirements
- 6 • Apply resources management to ensure a realistic product given the time, costs, scope, set requirements, and marketing of the project
- 7 • Communicate the designed concept, process, and value proposition
- 8 • Reflect on the impact of the chosen solution on its context and society
- 9 • Reflect on his/her own contribution to the project, based on disciplinary knowledge and academic skills.

After finalizing the minor From Idea to Prototype the student is able to:

- 1 • Collaborate & communicate with multi-disciplinary team members and stakeholders. (Applying)
- 2 • Address a given design challenge by:
 - Analyzing and breaking it down to several specific research questions. (Analyzing)
 - Applying design-based research and other appropriate research methods. (Applying)
 - Composing requirements that integrate the needs of different stakeholders and different domains. (Applying)
 - Designing several concepts and compare them based on the composed requirements. (Creating)
 - Using resource management to construct a prototype that considers the trade-off between various requirements in multiple domains (time, costs, marketing, etc.) (Applying)
- 3 • Validate and demonstrate the designed solution and elaborate on the design rationale. (Evaluating)
- 4 • Evaluate and critically reflect:
 - On the impact of the chosen prototype solution on its target group and society. (Evaluating)
 - On their own contribution to the team, based on their disciplinary knowledge and academic skills. (Evaluating)

Figure 10 On the top of the figure the ILOs when I started with the redesign of the minor. On the bottom part the current ILOs after thematic grouping and consideration of Bloom's taxonomy (in brackets the levels of each ILO in the taxonomy).

3. Active, effective and efficient learning methods and materials

In line with the principle of constructive alignment, the learning methods and materials are designed in alignment with the ILOs as described in the previous chapter (ILOs) and with the assessment (see Figure 12 and chapter **Assessment**). Figure 11 shows which ILO is addressed for every lecture/workshop offered in the minor FtP. A similar approach was employed regarding the alignment between ILOs and Assessment (more on that in chapter Assessment). As it is evident from Figure 11, the ILOs are mostly addressed by an equal number of lectures/workshops. However, the recent evaluation of the minor (see chapter **Evaluating Teaching**) demonstrated that ILOs regarding reflection and collaboration (ILOs 1 and 4) are currently not receiving a fair amount of support by the current teaching activities. This is the current curriculum of the minor, however, keep in mind that due to the undergoing changes and the inclusion of CBL and the recent evaluation of the minor, this table will soon be revised to fit the new version of the minor. This is planned as a workshop with all the teachers that currently provide lectures and workshops, where the table presented in Figure 11 will serve as a base of discussion for the redesign of the current curriculum. In order to learn about effective modern educational methods, I followed the course Designing a lesson and a Course, the course on Practical Teaching Skills, and I followed the Online demo: IT-tools for learning & teaching by TELT (TOM 2.0 voucher) to keep being aware of all the recent developments (see also appendix **Attended courses and workshops**).

Learning Objective	Lecture/Workshops												
	Research Methods	Multi & Interdisciplinary Collaboration	CBL Workshop	Design Approaches	Design Thinking	Iterative Design	Ethics of Design	Design Requirements	Behaviour Change Tools	Reflection	Arduino & Programming	Stakeholder Analysis	Value Proposition
1													
2a													
2b													
2c													
2d													
2e													
3													
4a													
4b													

Figure 11 The table presents the alignment between the ILOs and the lectures/workshops offered by the HTHT minor From Idea to Prototype.

Lecture/Workshop	Assessment						
	Formative Assessment			Summative Assessment			
	Motivation Letter	Assignment Proposal	Midterm Presentation	Report (60%)	Individual Reflection (10%)	Final Presentation (30%)	
						Peer Assessment (10%)	Expert Assessment (20%)
Research Methods							
Multi & Interdisciplinary collaboration							
CBL Workshop							
Design Approaches							
Design Thinking							
Iterative Design							
Ethics of Design							
Design Requirements							
Behaviour Change Tools							
Reflection							
Arduino & Programming							
Stakeholder Analysis							
Value Proposition							

Figure 12 The table above, shows the alignment between all the assessment methods applied in the minor From Idea to Prototype and the teaching methods used.

a. Implementation of changes

- Since my coordination started, I added a lecture given by me and my own research, namely: Design requirements (trade-off between research and education is part of my vision as seen in Figure 1).
- I have created specific rubrics for all the forms of assessment involved (see chapter **Assessment** and appendix **Rubrics**). This helped the students be in line with the expectations of the assessors and adjust their learning to that end. Also clear rubrics enabled a better assessment procedure, since multiple assessors are assigned per assignment. A detailed rubric safeguards consistency, transparency and fairness in grading when multiple people are involved.
- The module has adopted the CBL approach to facilitate interdisciplinary (ID) education for students from multiple programmes (the minor FtP is open to all university programmes) and diverse disciplines from across applied and social sciences. The recent introduction of CBL and the necessity to communicate with multiple stakeholders, led to introduction of a CBL workshop and a Stakeholder Analysis workshop (since 2020). The introduction of CBL and the consequent hands on involvement of the challenge providers led to a significantly more interactive experience for the students (Kohn Rådberg et al., 2020). Additionally, CBL supports and

promotes self-driven learning (in line with Shaping 2030). This was especially important for the minor FtP, as the group composition may differ every year (in terms of disciplines). The opportunity that CBL gives to the students in order to define a challenge from a broader problem based on their expertise and interest was a great benefit for the minor. As authentic real-world challenges are inherently multidisciplinary, and the minor FtP welcomes all the programmes of UT, CBL is designed for multidisciplinary teams working along with the partners from the 'challenge' context to collaboratively address the challenge (Magnell & Högfeltd, 2015). Students have opportunities to integrate new knowledge with existing knowledge thereby making learning more effective (Gero, 2017) and improving their motivation to learn (Zhou & Krogh, 2019), and also be in line with the ILOs of FtP. It is not certain if CBL resulted in an improvement for the minor, although the evaluation showed very promising results (see chapter **Evaluating Teaching**). However, in the year after its implementation we have noticed a slight improvement in the quality of the deliverables by the groups which was reflected in their grading (Figure 13).

- A noticeable problem within the minor (especially the year 2020-2021 due to the lockdown), was the domination of the minor by psychology students. This created complaints and difficulties in the addressing of technical challenges (see also chapter **Evaluating Teaching**). In order to account for this, I contacted all the programme coordinators and ask them to promote our minor on the CANVAS pages of their programmes and also the websites. To this point (as currently I organize the minor for the year 2021-2022), the results of this measure are still unclear.
- In the past, it was decided which student group get which challenge based on preference and in case of overlapping interests based on a first come-first serve process. This resulted in groups not being satisfied with the assigned case (best case scenario) or even not being able to deliver a satisfactory results due to lack of relevant disciplines (worst case scenario). Based on this evaluation of the first iteration of the minor in 2019-2020, I implemented the intermediate step of a motivation letter (see Figure 14) regarding the challenge selection and assignment to groups. This way, we can ensure that the groups that receive their first choice do not do so due to good timing or chance but mostly due to merit.

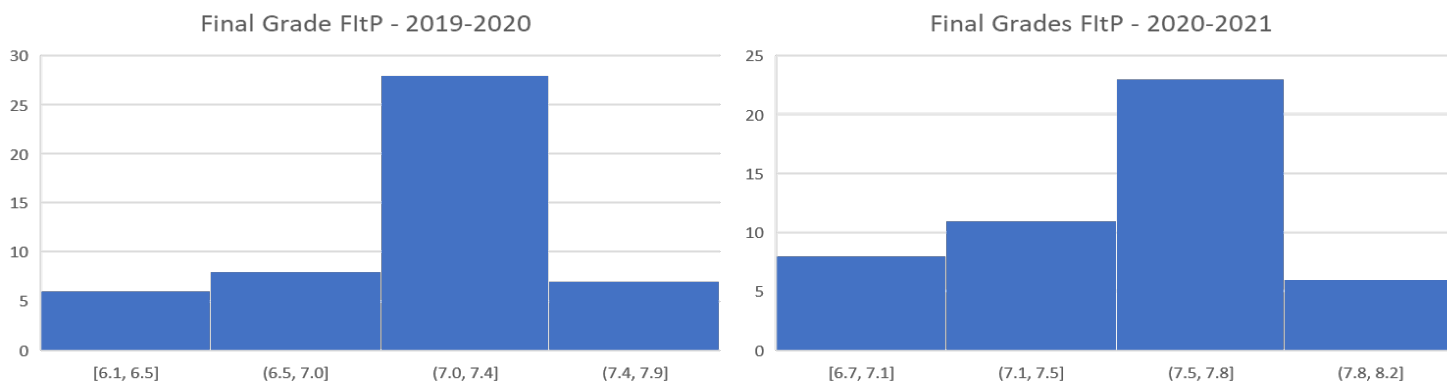


Figure 13 Final grade distribution of the students of the HTHT minor From Idea to Prototype in the years 2019-2020 and 2020-2021.

Learning Objective	Assessment						
	Formative Assessment			Summative Assessment			
	Motivation Letter	Assignment Proposal	Midterm Presentation	Report (60%)	Individual Reflection (10%)	Final Presentation (30%)	
					Peer Assessment (10%)	Expert Assessment (20%)	
1							
2a							
2b							
2c							
2d							
2e							
3							
4a							
4b							

Figure 14 The table above, shows the alignment between all the assessment methods applied in the minor From Idea to Prototype and the ILOs.

- The last change I have implemented is the change of the process tutors from being student assistants to being PhD students and assistant professors. This way I can ensure that the process is monitored by an experienced tutor

b. Activating and Variable Teaching Methods

As mentioned previously the implementation of CBL with all its advantages is the major change I have implemented in an otherwise very well design minor with regards to activating teaching and variability in teaching methods. However, in this chapter I would like to describe and motivate the use of the most important activating teaching methods that are used within the minor FtP.

- **Curriculum and Design:** Regarding the design of the curriculum, we offer multiple lectures/workshops (see Figure 11). The implementation of these is done in a way that each lecture is given by an expert in the field coming from various scientific and non-scientific backgrounds. Therefore the students are exposed to variable and diverse activation methods ranging from hands on workshops to small assignments and in class experiments, as well as traditional interactive lectures and quizzes. The design of the timetable for the minor is such that all courses and workshops are given before the midterm. Therefore, when the students receive feedback during their midterm presentation, they have enough knowledge (stemming from the provided education) and time to implement te feedback and finalise their prototype in time.

ROUND 1

- The questions:
 - Where do you come from?
 - What are your ages?
 - Where do you normally study? (in which building)



ROUND 2

- This round will be played 3 times, 5 minutes per time
- Discuss the following topics in pairs of 2:
 - What is your name?
 - What are you proud of?
 - Name one skill you are good at and one skill you would like to develop yourself on
 - Name the knowledge domain you are good at and a knowledge domain you would like to develop yourself in



ROUND 3

- This round will be played 3 times, 5 minutes per time
- Discuss the following topics in pairs of 2:
 - What is your name?
 - Explain which case you think is most interesting and you would like to continue with
 - Explain which case you think is the least interesting



ROUND 4

- During this final round you will form the project groups.
- Use the following conditions:
 - Form 8 groups
 - Minimum of 3 (or 2 depending) different disciplines
 - Minimum of 2 different nationalities
 - Mix of genders in the group
 - Groups of 6 (+1)
 - Rank the cases in order of preference



Figure 15 The 4 rounds of the speed dating game for student group formation.

- **Introduction Lecture:** The introduction lecture is an interesting example of activating methods. After a presentation by the minor coordinator that explains the structure of the minor and all the information needed to the students, the challenge providers in person present their case and try to “sell” it to the students in order to attract their attention. Afterwards, the students are invited to make their groups within 4 rounds of “speed dating” (see Figure 15). This way the students form their groups in line with their interests after they get to know each other and additionally in line with the constraints imposed by us to promote balance (more than 2 different disciplines more than 1 nationality, and gender balance). This way the students get to know each other and form personal bonds already from the beginning and additionally in line with student driven learning, they are in charge of the composition of their team. After they form their groups, they mail the composition to the coordinator together with a top 3 priority for the challenges presented earlier and a motivation letter (see Figure 14) for the one they prefer the most (with a focus on the utilization of the group disciplines). After the challenge is assigned, the groups need to submit to their tutors and challenge providers a research proposal (see Figure 14). They have their first meeting together and use this document as a basis for their planning and receive feedback from professionals.

- **Out of Comfort Zone Week (OOCZW):** Another method we apply in this minor to activate the students is the OOCZW. This is a week (usually week 5 of the minor), that the groups of students receive an assignment by another group. This way the students get to see what the other groups working at and at the same time benefit from the knowledge of other groups and an outside perspective on their work, as they have said themselves in their evaluation (see chapter **Evaluating Teaching**). Additionally, it puts them in the position that they need to offer an assignment to another group and therefore makes them think about their approach and understand better how assessment works, as they need to submit an evaluation of the work that the other group did for them, based on the agreements they have conducted with them. This way they get to teach each other which is beneficial for knowledge retention (De Bruyckere, 2018).
- **Midterm:** Continuing with the formative assessment and the provision of feedback, we give the chance to the students to present in front of their peers in the form of a midterm (see Figure 14). Experts, tutors and challenge provider have the chance to offer feedback regarding the groups progress. This way the students receive variable extensive feedback and are able to rectify potential mistakes in their approach. The groups of students are encouraged to ask 2 questions to the audience at the end of the presentation. We conduct the midterm in two parallel sessions with 4 groups in each session.
- **Final Presentation:** Similar to the midterm the final presentation is split into to parallel sessions with 4 groups each. The students present again in front of their peers, tutors and challenge providers. After the presentation they are asked questions and need to provide answers. When the questions round is done, the tutors and the coordinator grade them and at the same time their peers do the same with the use of Google forms. This way the final grade is a combination of the tutor/coordinator assessment as well as the peer assessment.

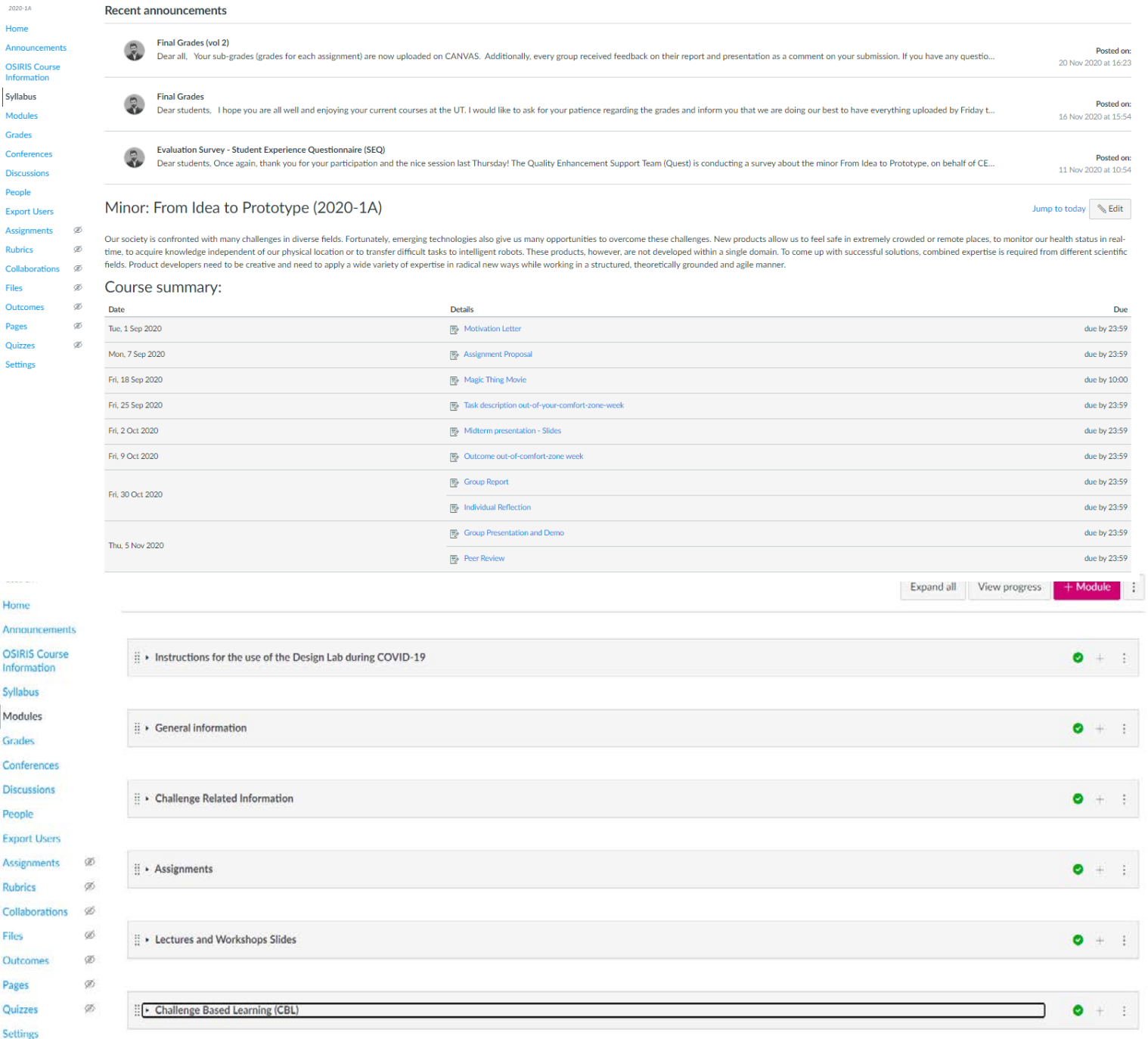


Figure 16 Screenshots of the CANVAS page of the minor From Idea to Prototype. The top view shows the home page for the students and the bottom view the supporting material.

- Blended Learning:** Even before the Corona times the CANVAS page of the minor FtP was up to date and approved by the faculty e-learning expert. Blended learning plays a very important role in education and has advantages, such as progress tracking, personalisation and provision of feedback. This proved to be beneficial, as the pandemic made the use of CANVAS integral for

education. Students that join the minor see the home page with a short description of the content and an up to date list of all the deadline dates already implemented as calendar events (see Figure 16 top view). By clicking in any of those assignment deadlines, the student is linked into a page that describes the assignment, offers the rubrics that will be used to evaluate the result and also instructions on how and when to submit. The canvas page is being annually evaluated by an e-learning expert to streamline it and make sure it is clear and useful to the students. In the bottom of Figure 16, you can see all the supporting module. The student got specific safety and sanitation instructions regarding the use of the Design Lab, general information about the minor in the form of CANVAS pages (based on the chapters included in the manual and directly linked to all assignments and rubrics), and information related to the challenges they are assigned this year. Additionally, all the slides of the lectures and workshops are uploaded in CANVAS and extra information on CBL are given to the students. The teachers of the minor have also rights in the CANVAS page, a fact that makes it a dynamic and interesting platform to support the students.

c. COVID-19 Adaptations

Due to COVID-19 and the subsequent consequences a few of the previously described active learning techniques were adapted. However, this situation also created interesting opportunities for teaching.

- Due to the good level of the CANVAS information, and the flexibility of the lecturers in delivering online education, the minor was able to offer education to students that were not even able to visit the Netherlands or live here due to the imposed lockdown or their own fear of being unsafe. Additionally, in close collaboration with the Design Lab we were able to offer safe on campus education every Friday. This way we adapted our education to the needs of the students and at the same time promoted psychological safety, which is critical to learning (Borrego, Karlin, McNair, & Beddoes, 2013). We showed high flexibility in adapting all the teaching and assessment in an online setting starting from the speed dating (with the use of CANVAS breakout rooms), and finishing with the final assessment.
- The fact that the students were on campus every Friday (4 groups in the morning and 4 in the afternoon) led to the necessity for supervision of them in order to make sure that they comply to the rules and regulations regarding COVID safety. This seemingly tedious duty, however, created a very interesting outcome. The students were able to talk to me whenever they wanted and receive fast feedback and instruction, as they now I would be there the whole day. This reduced the amount of e-mails I usually receive with questions. Additionally, it allowed me to see how the groups work and prevent/attenuate conflicts and dead ends. All in all it is a teaching method that I plan to retain even after the pandemic.
- As the midterm and final presentations had to be in CANVAS we adapted the format. We invited all the interested parties in a CANVAS conference, however in the midterm we have noticed that student participation in asking questions and giving feedback was very limited. In response to that, for the final session, we asked the students in advance to pay attention to the presentation of a specific group and prepare questions in order to lead the discussion. This highly increased student participation during the final session.
- Since 4 groups were meeting on campus in the morning and 4 in the afternoon, we had to pair them together for the OOCZW to make the process easier. However, in order to also have them

mingle we shuffled the groups for the midterm and final presentations (2 morning and 2 afternoon groups in each parallel session). This way all the groups had the chance to see what their peers were doing during the minor.

4. Teaching tailored to the needs of the students.

a. Course design for students prior education and interests

- Prior knowledge plays a very important role in the design of education because.....(de bruykere). Our students come from all the possible programmes of the UT (the majority is split between mechanical engineering and psychology). Due to this fact, we have a great variability of background and prior knowledge. In line with this, the minor is designed in a way that focuses greatly into goals such as multidisciplinary collaboration and communication (ILO 1), as well as demonstration of the proposed solutions in a broad context of stakeholders, while taking their needs into account (parts of ILO 2 and ILO 3). This way, the students are challenged to move out of their comfort zone, where learning is happening. We have noted that indeed most students from different disciplines do not find the discipline related ILO (ILO 2) difficult but the collaboration with other disciplines. However, after the end of the minor their appreciation of the role of other disciplines reportedly changes and their communication with other disciplines is enhanced (see chapter **Evaluating Teaching**).
- In order for students to learn outside of their comfort zone in multidisciplinary teams it is very important to offer the appropriate support from the teaching staff (Warr & West, 2020). Otherwise they move outside of the comfort zone to the panic zone, where there is no or limited learning (Panicucci, 2020). In order to achieve that, each student group is supported by a process tutor, a challenge facilitator and a challenge provider (for a more detailed explanation of their roles see chapter **Microscopic context:** or the **Appendix Manual**). This offers a diverse team of people that the students can talk to and exchange ideas with. The variable backgrounds of the tutors (spanning from engineering and design to psychology and philosophy), help with the appropriate scaffolding of the multidisciplinary groups. Additionally, the challenge providers and facilitators are also coming from diverse fields and study backgrounds.
- Additionally, every year we introduce problems and challenges that are of technical as well as of non-technical nature. Additionally, the introduction of CBL allows students to define the challenge they want to address from the main problem based on their disciplinary composition. This way the challenges are always tailored to the needs of the group, as the students themselves are able to define them based on their needs, interests and prior knowledge.
- Despite the logistics difficulty and the situation with the COVID-19 crisis, I insisted in keeping a hybrid education when possible. Together with the Design Lab, we managed to achieve a corona proof once a week physical session on campus. This success resulted in better bonding between the students and helped them to get to know each other and overcome the fact that they belong to different programmes.

b. Course design for diversity of students

The groups according to the instruction of the coordinator are split with a balance in disciplines, nationalities and genders. This creates interesting blends of students but is also a growing bed for conflict. The minor deals with this potential issue in various ways.

- As mentioned before the tutors are Ph.D. students and assistant professors with experience in project management, working with multidisciplinary groups and various nationalities and also from different countries themselves (last year all 8 tutors were from a different country). This way they have understanding of how different cultural backgrounds perceive education and can manage those multicultural groups better.
- Besides that I wrote with the help of Lisa Gomer a document (see **Appendix D – Tutor Guidelines**). This document is distributed to the tutors as a way to deal with potential situations that may arise during supervising a group of students. Additionally, the tutors receive training by the minor coordinator prior to being assigned to a group, as well as a CBL workshop by an expert. In case of situations getting out of hand (there was a case of a reported sexual harassment), they report to the coordinator and the coordinator together with the student and the student advisor is attending to the situation. According to the evaluation of last year though with respect to interdisciplinarity in the minor and its effectiveness it was pointed out that some students did not perceive the offered support as sufficient (see **Evaluating Teaching**). Therefore, we are in the process of implementing bi-weekly meeting with the tutors to keep them and us up to date as well as train them if needed.

c. Course design for self-driven learning and critical self-reflection

- There are several instances where self-driven learning and reflection is an integral part of the minor. To start with, ILO 4 is fully dedicated to reflection (especially 4b). The students are required to write an essay and self-reflect on their role to the project based on their disciplinary knowledge and personality. This accounts to 10% of their grade (see Figure 14). Additionally, the reflection essay fits the ILO 1 of the minor in the sense that students are assessed in soft skills that will be essential for future job seeking (we do not give them only disciplinary knowledge, as they already have that from their own programs).
- The students are encouraged (see **Appendix B – Documentation of the HTHT Minor From Idea to Prototype** for more details) to make use of the facilities of the design lab, as well as all the experts provided by the minor team. Outside of that though, they are also encouraged to use their own network and all the available experts on campus. This way they are able to grow their network further. Our recent collaboration with NovelT for the CBL assisted in this direction as the students are able to use the expertise and resource of NovelT as well. A result of this was a group negotiating the commercialization of their prototype with Volker Wessels.
- The students sign a contract with the challenge providers regarding the intellectual property (IP) of the solution they will develop. The students have the first right of refusal (the right to claim or refuse IP), and the company may or may not offer to buy it from them. This promotes self-responsibility as the student are independent in their pursuit of a solution. Additionally the exposure to multiple stakeholders and the balances that need to be kept, (always with the support of the coordinator, facilitator and tutor) is very useful regarding learning to properly communicate with multiple stakeholders (ILO 1) and promotes student-driven learning. At the end of their report, the students are asked to explicitly indicate if they agree with the public dissemination of their work (see manual in appendix **Manual**)
- Student-driven learning is one of the main pillars of CBL. Students are in charge of defining their own challenges and develop their own learning objectives. Therefore they share responsibility in

their own education. In the minor FtP, however, we still did not manage to include self-developed ILOs for our students (mostly due to logistic constraints), but we are considering this for future implementation.

5. Designing the teaching within logistic constrain

a. Course design with a sustainable budget & logistics in mind

With the logistics and budgetary constraints in mind, the minor design process took the following actions to ensure sustainability:

- Every year we constrain the number of students that can follow the minor FtP to a number of 48 students. This number results in 8 groups of 6 students. This is a manageable number of groups considering the following:
 - As CBL becomes implemented university-wide, it becomes increasingly difficult to attract more than 8 authentic challenges
 - The use of assistant professors and Ph.D. students as process tutors means that we have a limited pool of qualified candidates for the role (considering also their large workload)
 - In CBL a number of 6 students per group is recommended as more than that might lead in lower participation of some students in the process
- We have decided for the latest iteration of the minor, to split both the midterm and the final presentation into two parallel sessions of 4 groups in each. This was done because in the past the presentation process took more than 8 hours resulting in exhausted students and staff. Then all had a hard time to focus in reviewing the last groups in the presentation schedule. The implementation of this measure showed already this year to be a large improvement regarding the process. The fact that the coordinator of the second part of the minor package was willing to assist made the process possible.
- As mentioned previously but also in the chapter **Evaluating Teaching**, As a future improvement I want to meet with all the lecturers. This will be an attempt to try to align the lectures with the deliverables and with each other and update the current curriculum. It is a strenuous process considering the logistics of such an attempt, but, I believe that it will result in a smoother educational process. Therefore the shortly strenuous process may assist the long-term sustainability of the minor.
- Lastly, regarding the financial support of the students during the minor, we rely on the support of the design Lab and the fact that we are free to use their facilities (3d printers and laser-cutters), as well as on the support from the challenge providers (if they are willing). In some cases students are using material and equipment from other courses or even their own things. Lastly the department of DPM, is in-kind lending the students a programming kit to practice their programming skills and even use it for their prototype.

b. Course design with a sustainable time expenditure in mind

- The process of grading is split between the two coordinators, the process tutors and the students for their peer review. This allows for inter-rater reliability (see also chapter **Assessment**), as always at least two staff members grade every student output and makes it possible to perform the grading within 10 days.

- The introduction of CBL resulted in providers being actively involved and work together with the students. this reduces the time I have to put in as there is a lot of experienced support for the students, and frees me to deal with other issues, where I can be of better use.
- As I decided to adopt the measure even after the COVID-19 crisis is over and be every Friday with them, it seems that this creates a straining my timetable. However, compared to the time I usually was spending in answering e-mails in the past, this reduces my workload.
- Struggles with giving personalised feedback and pay attention to individual students
- The complete implementation of CBL that we plan for the minor requires a large amount of time to be prepared, but also to be implemented. This is the reason why I adopted a slow integration of CBL in the minor, by introducing new components every year. This way, even with the low capacity that the minor currently has, we can innovate and shift towards CBL.

II. Teaching and Supervising

In this chapter you will read about the teaching and supervising competences of the author as assessed, by experts, students and colleagues. This is part of competence 2 (see Figure 17) and the ecosystem around it. The chapter starts with the preparation for the teaching assessment by an educational expert and the importance of a well aligned lesson plan. It continues with the results and reflection upon the educational assessment and finishes with the students supervision in groups and individually. Figure 17, shows in a nutshell the most important elements of teaching and supervising, and their interconnections.

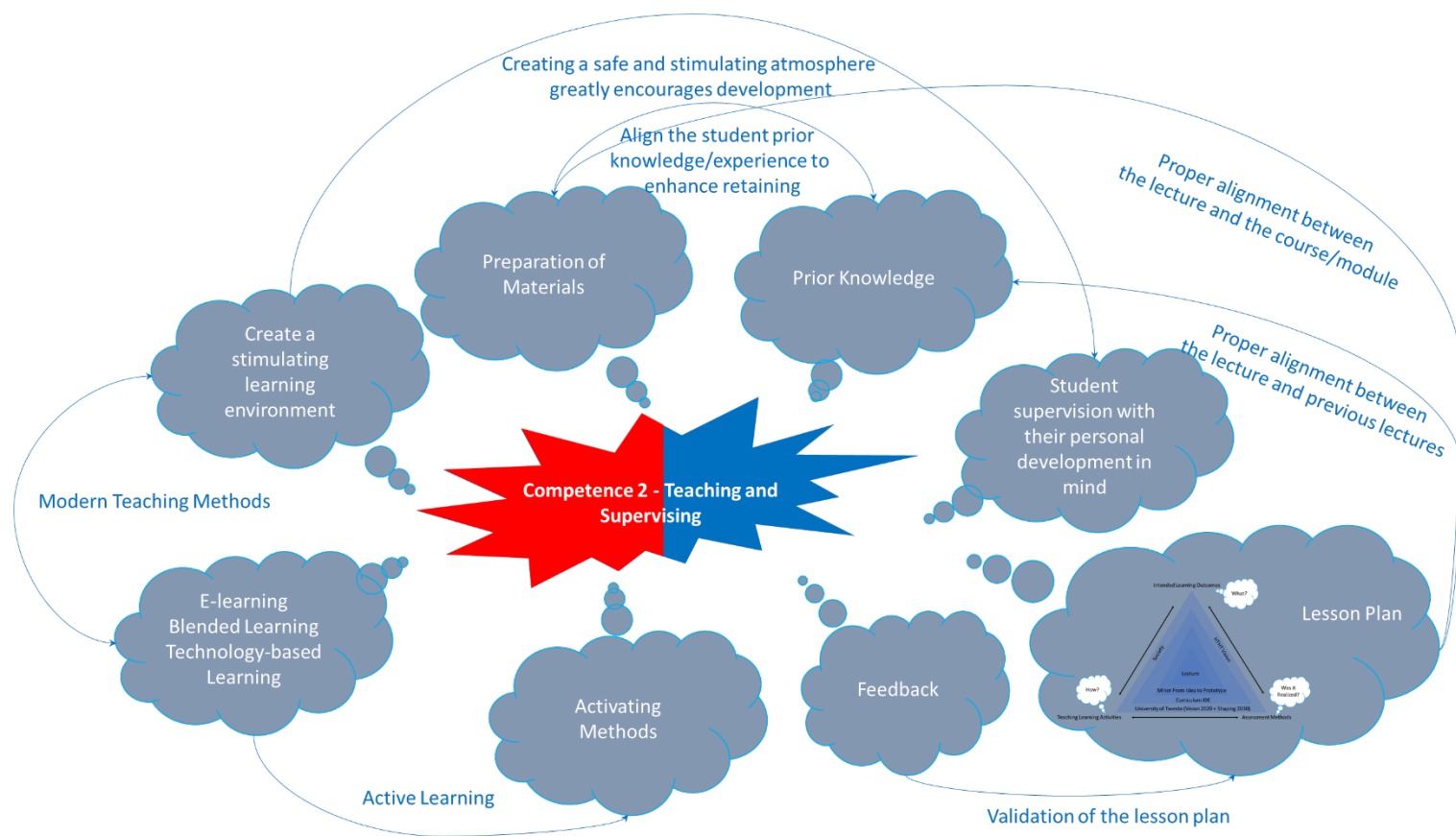


Figure 17 The above mindmap describes the ecosystem of Competence 2. Every component described in the clouds, interacts with other components and together ensure that teaching and supervising is in alignment with the course/module goals (constructive alignment), it is based on previous knowledge/experience and contributes to student development.

1. Preparing an educational meeting

a. Preparing for the assessment

In the beginning of my journey towards the UTQ (2019), I was informed by my UTQ supervisor about the educational meeting assessment and reflection. According to the instructions I started by looking for the appropriate context to execute the educational meeting. As I was not actively coordinating or organizing my own courses at the time, I used one of my guest lectures as the context for this assessment. The lecture was entitled **Social Impact and Risk Analysis**, and was conducted within another HTHT minor, entitled Biorobotics.

A few months earlier, I considered an important step to also get assessed for my English level before entering a class. The results of that assessment was a level of C2. The assessment can be found in appendix English language assessment.

Two weeks prior to the educational meeting, I contacted an assessor to arrange the details. It was decided that due to the high workload at that time, that I will record the educational meeting and deliver the recordings to the assessor in order to proceed. The recording was in line with GDPR guidelines. The students were informed in advance that there would be a recording and the purpose of that recording. We asked them to declare prior to the lecture if they did not consent. No faces of students were recorded, as the camera was always pointed towards the lecturer.

The first thing to prepare at that stage was the teaching material. I did that myself and later I shared it with my UTQ supervisor. This feedback round greatly benefited my material as it was revealed that not enough activities were included and that the lecture was a bit monotonous. After the feedback I updated my presentation and in line with the preparation steps, I have created a lesson plan and send it to the assessor as well (the lesson plan can be found in Appendix Lesson Plan).

b. Lesson Plan

The lesson plan was prepared in line with the constructive alignment principle (as described in chapter Constructive Alignment). In Figure 9, you can see that this principle can extend to the general goals of the university and also zoom in to the specific goals of a lecture. I first contacted the HTHT minor coordinator Arvid Keemink, in order to discuss the ILOs of his minor and define together the ILOs of my lecture. The ILOs of the minor I was invited to give the guest lecture were:

- 1. Systematically approach a design project from user requirements to device evaluation. (synthesis and evaluation, with a little bit of application and analysis)**
2. Design a robot for application to a biomedical problem using multidisciplinary knowledge from mechanical, electrical, control and software engineering domains. (application and synthesis)
3. Create a kinematic model of the robot to control the joints to perform useful movements and tasks.(analysis, synthesis, application and evaluation)
4. Extract biological signals from the human body that can be used to control a robot. (application and synthesis)

My lecture was decided to be in alignment with the first ILO (in bold) and the available duration in the schedule was 45 minutes. Additionally, it was decided that my lecture would be built on the lectures received the week before and that it would close the cycle of the specific ILO (last lecture on ILO 1). The number of expected students was 150, and they were mainly 3rd year engineering students from UT. In line with these points, we created the ILOs of the lecture (Figure 18):

1. Define social impact
2. Relate design choices to social impact
3. Apply social impact analysis
4. Apply risk analysis

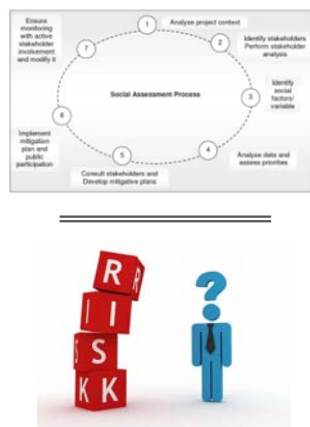
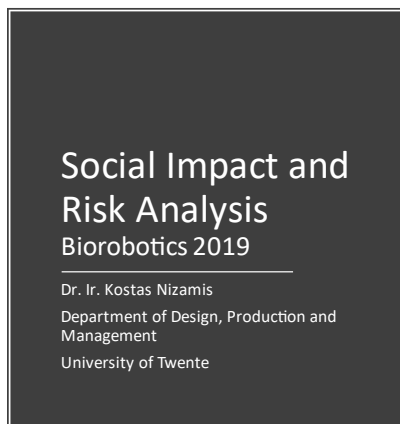
Due to the time limit and the large number of students, the students were asked to study one article prior to the lecture as preparation. The article would then serve as the basis for a small in class exercise. They were provided one week ahead with the article they needed to prepare, as well as some supporting literature to study after the lecture. Those were given as links in order to comply with the UT guidelines to avoid copyright issues. Additionally, I created an excel template for a second in class exercise. All these were uploaded timely on CANVAS and accompanied by an announcement that explained their

purpose. My lesson plan included all the activating learning activities, the teaching material to be used, the preparation required by the students, an assessment plan for the presented ILOs and a detailed time plan for executing the educational meeting (see **Lesson Plan**). This plan was agreed upon with the minor coordinator, and my UTQ supervisor. Subsequently it was sent to the assessor.

2. Conducting an educational meeting and reflecting

a. Conducting the meeting

The lecture started with the introduction of myself, the topic and the ILOs (Figure 18). The students were presented immediately with the ILOs in order to manage expectations and also they were told how we will achieve each ILO (see brackets in Figure 18, right).



Learning Objectives

- Define social impact (Definition and discussion in class)
- Relate design choices to social impact (Listing)
- Apply social impact analysis (In class group activity)
- Apply risk analysis (In class group activity)

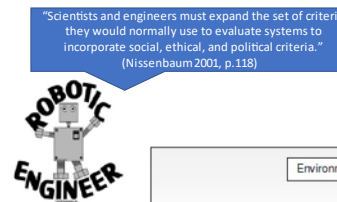
Figure 18 First slides of the presentation prepared for my educational meeting assessment.

In order to activate the students, I decided to use online tools such as Kahoot and Mentimeter (see Figure 19), combined with traditional pen and paper assignments (see Figure 20) in the classroom (blended learning). I used Kahoot (back then Kahoot was free for up to 150 students) to activate their prior knowledge (as this is the most important factor influencing learning (De Bruyckere, 2018)). To achieve this in the most effective possible way, I have contacted the teacher that gave the previous lecture and ask her to attend her lecture. After attending and studying her slides, I have created together

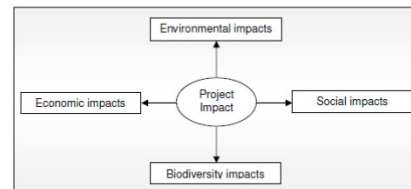


Let's play a game!

Play Time!



Social Impact:
'the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society'
<http://unpan1.un.org/intradoc/groups/public/documents/csg/unpan026197.pdf>



Mentimeter

Figure 19 On the left side, the slide introducing recall of prior learning. On the right side, the integration of Mentimeter in the class is shown.

with her, a series of Kahoot questions to test what the students remembered and help them connect the previous lecture to mine. Each question, then would serve as basis for discussion depending on the amount of wrong answers.

Additionally, I have created a Mentimeter wordcloud (menti.com), in order to discuss the importance of stakeholders in line with my ILOs. This activating method aimed to serve again as a basis for an open discussion. Furthermore, besides those individually answered activities, I employed two group activities in the classroom. One was based on the article the students had to prepare at home. I gave them 3 examples of cases and asked them to match them to the categories described in the article. They had to do this in groups (those were already pre-made by the minor coordinator). I handed them some post-its. After discussing with each other, one person per group would have to take their post its and stick them on a whiteboard, that I had prepared in advance. The last group exercise, was the risk analysis. For that purpose, I had prepared and uploaded on CANVAS an excel template to assist the



Figure 20 On the left side, the slide introducing group assignment 1. The text in brackets was hidden and appeared only after the students stuck their post-its on the whiteboard. On the right side, the slide introducing the risk analysis and the excel template to be used in the classroom.

students in their exercise. As the students were working on that, I was walking around and answering their questions. At the end of the class, I had some time saved for questions from the students. If they

had multiple questions or were feeling shy to ask, I have posted my e-mail as well on the slide in order to offer them another option for asking their questions (see Figure 21).

The previously described educational meeting was assessed, and the results of that assessment can be found in Appendix Assessment for my educational meeting and the following chapter.

b. Evaluating and reflecting on the educational meeting

The evaluation of the educational meeting described previously was assigned to an educational assessor from the Centre of Expertise in Learning and Teaching (CELT) of the UT. Maria van der Blij received the recording on my lecture on 9th of September 2019. The lecture slides are available in Appendix Slides from my educational meeting and the full evaluation of the lecture is available in the Appendix Assessment for my educational meeting. The Lesson Plan (as discussed in the previous paragraph) and the related slides of the meeting to evaluate have been sent in advance to the educational advisor. The meeting has been assessed as “Very Good”, by the educational advisor and the feedback provided was very enthusiastic.

Before the assessment meeting, I was asked to create a self-reflection document (it can be found in Appendix Self-Reflection). I compiled this document based on my observations and the observations of the minor coordinator who was present during the lecture.

Personal Reflection:

After the execution of my lecture, I was very satisfied by the quality of delivery. Especially, keeping in mind the large number of students (132 attended out of 150 enrolled) and the limited time (45 minutes). The lecture was received by the students positively and the majority of the students participated in the classroom activities.

The strengths of my lecture as seen by me were:

Thank you for your attention!



For further questions:

k.nizamis@utwente.nl

Figure 21 As I allocated 5 minutes for questions at the end of the class, this is the slide that I used for that. Additionally, due to time pressure, I have included my e-mail in case there was not enough time, or students were too shy to ask directly.

- The immediate engagement of the students attention as we started with a game and recall of prior knowledge

- Recall of prior knowledge was successful, as I have personally attended their previous lecture and developed my questions together with the lecturer.
- Active-blended learning was facilitated with the use of multiple in class activities interrupted by short bursts of theory.
- I was able to handle students questions and inquiries. Walking amongst them during the class assignments was especially helpful to our communication.
- I made it clear to them how they can use the presented material for their final report and assessment.
- I received many questions during and after the class. When asked, I responded calmly and respectfully to the students questions.
- I employed a diverse range of teaching activities, materials and didactic aids during the lecture.
- I demonstrated flexibility during one instance. Some students were not able to see my slides (as a few screens were out of order). To help them , I immediately uploaded my slides on CANVAS and asked them to download them from there.
- Students participated enthusiastically in the in class activities
- I enjoyed the lecture very much and I felt very confident with my task and my audience.
- My lecture was planned in line with the trifecta of Knowledge (Theory), Insight (Discussion) and Application (Activities in class).

The weaknesses of my lecture as seen be me where:

- The main weakness was the underestimation of time.
- The ILOs were not explained in great detail in the first slides. However, this was rectified by detailed explanations during the rest of the lecture.
- Due to underestimating the time constraints, I was able to perform the activities in class, but, barely had the time to discuss and reflect on them.
- During the Mentimeter activity students wrote inappropriate things on the board.
- The performed in class activities with 132 students some times created excessive noise.
- Lately platforms such as Kahoot and Mentimeter are overused by teachers and they slightly lost their initial impact on students.
- I would like to employ think-pair-share in the future, in order to stimulate discussion and peer feedback. However, this may be challenging with this amount of students.
- Whenever, students were too noisy and/or inappropriate, I had a hard time handling the situation (considering the size of the class). My reaction to any such situation was to joke about it in order to de-escalate it or not offer ground for it to become an obstruction to the lecture.
- Students were not so open to answer direct questions or questions that required them to talk instead of typing in a platform (i.e. Kahoot).

Minor Coordinator

The minor coordinator was present during the educational meeting and also reflected on my performance.

Tops:

- Good presentation of the learning objectives.
- The preparation for the lecture was excellent (material, prior communication with the students, planning, etc.).
- Excellent connection to the prior knowledge and to subsequent lectures/activities.
- Good communication and providing instructions.
- Excellent interaction with the students.
- The learning objectives were all achieved in an excellent way.

Tips:

- Good presentation of the learning objectives, however lacking a bit of detail.
- However, instruction went a bit quick. Possibly you should have taken 2 hours, and maybe analyse more examples. Not sure if all the main messages were properly received.
- Unfortunately there is no way around students who mess up your word-cloud or give nonsensical answers on purpose.
- The word-cloud (mentimeter) was made, which cost quite some time, but was never really used. The results of the activities could have been used more for active discussion. Maybe you could have forced several volunteers to the front of the class to discuss something?
- Due to how we planned it, time was a bit short.

Educational Assessor Evaluation

The educational assessor was very positive towards my lecture. She pointed out several Tops and Tips for improvement and also helped me reflect further on my performance and conclude what can still be improved.

Preparation:

Observations:

- Good lesson plan. Well structured time slots and defined teacher and student activities.

Tops:

- Lots of variation and activating methods.

Tips:

- Make some more room for unforeseen events.

Introduction:

Observations:

- Gets attention in a natural way. The importance is related to the objectives (next point).
- Explains the objectives and structure of the lecture.
- Uses Kahoot with four questions to stimulate prior knowledge.

Tops:

- Elaboration on objectives.
- Even though the tool started slow, you kept contact with the group.

Tips:

- What do you think of putting main objective on slide with picture as appetizer?
- Such a tool is very nice, but could it have been done with hands-up?

Core:

Observations:

- Seen just what is describes on the assessment criteria!
- Very clear explanation of the first assignment concerning the article groupwork.
- Explanation of the second assignment concerning the risk analysis was less clear. He asked them to form groups, download the tool and look at his demonstration at the same time.
- While giving feedback he first names the good and then asks further on the incomplete/unclear.
- Assesses performance by all the assignments and by asking questions during his explanations.

Tops:

- Humour! Creates a very nice atmosphere with the students. Is very focused on the group and keeps them involved by continuous addressing them.
- Walks around during assignments, keeps in contact with the students.
- Lots of practice, great!
- No negative feedback.

Tips:

- Make choices in case of not enough time. Better less but good than more but too fast.
- Do you see possibility for students to play a role in the feedback? Now you were the one who discussed the results.

Closure:

Observations:

- This was a bit chaotic because of not enough time. Said there was time for questions but the lecture was already finished.

General Aspects:

Observations:

- Speaks clearly and calmly.
- Addresses students' questions in a correct manner.
- Employs teaching materials and didactic technical aids.

- Took more time for explanation elements but skipped nothing else.
- When talking of students interfered he got the very quick silenced by not talking himself. Keeps the atmosphere very good an the students motivated by variation, jokes, relation future profession, etc.
- Treats students equally and respectfully using phrases as: “There is no right or wrong answer” “Main part is correct but...”
- Expects them to have read the article. Asks questions and repeat them in an other way when no answer is given.
- Good body movement, covers the room, seems relaxed and has much eye contact with the group.

Tops:

- All tools worked and he brought printed articles.
- Students worked motivated on assignments.

Tips:

- Such a tool is very nice, but could it have been done with hands-up?
- You could reward their effort a bit more by e.g., giving them a role in the discussion of the results.

Conclusions

The reflection of myself, the coordinator as well as the discussion with the assessor led to some specific conclusions. The meeting was in the words of the assessor very good: **“During the discussion Kostas was very open for feedback and showed his love for and commitment to teaching and students. This educational meeting was executed very good!”**. The reflection was deemed as: **“The reflection of Kostas showed his insight in the important elements of his lecture an appropriate measures for improvement were formulated”**, but also: **“Kostas may reflect not only on the lecture itself but also on his experience as a teacher and a person”**. In a nutshell the assessor recognized the following strengths:

- ❖ Learning atmosphere(humour, relaxed, contact).
- ❖ Natural way of talking and explaining concepts with elaboration.
- ❖ Student involvement.

And the following improvement points:

- ❖ Time management.
- ❖ Enhance student participation/responsibility (SDL / peer feedback / etc).

Accordingly measures have been taken to improve the points that were perceived as ground for improvement by me, the minor coordinator, and the assessor.

- The lack of time was an issue identified by all and resulting in a problematic lecture, as there was not enough time for all the scheduled material. This was corrected the next year (2020), by making the lecture 2*45 minutes instead of 45 minutes.

- Last year, I have already corrected the way I present the ILOs to the students according to me reflection and the suggestion of the assessor (adding sketches). This is shown in Figure 22.

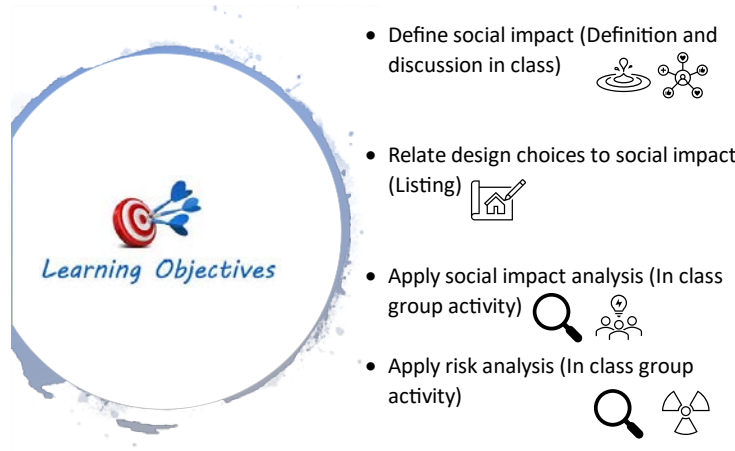


Figure 22 New slide describing the learning objectives using relevant sketches.

- To avoid instances where students cannot clearly see my slides, but also to stimulate preparation and help them keep better notes, I always upload my slides on CANVAS one week prior to the lecture.
- Instead of Kahoot, I have used the CANVAS conference polls for the recall of prior learning by the students. This was also in line with the transition to remote teaching due to COVID-19,

c. COVID-19 adaptations

Due to COVID-19, the University had to adapt to online teaching. This led to several adaptations in the teaching of this specific lecture as described previously. Instead of Kahoot, I used the CANVAS conference in combination with polls as shown in Figure 23. Additionally, I offered the students the opportunity to record the lecture in order for them to watch it later on their own time. Additionally, regarding the planned group activities, I have shared my screen with examples of those activities and discussed it with them and answered to their questions.

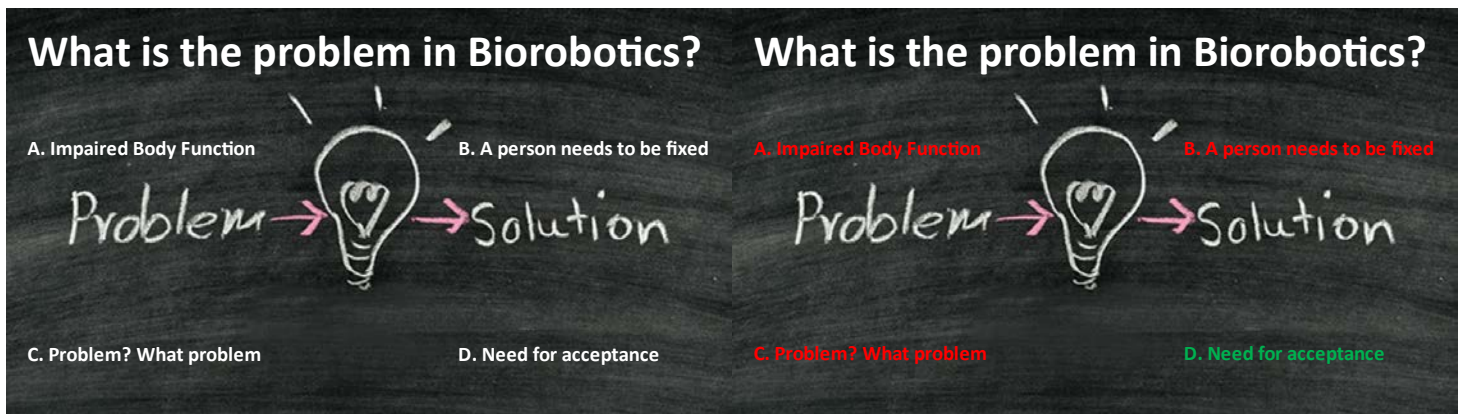


Figure 23 Slide posing the question and then showing the correct answer. These slides were combined with CANVAS conference polls to get the answers of the students.

Here are some student testimonials regarding the course Design Engineering for 1st year Mechanical Engineering students. This was the 2nd iteration of that course and this year it was done fully online without ever meeting the students in person (for the more detailed evaluation look at chapter Evaluating Teaching, and the Appendix Student Feedback and Evaluation of supervision).

- ✓ I really liked the way you teach and keep interacting with us. That is especially nice with all these online lectures to keep me engaged.
- ✓ You really did a great job in making the students an active part of the lecture by encouraging us.
- ✓ Dear Kostas, thank you for making the course so enjoyable. In a time when online learning is shi**y as hell and other courses are boring, yours was actually very interesting and the involvement of us with you was a pleasure to have. Thank you Kostas!
- ✓ It would have been nice to have some test questions before the actual exam. There was the quiz at the last lecture which was very useful but the actual exam questions were a lot harder than those. I would have liked to see like 3 extra questions but at an exam level. Other than that best course so far!
- ✓ This teacher is the only professor who could keep this many people attentive and engaged during the lectures which is a really hard thing to do online. The ambiance in the lectures was really good, a lot of jokes were made, there was competition, but everyone knew their boundaries and when needed this was also pointed out by the teacher. Even with a bit of fun the class remained educational.

3. Student supervision

a. Supervising students in groups and individually

Supervising students is an integral part of teaching at a university. Since the time I was doing my Ph.D. at the University of Twente, I was involved in supervising student groups as a tutor or individual students as part of their Bachelor or Master assignment. Up to this point, I have been the supervisor (more information [here](#)) of:

- 5 Master students (1 currently studying)
- 14 Bachelor students (4 currently studying)
- 1 International Internship
- Approximately 20 groups as tutor (on average 5 per year for the last 4 years)

And mentor of:

- 2 Master
- 9 Bachelor students
- 2 Pre-Master students

Group supervision is distinctly different than individual due mainly to the more complex dynamics. My experience with groups supervision led to the writing of a tutor manual (for more details see **Appendix D – Tutor Guidelines**), which I still use to train/inform my tutors for the minor FITP. There among other things I make clear the importance of setting the tone from the first meeting and do proper expectation management. The rest of the supervision, is greatly affected by the first meeting. For example a group with low ambition may need a lot more motivation while a group with high ambition some raw realism

and a more careful supervision. The most difficult situation is the one where not all student share the same ambitions. There it needs to be clear from the beginning that the tutor needs to manage the balance between the overly ambitious and the not so ambitious student(s). Additionally, it is of great importance to ask the students about what they expect from their tutor/supervisor. My own vision is not to teach them only *what* to learn, but also *why* and *how*. In the first meeting there are some steps I always follow in order to set the tone for the rest of the supervision time:

1. Introducing my self to the students and ask them to introduce themselves to me and to each other. This also includes some information like hobbies or background information that are not related to the content of the course. This helps them to not see me only as a teacher but also like someone that also exists outside of academia and therefore relax and feel more safe (psychological safety).
2. Next, I ask them about what they expect from me and subsequently I state my expectations.
3. We set a weekly meeting on a specific day and time. This helps them to keep a rhythm and not get lazy with their deliverables.
4. We make together a plan including the main milestones and dates for the deliverables
5. We decide together on a file sharing method that works for all of us. This way I can give them feedback asynchronously and not only during our meetings.
6. I establish a communication person, in order not to communicate with multiple students from the same group at the same time.
7. I ask them to send me the agenda for the meeting the latest 24 hours before the meeting. This way, I can sufficiently prepare.
8. The rest of the meetings follow the agenda as proposed by the students. In case I have some points of my own I tell them during the meeting.
9. I avoid giving them direct answers, but instead I ask them what they think they should do. If the discussion will not lead to a good solution, I start hinting towards my opinion.
10. In case they have questions that I am not the appropriate person to answer, I refer them to the correct person (study advisor, student psychologists, a content-expert, etc.)
11. I always adhere to the do's and dont's table that I have created for my tutor guidelines:

Table 1 Do's and Dont's of Tutoring

Based on expert and experienced tutor opinions	
Do	Don't
Put students to work.	Solve the problem for them.
Steer your students to the right people	Try to be all these experts yourself. (design experts, student advisors, programmers, etc.).
Keep your mouth shut more often; observe first.	Feel too responsible for the end result.
Encourage students to come up with original solutions.	push through your own favourite ideas.
Based on my experiences	
Be there for them.	Offer solutions.
Ask them to assess your performance at the end.	Manipulate them.
Give them responsibilities.	Patronize them.

Treat them as professionals.	Ignore them.
Based on students' opinions	
Maintain structure and overview.	Push through your own ideas.
Offer extensive professional knowledge.	Focus too much on your own subject area.
Pull students out of their tunnel vision.	Adopt a passive attitude.
Ask critical questions.	Show that you are uninterested.
Communicate clearly.	Be insufficiently informed about their assignment.
Be involved!	Be indifferent.

Regarding my supervision of students (regardless of individual or group), I always ask my students to evaluate me using google forms (some examples of feedback from the students that I have supervised can be found in Student Feedback and Evaluation). The points for evaluation are most of the times a simple tips and tops document or a more structured (that I developed and start applying recently), that is evaluating me based on my skills in:

- Guidance
- Transfer of Expertise
- Interpersonal Skills
- Motivation
- Time-Management
- Organization
- Feedback
- Academic Development

For my future meetings with students in groups, I plan to apply and test the results of a recent workshop from Marieke ter Maat on *Successful Collaboration in Student-Teams*. There, the Tuckman theory of group dynamics and teamwork (Tuckman, 1965) was presented together with specific activities that we can do with the students depending on one of the five stages (Forming, Storming, Norming, Performing, and Adjourning). An example of an activity that I plan to use during the Forming stage (and it is facilitated by the online nature of meetings currently), is to ask everybody to look for an item in their room and explain why is it special to them. This way we can all get to know each other, and “break the ice” of the first meeting.

Individual supervision is offering the opportunity for a more personalised way of supervising the students. Of course many of the steps mentioned previously are overlapping here (expectation management, motivation, learning how to learn, keeping frequent meetings, etc.). However, the group dynamics are absent and the only dynamics that develop is between student and supervisor. The distinction that is necessary to make here is that MSc. And BSc. Level students are quite different in the way they are supervised. For example MSc. Students are more independent and have a better ide of what is expected of them, due to their experience. Often, I involve MSc. students in the supervision of BSc. students with similar assignments. This way, MSc. students gain more insights and motivations, while at the same time benefiting from the research of the BSc. student. On the other side of this

relationship, the BSc. student can learn a lot from the MSc. student and gain knowledge and better understanding of the bigger picture of the BSc. assignment. Additionally, MSc. students can handle higher level feedback and are required to push through in order to ensure novelty (which is not a requirements for BSc. students). Lastly, MSc. students can in general be trusted with more high-level processes and tasks and their work can and should be published (as I did with half of them (Kapeller, Nagenborg, & Nizamis, 2020; Nizamis et al., 2018)). Additionally, I managed to publish work also with a three BSc. students, which is quite exceptional for a BSc. student ((Nizamis, Rijken, et al., 2020; Nizamis, Schutte, Goseling, & Koopman, 2017; Nizamis, Schutte, et al., 2020)).

Usually the agenda I employ in the meetings with my MSc. and BSc. students includes the following:

- How are you?
- Progress based on the predefined goals (some slides always help)
- Define next goals (long/short- term)
- Problems/Issues/Concerns
- Motivation
- Feedback on documents or ideas
- Confirm availability for next meeting

You can find an extensive list of testimonials from students and Tips and Tops in appendix Student Feedback and Evaluation regarding my supervision in groups or individuals. Here I will summarise a few of the most important and reflect upon them.

Tops

- ✓ *During the project you were very approachable. Mail contact and face to face contact was good. In addition you replies were fast and you really wanted to help us. You offered several times to help us outside the planned tutor meetings when something was not working the way we wanted. It was also helpful that you immediately took action when we had a question, for instance you called someone immediately if you thought he/she had the answer to our question.*
- ✓ *You listened very patiently to our problems and we had the idea that you were interested and tried to help us.*
- ✓ *You made your role as a tutor very clear: not being our boss but a part of the group.*
- ✓ *If we had a problem which you couldn't help us with you could redirect us to people who could.*
- ✓ *Weekly meetings: the more meetings the better, because it obligates us to show some work, and if we don't need to show stuff, we will feel that we have plenty of time (which is not true)*
- ✓ *Finally, and more important: the incentive words you gave me every time I did something more or less ok, it was very very very important for me because it gave me the motivation to keep going, it makes you feel that you are in a nice way*

Tips

- *Remembering the appointments and being there in time.*

- *We had the idea that you, and the other tutors, did not know much about the contents of the courses and the organisation of the module. The coordinator should keep you guys more in the loop.*
- *We were also a bit disappointed when you didn't show up at our presentation, because earlier you said that you wanted to be surprised at our presentation. Therefore we thought that you would come.*
- *Annual plan; in my case in the beginning my assignment was extremely broad, it took me a while to do it, and with the monthly plans, it was not necessary. However, I think it's nice to do a diagram similar the one I did based on the main goals of the assignment*
- *The literature search is very important, but I don't know if writing a review is a nice idea for 9 months. it takes a long time and a lot of effort.*

The Tops presented here are meant to highlight the Do's and Don'ts as presented in Table 1. It is evident that the students no matter if they are in a group or alone, appreciate interest, time availability and approachability. Additionally, frequent meetings, proper guidance (steering them towards the proper experts in case you don't know the answer), expectation management, and motivation seem to go a long way. On the other hand, I still needed to learn that punctuality is very important to them since it shows that you value their time and work. This is an aspect I improved in the course of the years and nowadays I am always punctual. Additionally, another point that is useful for me as a tutor, but also as a coordinator (see **Evaluating Teaching** regarding the point on more coherent support to the tutors of a minor) was the fact that tutors need to understand the bigger picture in order to help the students. Not showing up in their milestone meetings also seemed to be a negative. Planning is very important, but a tutor also needs to balance good enough planning with too much planning. Too much planning may impede creativity and spontaneity. Lastly, something I have learned in time is to identify signs that the student(s) is/are under pressure and they have in their plate more than what they can handle. I received the tip that I need to know what is realistically expected for them.

In the end, as a take home message, I would like to add that the natural supervisor, eventually does not think of rules and behaviours and activities. What we teachers intuitively do at the end, is to supervise by our behaviour. No matter what we tell the students supervising is not only content but it is also teaching by example and making them better people. Telling the students to be organized while we confuse meeting times and appear chaotic is not going to resonate with them. In the end supervisors need to first improve themselves and then try to effectively supervise students.

III. Assessment

In this chapter you will read about the assessment methods and techniques employed in the HTHT Minor From Idea to Prototype as well as an analysis of them. This chapter is part of competence 3 (see Figure 24) and the ecosystem around it. The chapter starts with the design and implementation of assessment (following the test cycle when relevant). It continues and finishes with a short analysis of the aforementioned assessment. Figure 24, shows in a nutshell the most important elements of assessment and its analysis, and their interconnections.

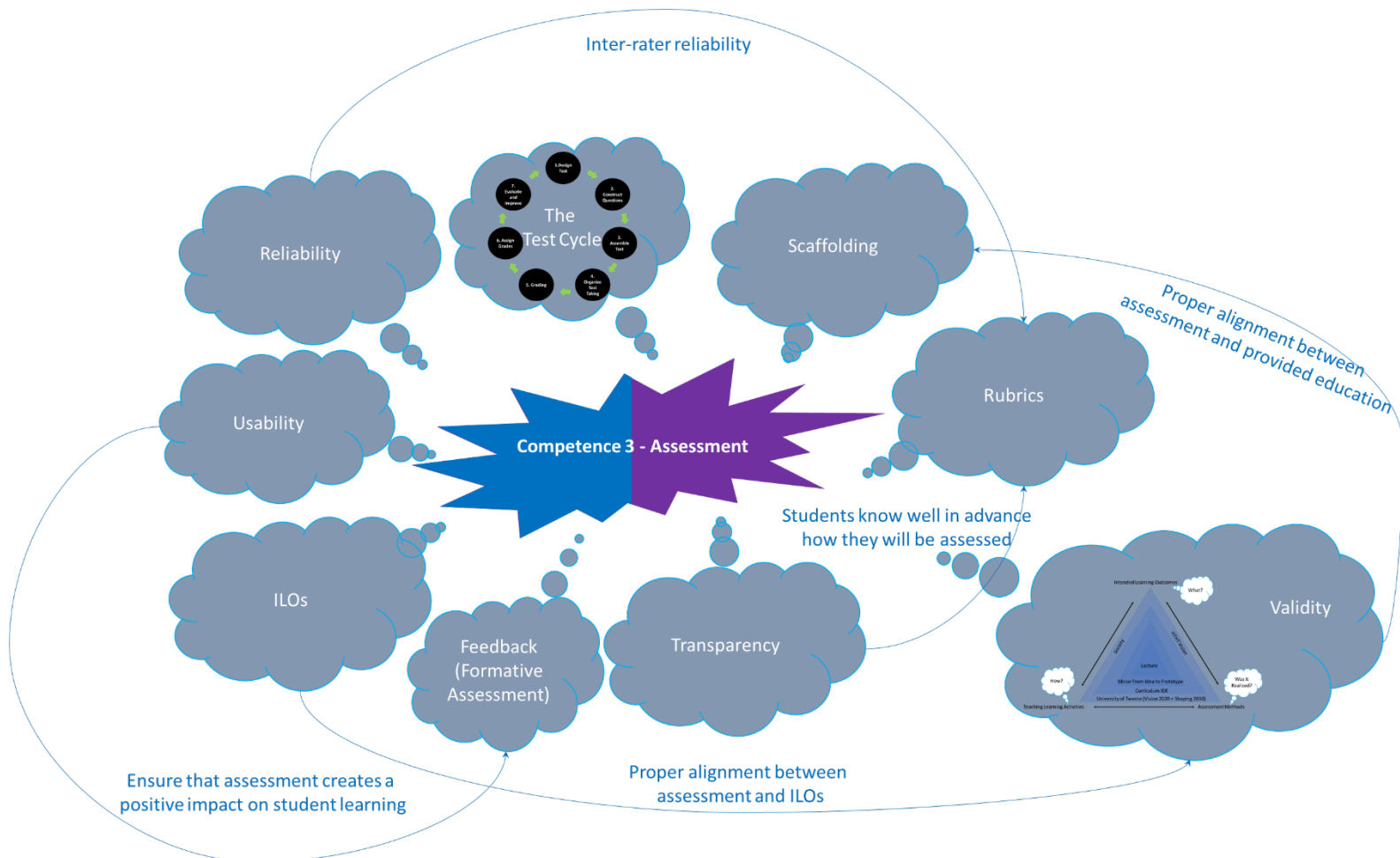


Figure 24 The above mindmap describes the ecosystem of Competence 3. Every component described in the clouds, interacts with other components and together ensure that assessment in alignment with the principles of transparency, validity, reliability and usability, and contributes to student development.

1. Design and implementation of assessment

Looking at Figure 25, there are 7 steps regarding the design, development, application and evaluation of assessment. It is good to start with the design of assessment and its alignment to the ILOs and lectures as presented in the chapter Designing or Redesigning Teaching. Let's first introduce all the assessment methods (both formative and summative) that we employ in the HTHT minor FitP (see Figure 26).

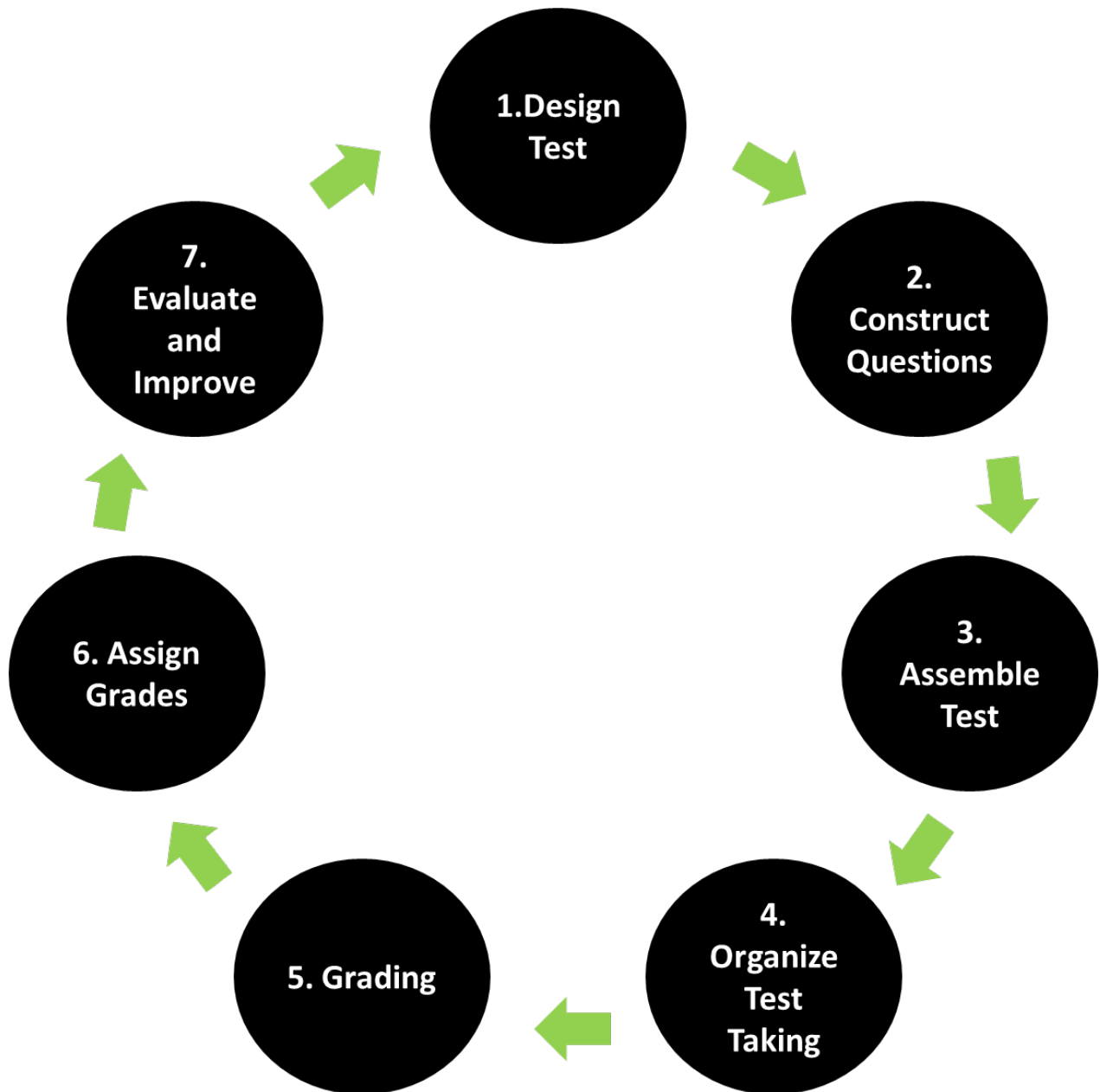


Figure 25 The test cycle. The figure shows the 7 sequential steps for designing, developing, applying and analysing assessment. The following sections of this chapter will refer to this cycle whenever relevant. The successful use of this cycle, guarantees validity, reliability, transparency and usability of assessment.

As can be seen in Figure 24, there are four elements that are very important for effective assessment. Those are:

- Validity: Tests what needs to be tested and can be ensured by proper alignment of assessment methods and ILOs.
- Reliability: If you assess again you get the same results and is linked to inter-rater reliability when multiple assessors are involved and can be ensured by the creation of good rubrics.

- Transparency: Students know upfront what the assessment would be and how they can satisfy the assessment criteria of each assessment method.
- Usability: This is related to the positive impact of assessment in the learning experience of the student and it is linked to effective feedback. It is also related to how appropriate is an assessment method based on its intended purpose.

These elements will be intensively discussed in the designing assessment chapter. Every time they appear they will be denoted with bold italics (i.e. ***transparency***) to help the reader spot them in the text.

a. Formative Assessment

The formative assessment includes a motivation letter, an assignment proposal and a midterm evaluation (all group based). All formative assessments contribute towards the effective feedback to the students and fit their intended purpose (***usability***). The motivation letter (see chapter **Implementation of changes for more details**) and the assignment proposal are delivered in the first two weeks of the project in order to assign the challenge to the students based on merit and group composition (motivation letter) and make sure that their plan is realistic and in line with the expectations of the University and the challenge provider. The motivation letter receives feedback from the coordinator of the minor (me in this case) and the challenge providers. The research proposal receives feedback from the tutors and the challenge providers. The midterm evaluation is in the form of a presentation. The groups present their progress in front of their peers, the coordination team, their tutors and the challenge providers. Following their presentation they have the chance to ask questions to the experts and also defend their work based on the questions they receive from the audience. In Figure 28, you can see all the support (teaching activities) related to each of the formative assessment items. The students have all the necessary information regarding formative assessment upfront (***transparency***). The three methods used for formative assessment are also linked clearly to the ILOs (***validity***) of the minor (Figure 27) and are supported by linked teaching activities (see Figure 28).

b. Summative Assessment (see appendix Rubrics for more detailed information on the rubrics and assessment criteria of the summative assessment)

The summative assessment includes a report (group, 60% of the final grade), peer-review of their final presentation (group, 10% of the final grade), expert review of their final presentation (group, 20% of the final grade), and a reflective essay (individual, 10% of their final grade). The weights of the three different assessment methods are motivated by their contributions to the learning objectives as shown in Figure 26 and in more detail in Figure 27. In Figure 28, you can see all the support (teaching activities) related to each of the summative assessment items. The assessment fits within the assessment policy of the supporting program of the minor (IDE), regarding the cut-off score of the assessment methods and the possibilities for repair assignment in case of failure. This is communicated to the student in the manual accordingly:

Students receive a pass for the project if all partial grades are ≥ 5.5 . If students do not comply with this requirement, the following rules are applied, according to the pass/fail regulations, as mentioned in the student charter of the Bachelor's Programme Industrial Design Engineering ([OER](#)):

1. Students receive a fail for the project if a partial grade is lower than 4.5.
2. Students receive a fail for the project if more than two partial grades are lower than 5.5.

3. For every project part receiving a partial grade below 5.5 (but ≥ 4.5), students must do supplementary work (for a maximum of two) in order to pass the project.
 - i. Each supplementary work can earn a maximum partial grade of 6.0.
 - ii. If a supplementary work assignment (one or more may be assigned) is assessed with a partial grade below 5.5, the student fails the project.
 - iii. Written details about the contents and time allotted to complete supplementary work are made during or as soon as possible after the project exam.
4. In exceptional cases, the examiners may (where necessary in consultation with the examination committee) establish individual arrangements. Other students can derive no rights in such an arrangement.

Individual Reflection (10%):

- This constitutes a short essay that each student has to submit individually. It is graded by two experts and the final grade is accompanied by individual feedback (The speedgrader functionality of CANVAS is used for this purpose). The main purpose of this assessment method is to provide insights on the individual learning of the students and is linked mainly to ILOs 1 and 4b (see Figure 27 for **validity**) and supported by three teaching activities (see Figure 28). The reflection assignment fits the ILO's of the minor in the sense that students are assessed in essential skills such as teamwork, reflecting upon their role in the overall effort and reflecting upon the impact of their solution (**usability**). **Reliability** is ensured by the fact that both assessors use the same assessing criteria and **transparency** is ensured as the students know upfront about those (Canvas and manual). For more details on the assessment criteria see appendix **Assessment criteria for the reflective essay**
- and Figure 40.

Final Presentation (30%):

- All student groups are invited to present their final results in a final presentation. There, they have the chance to present and defend their work. Similar to the midterm presentation, the students are presenting for an audience of their peers, experts, tutors, and challenge providers. Shortly after their presentations they are asked to defend their work based on questions from the audience. Once this is done, each student uses a google form to evaluate the presenting group based on upfront given assessment criteria (**transparency**) that are the same for every group (**reliability**). Later, the minor coordinators meet with an educational specialist in order to define the final grade of the peer review, based on the feedback of the students (**reliability**). The main purpose of this assessment method is to provide insights on the communication and demonstration skills of the students and is linked mainly to ILOs 1 and 3 (see Figure 27 for **validity**) and supported by multiple teaching activities (see Figure 28). The final presentation assignment fits the ILO's of the minor in the sense that students are assessed properly for the ILOs related to communication and demonstration which can be very well assessed via a presentation (**usability**).

- For the peer review we use a five point Likert scale. We do this to mitigate the limitations of the 1-10 point system (especially for presentations, where you have to keep up with the presentation and grade at the same time).
- Additionally, the group tutor and the minor coordinator are grading the groups using the same assessment criteria and provide the students with group feedback after the end of the session (The speedgrader functionality of CANVAS is used for this purpose). For more details on the assessment criteria see appendix **Assessment criteria for the Peer-Review and Presentation**
- and Figure 40.

Learning Objective	Assessment						
	Formative Assessment			Summative Assessment			
	Motivation Letter	Assignment Proposal	Midterm Presentation	Report (60%)	Individual Reflection (10%)	Final Presentation (30%)	
						Peer Assessment (10%)	Expert Assessment (20%)
1	X	X	X	X	X	X	X
2		X	X	X			
3				X		X	X
4	X			X	X		

SCHEDULE AND DELIVERABLES

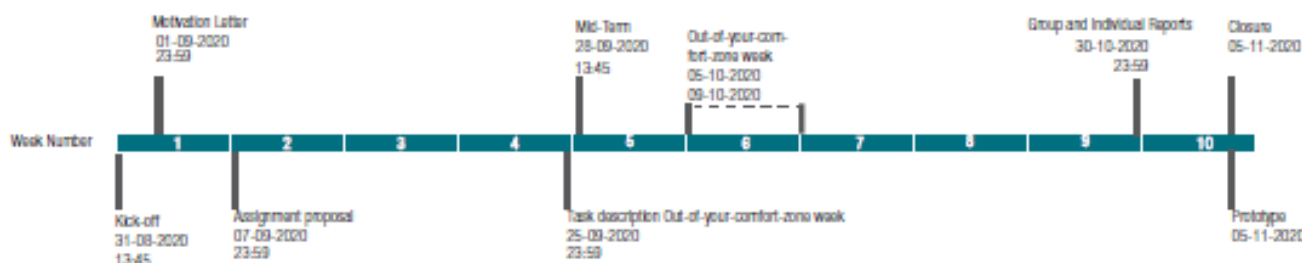


Figure 26 This table is shared with the students in the manual (see also manual in appendix Ba). The alignment with the ILOs is present as well as links to the rubrics (denoted as black square). The weight of each of the summative assignments is also given. The black squares if clicked upon (in the manual), link to the rubrics and assessment criteria of each assessment method. The students can also see the timeline for the expected deliverables. This table is aiming to enhance *transparency, validity, usability, and reliability*.

Report (60%):

- The report contributes 60% of the final grade, as it is linked to most of the ILOs (**validity**) (all except 4b as shown in Figure 27). Besides being the assessment method that contributes the most to the ILOs, the report is preferred as it is a very valid way to demonstrate knowledge and

Learning Objective	Assessment						
	Formative Assessment			Summative Assessment			
	Motivation Letter	Assignment Proposal	Midterm Presentation	Report (60%)	Individual Reflection (10%)	Final Presentation (30%)	
					Peer Assessment (10%)	Expert Assessment (20%)	
1							
2a							
2b							
2c							
2d							
2e							
3							
4a							
4b							

Figure 27 The table above, shows the alignment between all the assessment methods applied in the minor From Idea to Prototype and the ILOs.

understanding, assess critical thinking and problem solving skills, therefore highly contributing to **validity** and **usability** (University of Waterloo, n.d.). In turn, the report is the assessment method that receives the more support by lecture/workshops (see Figure 28). The report is graded based on an analytic rubric (see appendix **Rubric for the Report**) that is shared upfront with the students (**transparency**) both in Canvas and in their manual. To ensure **reliability**, the report is graded by two people (the tutor of the group and the minor coordinator). If the grading distance is more than 1 grade apart, the two assessors discuss the result. If they cannot compromise, a third reviewer is employed.

- The rubric for the report is the only analytic rubric provided in the minor. In the rubric it becomes clear why the cut-off score of 5.5 is employed, as for every ILO a set of criteria that need to be satisfied are presented and additionally, for each criterion the meaning of every grade is presented (see Figure 41) as a reflection of the acquired knowledge (**validity**). The use of an analytic rubric results in high **transparency**, and inter-rater **reliability**. Additionally, it provides feedback and it highlights the appropriateness of it for the intended purpose of the report (**usability**). The use of an analytic rubric is also motivated by the fact that those are better for summative assessment and grading, compared to holistic rubrics (better for small assignments)

or single point rubrics (better for formative assessment) (UTQ Course 3: Training, Testing, and Assessment).

Lecture/Workshop	Assessment						
	Formative Assessment			Summative Assessment			
	Motivation Letter	Assignment Proposal	Midterm Presentation	Report (60%)	Individual Reflection (10%)	Final Presentation (30%)	
						Peer Assessment (10%)	Expert Assessment (20%)
Research Methods							
Multi & Interdisciplinary collaboration							
CBL Workshop							
Design Approaches							
Design Thinking							
Iterative Design							
Ethics of Design							
Design Requirements							
Behaviour Change Tools							
Reflection							
Arduino & Programming							
Stakeholder Analysis							
Value Proposition							

Figure 28 The table above, shows the alignment between all the assessment methods applied in the minor From Idea to Prototype and the teaching methods used.

2. Analyse assessment

Analysing the results of assessment is necessary in order to:

- ❖ Realise whether the ILOs have been achieved (**validity**);
- ❖ Evaluate the **reliability** and the **usability** of the assessment methods;
- ❖ Determine the cut-off score and the grading
- ❖ Discuss potential improvements in the current assessment methods.

For demonstrating the analysis of the assessment, I will use here as an example the report. This is because it is the most important assessment method based on the ILOs it covers, the percentage that it has in the final grade and the number of teaching activities that support it. The rubric to the report grading can be found in appendix **Rubric for the Report**

and in this [link](#).

a. Validity

The report was developed as a means to assess the achievement of all ILOs except the last one (see also Figure 27). This is achieved by the development of specific criteria for the assessment of the report that are linked directly to the ILOs (see Figure 41). These criteria were expanded into an analytic rubric that is used to grade the report. This process of going from ILOs to a rubric (see Figure 29).

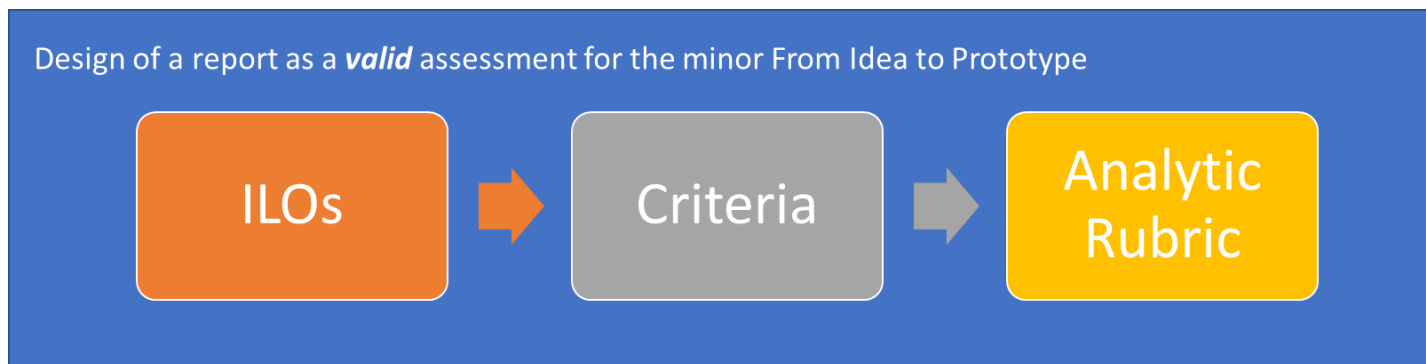
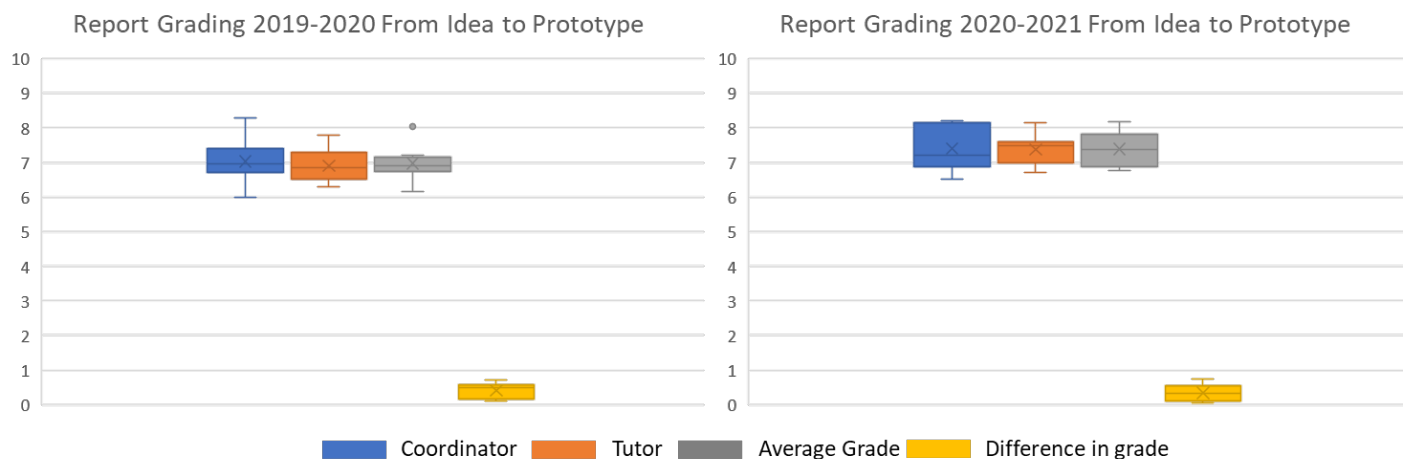


Figure 29 The process of creating a rubric that enhances the validity of the report as a means of assessment.

b. Reliability and Usability



2019-2020				2020-2021			
Coordinator	Tutor	Average	Difference	Coordinator	Tutor	Average	Difference
6.9	7	6.95	0.1	8.2	7.5	7.85	0.7
6.7	7.4	7.05	0.7	8.2	8.2	8.2	0
7	6.5	6.75	0.5	7.3	7.6	7.45	0.3
8.3	7.8	8.05	0.5	8	7.6	7.8	0.4
6.7	6.8	6.75	0.1	7.1	7	7.05	0.1
7.5	6.9	7.2	0.6	6.5	7.1	6.8	0.6
6	6.3	6.15	0.3	6.8	6.7	6.75	0.1
7.1	6.6	6.85	0.5	7.2	7.5	7.35	0.3

Figure 30 The grading results of the reports for the last two years of the minor From Idea to Prototype. It can be seen that the difference in grading between the 2 independent assessors (tutor and coordinator) are minimal. This shows that the rubric is able to ensure a good degree of reliability.

To ensure that the grading results of the report are fair and not depending on one assessor and to increase *reliability* and objectivity of the grades, each report is graded by the tutor of the group and the coordinator. This results in each report being graded by two independent assessors. Despite, the advantages of such an approach the challenge it creates is how to ensure reliability of the grades and proper alignment between the two independent assessors. In order to face this challenge I created a rubric that is so analytic that it can potential safeguard inter-rater reliability. The results of the report grading of the last two years demonstrate that indeed the rubric for the report is able to reduce inter-rater variability of grades (see Figure 30). The criterion for the placement of a 3rd assessor is a grade difference of 1 full grade. However, to this point this was not necessary as the grades show a maximum difference of 0.7 in 2 instances. This results allows us to reliably use the average between the two assessors as the final grade for the group report.

The *usability* of the report and the rubric is highlighted again by the existence of an analytic rubric. The rubric can serve as a form of feedback for the students in order for them to understand what needs to be done in the first place and later when they receive their grade and feedback, as a place to look back in order to understand what they manage and what they did not manage to deliver. Additionally, the report is an appropriate means of assessing the related ILOs, as it offers a valid way of demonstrating knowledge and understanding, assess critical thinking and problem solving skills. In order for the report to be usable and not diverge too much outside of its intended purpose, the students are limited to a maximum of 30 pages. This way they have to carefully study the rubric and consider what should and what should not be in the report.

c. Cut-off score and grading

According to the OER and the assessment policy of the B-IDE programme at the University of Twente the cut-off score for the minor and for its separate assessment methods is 5.5. Indeed, it is possible to change the cut-off score for an assessment method (for example in the case of a multiple-choice exam, someone could also calculate the chance factor and therefore raise the cut-off score). It is also a fact that for grading the ability in the use of dangerous equipment, or in cases of medical training, higher cut-off scores need to be used in order to ensure the level of competence needed. However, and also based on the analytic rubric, I decided to use a cut-off score of 5.5 as it is a good reflection of the minimum knowledge a student should have in order to be considered that sufficiently achieved to meet the ILOs and the assessment criteria.

For details about the grading of the separate assessment methods please refer to chapter **Design and implementation of assessment**.

d. Conclusions

It was indicated to me (for more details see also chapter **Evaluating Teaching**), that despite its aforementioned benefits, the analytic rubric is not very usable by the students as it is too detailed. As in the end, the goal is to keep a good balance between reliability, validity, transparency, and usability, we plan some changes for the next year to address this issue. Our plan is to include an exercise for the students, where they will need to offer feedback as a group to another groups report by using the rubric. This way the students will have to use the rubric in order to evaluate the work of their peers, therefore resulting in a better understanding of the rubric for themselves and in the process receiving useful feedback from their peers. This way usability is increased. Additionally, the rubric instead of having specific text for every grade, can become a bit less analytic by giving text for a range of grades (for

example not what is a 6 but what is a 6-7). This way usability will be enhanced, albeit in the expense of reliability. It is therefore important to monitor how reliability is going to be affected and in turn re-evaluate this point next year.

Another limitation of the assessment that was identified via the course evaluation (see more details in chapter **Evaluating Teaching**), was the lack of connection between the lectures/workshops and the assessment. To address this topic it was decided to meet with all the teachers/educators/instructors, and use Figure 27, Figure 28, Figure 40, and Figure 41 in order to align their lectures/workshops to the ILOs and ensure that the students will be aware of the contribution of each lecture/workshop to their final assessment (see also chapter **Course design with a sustainable budget & logistics in mind**).

A final limitation of the current assessment that needs to be mentioned here is the very low influence of the individual work in the final grade. As 90% of the final grade (60% is the report) is group work related and only 10% is individual work related, it is obvious that the group grade dominates the final grade. Especially, the report grade. From Figure 31, it becomes clear that the final grade is mainly dominated by the report as expected (light blue line almost fully overlaps with the dark blue). However, what becomes also clear is that despite the group based grades showing some uniformity and low variance, the individual reflection shows a clear distinction between individual students which is currently lost in the final grade. Our decision to have multiple group assessment methods is motivated by the fact that our ILOs are linked to teamwork, communication and the team as a whole rather than trying to identify individual competences. However, we are now in the process of considering ways to make the individual contributions slightly more dominant. Those include raising the individual grade percentage to 15% and using the buddycheck Canvas add-on to have the students evaluate each other on certain criteria and thus giving bonus individual points to each other.

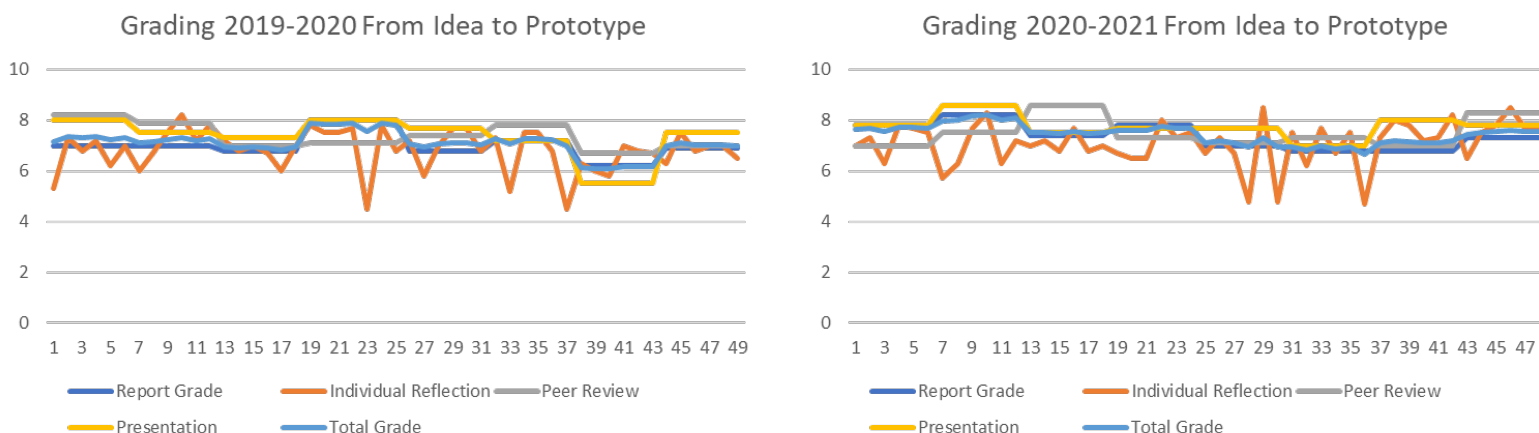


Figure 31 The grades of each assessment method for all the students of the last two years of the minor.

Another possible way to address this limitation is to indicate that every student needs to provide a single report. However, such a method would bring some more challenges such as:

This method would bring to possible scenarios:

- The need to correct 48-50 individual reports where even with the restriction of 30 pages we are talking about >14000 pages. The time constrain would not allow the lecturer to evaluate properly

the report and giving the constructive feedback, and it would result in a violation of the design education with logistic constraints in mind chapter (see chapter **Designing the teaching within logistic constrain**)

- The students are spending most of their time working as a team and enjoying the benefits of multi-,inter-disciplinarity and leaning from each other. Therefore, individual assessment methods would violate the validity and usability criteria of the assessment
- It may be that the variance in the grades of the individual assignment, can be attributed to the fact that it is a reflective essay. Certain programmes that join the minor have a higher degree of familiarization with such assignments than others. This is already addressed by a specific workshop related to the individual reflection assessment. I hope that with talking to the instructor of this workshop we can together re-shape the material in such a way that writing an individual reflection essay might become more easy for all the students.
- Lastly the variance in the individual reflection essay may also be attributed to the fact that the final grade is not affected severely by it, so the students may target just for a sufficient grade.

IV. Evaluating Teaching

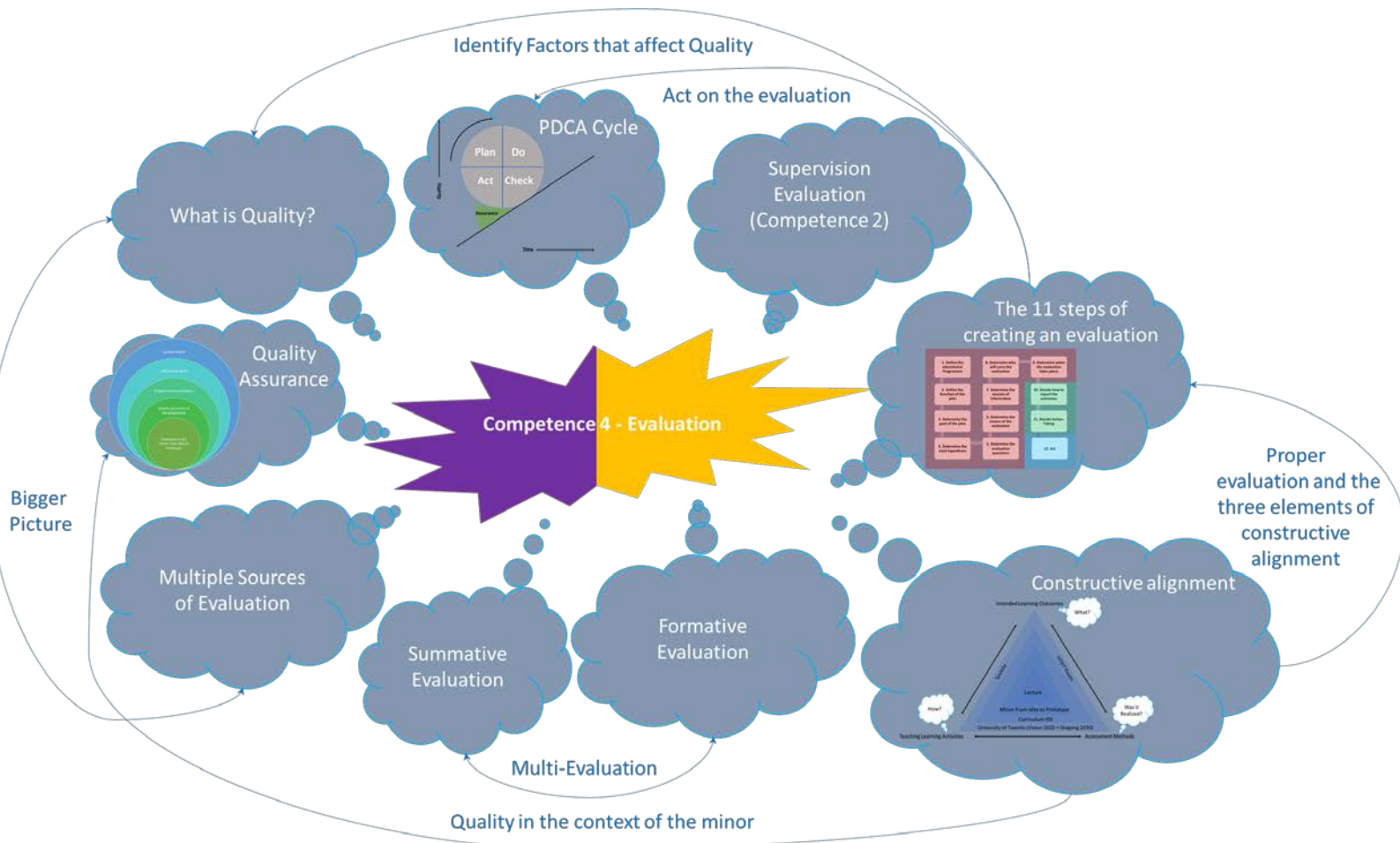


Figure 32 The above mindmap describes the ecosystem of Competence 4. Every component described in the clouds, interacts with other components and together ensure that teaching evaluation is thorough, systematic and it follows the PDCA cycle and assures the appropriate education quality.

In this chapter you will read about the evaluation methods and techniques employed in the HTHT Minor From Idea to Prototype as well as an analysis of them and some conclusions. This chapter is part of competence 4 (see Figure 32) and the ecosystem around it. The chapter starts with how to conduct an evaluation in a systematic way (following the PDCA cycle). It continues and finishes with an analysis of the aforementioned evaluation. Figure 32, shows in a nutshell the most important elements of evaluation of education, its analysis, and their interconnections.

1. Conduct an Evaluation (Plan + Do)

Conducting evaluation in teaching is an important competence for any teacher and a way to constantly improve education in a very dynamic environment as the University. Preparing students for shaping our society, it requires never-ending efforts in order to keep going to match the expectations of a fluid society with the passions of the students.

For this reason, a proper development of a course, based on Bloom's Taxonomy, needs to be constantly evaluated and improved with the use of the Plan-Do-Check-Act (PDCA) circle (Figure 34) in order to be aligned with the learning goals of the minor and with innovations in terms of education. Glimpses of an effort to evaluate teaching can also be seen in the chapter **Student supervision**, regarding the competence of the author to evaluate supervision and act upon feedback. This chapter will focus more on **Plan** and **Do**, while chapter **Analyse Evaluation** will focus more on **Check** and **Act**.

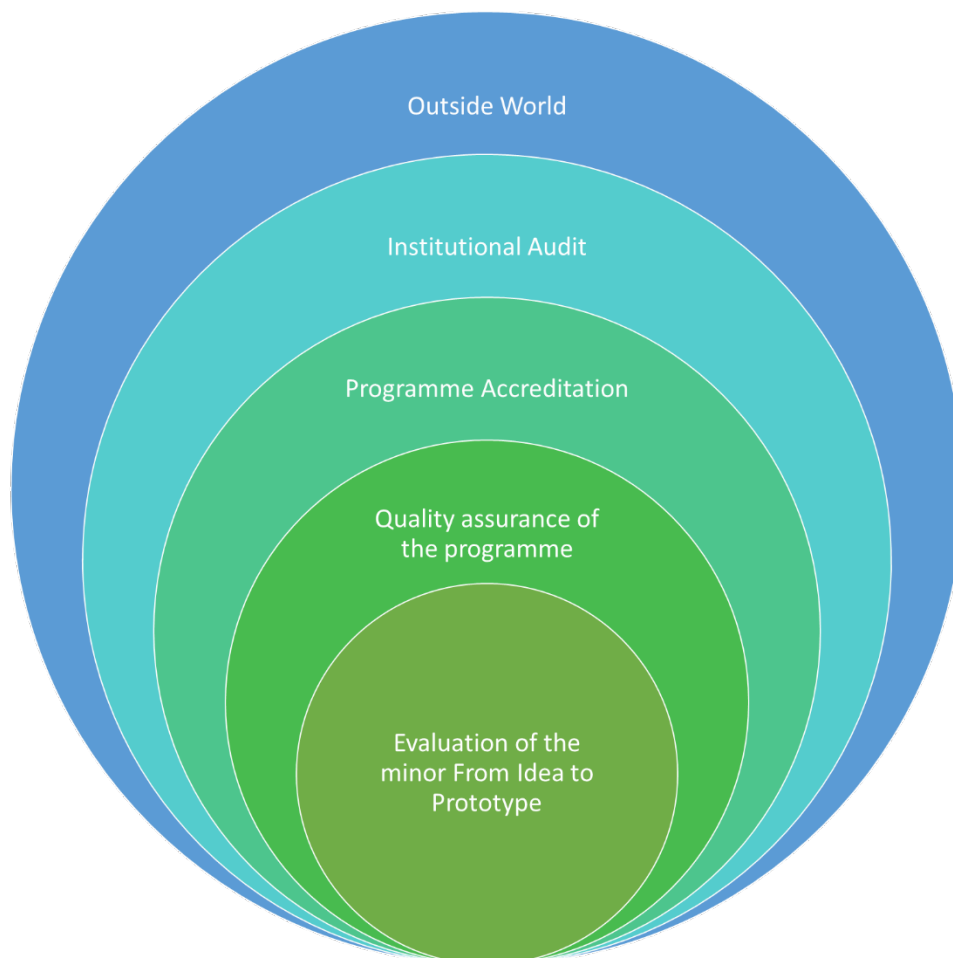


Figure 33 The multiple layers of quality assurance in educational programmes, starting from the outside world and focusing on a specific module, which in this case is the minor From Idea to Prototype.

Starting with evaluation is important to ask ourselves a few things. What is the quality we are trying to maintain by evaluating teaching? Which aspects of teaching is it related to and affected by? According to (Harvey, 2006), academic quality is:

“Quality in higher education is a multi-dimensional, multilevel, and dynamic concept that relates to the contextual settings of an educational model, to the institutional mission and objectives, as well as to specific standards within a given system, institution, programme, or discipline.”

Lee Harvey identifies 5 conceptions of quality relating to excellence, consistency, purpose, value for money and transformative power. In the classroom we additionally discussed the importance of the learning environment, high student learning experience in terms of capabilities and knowledge, good teaching and supervision, as well as the management of education overall (the bigger picture as shown in Figure 5, Figure 6, Figure 7, and Figure 8 where all the entities involved in the minor are described as well as in Figure 32 and Figure 33).

This leads us to the factors that influence education. From Harvey and from discussion in the classroom the following were identified:

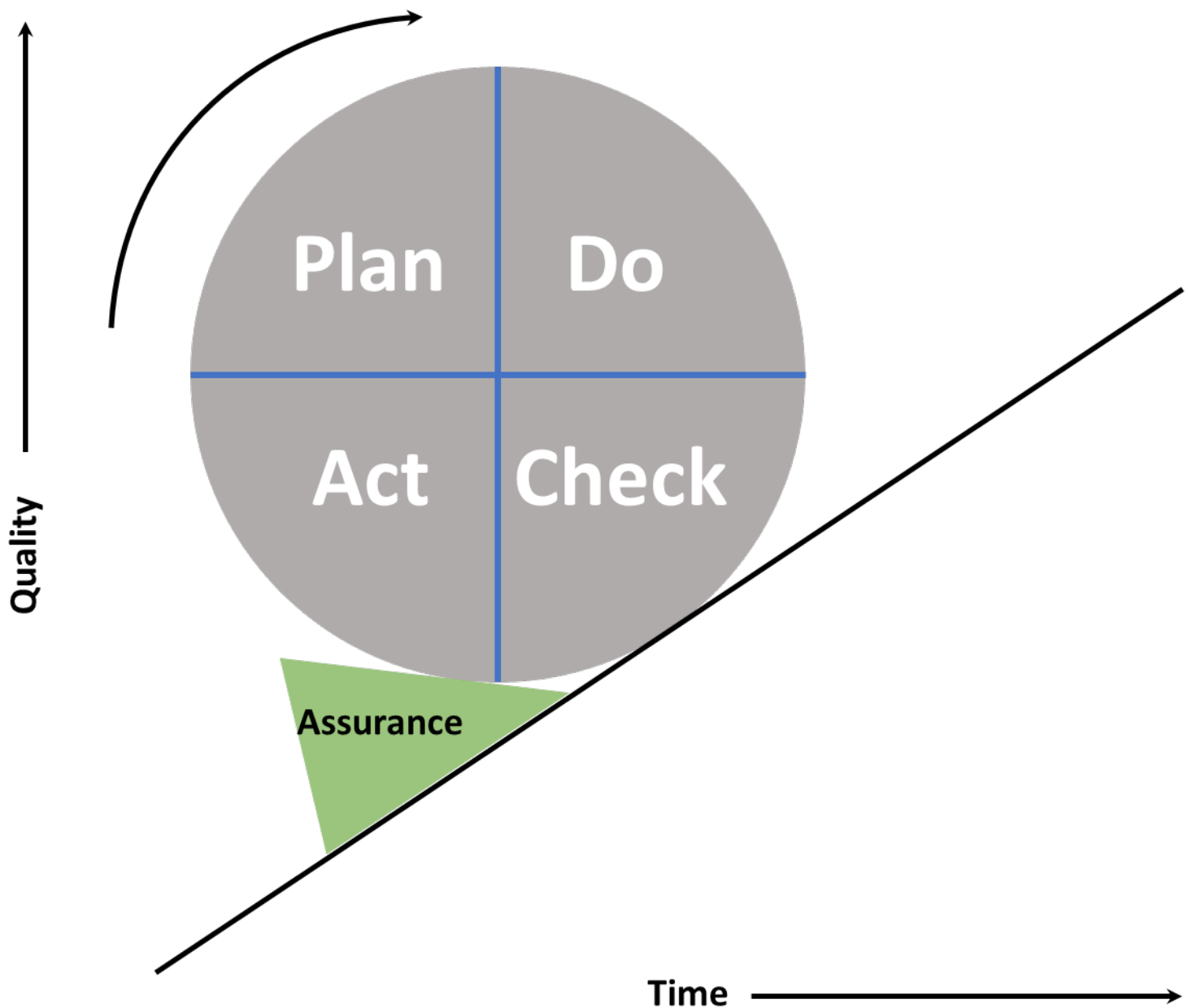


Figure 34 Deming's circle is used as the main approach in the FitP minor for constant evaluation and improvement.

1. Teachers (A very important factor! Slide 15 John Hattie (2011): ‘Teachers are among the **most powerful** influences in learning’)
 - a. Teachers do not only need to be well oriented with respect to content but also need to be engaging, motivating, and inspiring.
 - b. Here it is important to comment that this requires dedication and time investment that is not always present due to conflicting interests (i.e. time for research vs. time for education).
2. Didactics and educational methods
3. Assessment and expectation management
4. The attitude and acquired skills of the students
5. Constructive alignment
6. Facilities and the use of a stimulating environment
7. Quality of research
8. Continuous improvement
9. The size of class versus the number of teachers
10. Funding
11. Amount of quality time between the teacher and the student

These factors drove the creation of the evaluation performed by the coordinator (the author) for the minor FitP. Next to this evaluation in **Appendix F – Evaluation of Education**, you can find details on the

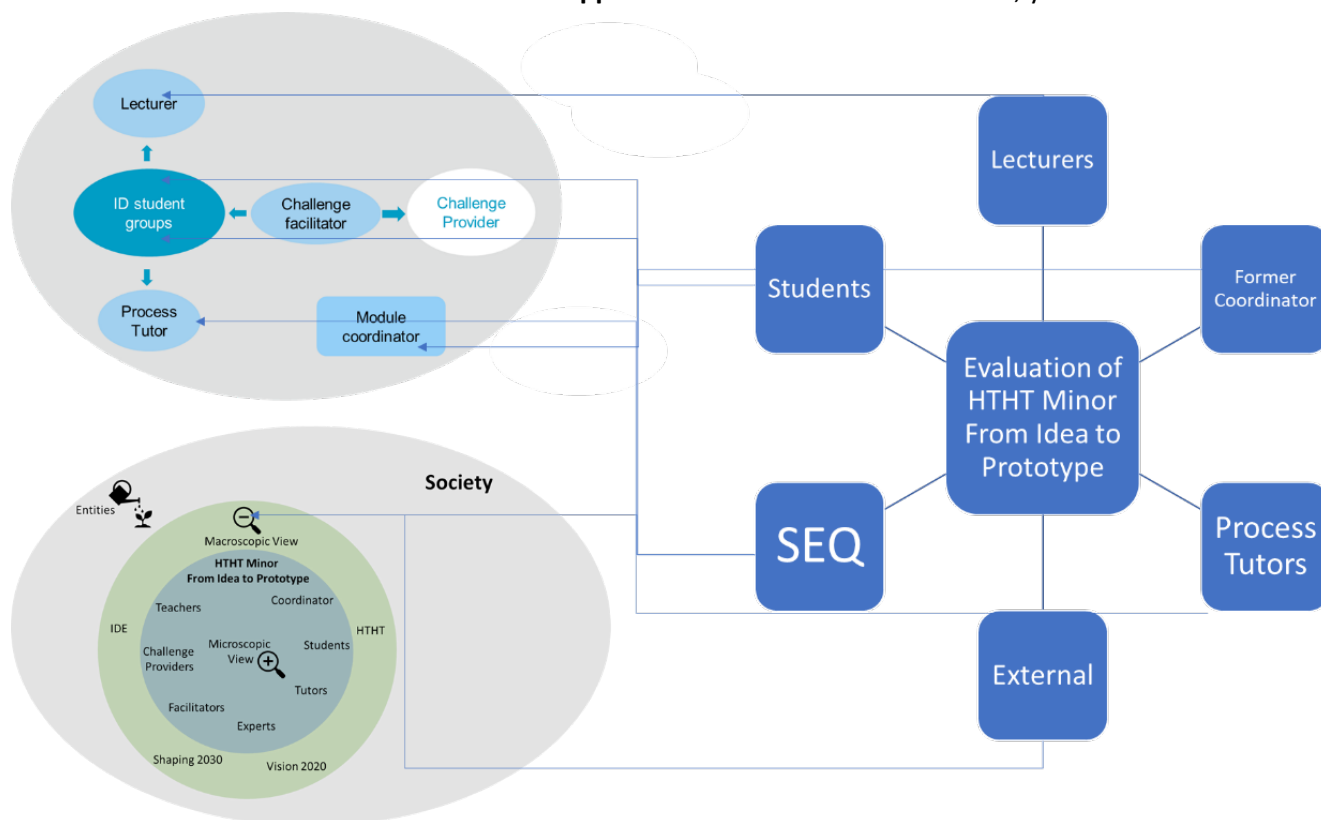


Figure 35 The connections between the people I asked to help me with the evaluation of the minor From Idea to Prototype and the context around it (the near context Figure 8 and the broader context Figure 5).

coordinator evaluation with the students and also on the other evaluations (External, colleagues, and SEQ evaluations, see Figure 35). During and after the minor there are 2 distinct types of evaluations happening:

- ❖ Formative (opportunities for feedback during the course):
 - Meetings with tutors, challenge providers, students, colleagues, teachers, etc.
 - No transcript of these are provided here.
 - Daily or Weekly basis
 - Checking student attendance in the lectures
- ❖ Summative (opportunity for larger improvements for the future):
 - **Evaluation with the students**
 - **Evaluation with process tutors, lecturers, and former module coordinators**
 - **SEQ Evaluation**
 - **External Evaluation**

a. Evaluation with the students

In order to evaluate the experience of the students during the minor, I have conducted a survey in line with the factors mentioned earlier (factors that influence the quality of education). The survey (and the

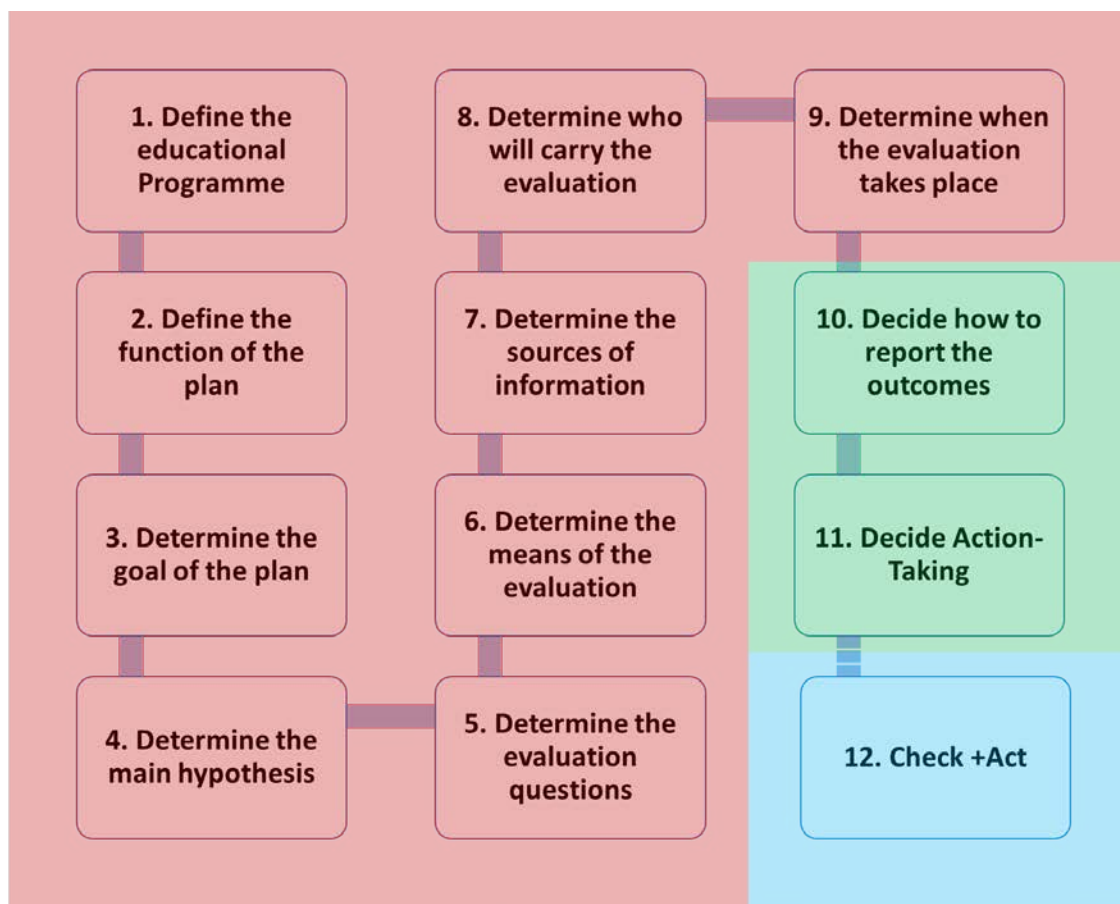


Figure 36 The 11 step plan of how to conduct an evaluation, plus a 12th step including checking the results of the evaluations and accordingly taking action (this part is described more in section **Analyse Evaluation**). The red part indicates Planning (PDCA cycle), and the green part indicates Doing

responses) can be found in **Appendix Student Feedback and Evaluation of the minor From Idea to Prototype**. For creating the survey, I used the notes of the course 4: Quality Assurance and Course Evaluation, and especially the 11 steps of making an evaluation plan (see Figure 36). The detailed 11 steps taken for creating the student survey and the survey itself, as well as the results can be found in **Appendix Student Feedback and Evaluation of the minor From Idea to Prototype**. The survey itself was developed with the use of the 5 steps of making a questionnaire as described also in course 4: Quality Assurance and Course Evaluation. The survey was subsequently evaluated and improved before application, by educational consultants Leonie Bosch-Chapel and Eva Blokhuis.

b. Evaluation with process tutors, lecturers, and former module coordinators

Next to evaluating the minor by asking feedback from the students, I also conducted separate surveys with the process tutors, lecturers and the previous coordinators of the minor. Those surveys and their results can be found in **Appendix Colleague Feedback and Evaluation of the minor From Idea to Prototype**. The purpose of including also the teaching staff in the evaluation is to make sure that not only the students are satisfied by the components of the minor but also the entities involved in keep the educational quality of the minor high (in line with the previously identified factors that influence educational quality).

c. SEQ Evaluation

The Quality Enhancement Support Team (QUEST) team of the University of Twente is conducting a comparative evaluation of all modules in every quartile in a yearly basis. The Student Experience Questionnaire (SEQ) offers insights (despite its low response rate) on how the students experienced the minor and can help in the improvement of non-optimal aspects. Therefore, it is also taken into account when the minor is evaluated every year.

d. External Evaluation

As mentioned in **Chapter Introduction**, the minor was evaluated from the interdisciplinary education perspective by the Comenius STRIPES 2021 project in collaboration with Jan van der Veen (“STRIPES2021: Structuring Interdisciplinary Projects for Engineering Students | NWO,” n.d.). This work lead to a submission to the SEFI 2021 conference (Uthrapathi-Shakila et al., 2021). This evaluation aimed to describe the implementation of the interdisciplinary minor, “From Idea to Prototype” that had students from nine study programmes across applied and social science fields who worked on a challenge-based learning assignment. Data was collected through several instruments (observations, focus group studies, document analysis, interviews, survey) from different stakeholders (students, staff) to gain holistic insight. This evaluation will be repeated next year after implementing the proposed recommendations to see the impact of them.

2. Analyse Evaluation (Check + Act)

According to the Deming’s circle (see Figure 34), the “Check” and the “Act” moments have to be conducted in order to:

- ❖ Use appropriate analysis and interpretation methods;
- ❖ Take into account both the strengths and limitations of the minor according to feedback;
- ❖ Address the received feedback.

To properly interpret the feedback I checked the overlap between the different evaluations and created a document with the things needed improvement. Subsequently, I discussed these things with an educational expert (Marieke ter Maat), and my co-coordinator (Marcel Pieterse) and we proposed solutions and actions for addressing the feedback realistically and taking time and logistics constraints into account. Based on this I have made the following table (although this is an ongoing process since 2019 (see **chapter Implementation of changes**), I will present here for the sake of brevity only the evaluation of the year 2020-2021):

Evaluation (2020-2021)	Plan	Do	Check	Act
Students (mine)	Survey (more information in Appendix Student Feedback and Evaluation of the minor From Idea to Prototype)	Performed by me through Canvas	<p>Tops:</p> <ul style="list-style-type: none"> The minor is well organized Coordinator is very responsive and attentive Good support to the group work by the coordinator 	<p>Actions:</p> <ul style="list-style-type: none"> Retain the tops
			<p>Tips:</p> <ul style="list-style-type: none"> Make sure that challenge provider realize the internationalization component Too many psychology students, means lack of technical skills that are needed for the challenges Team making process can be improved 	<p>Actions:</p> <ul style="list-style-type: none"> We now ask explicitly the challenge providers if they need Dutch speaking students in their team and explicitly inform them that the language of the project is English. Additionally all the documentation is in English. We now promote actively the minor in technical programmes to attract more technical students (see also chapter Implementation of changes). We can already see in the current registrations that the different programmes are more balanced between technical and non-technical students. The team making process as described in chapter Activating and Variable Teaching Methods, is a very fun and engaging ice-breaker activity. However, it's online implementation in Canvas was indeed lacking proximity and flexibility, thus resulting a non-optimal experience. If

				it has to be online next year we plan to use wonder.me instead of Canvas in order to achieve a similar effect as it would have been in person.
Teaching staff	Survey (more information in Appendix Colleague Feedback and Evaluation of the minor From Idea to Prototype)	Performed by me via e-mailing the survey	Tops: <ul style="list-style-type: none"> • Open issues were resolved quickly • Course information was clear • Great Organization 	Actions: <ul style="list-style-type: none"> • Retain the tops
			Tips: <ul style="list-style-type: none"> • Good to have a clear overview of grading tasks prior to the minor • Help with the use of Canvas (due to online teaching) • Unclear how the students use our lectures/workshops in their outcomes 	Actions: <ul style="list-style-type: none"> • The mail that I use to recruit tutors every year now states very clearly the exact amount of time expected to be invested including the grading tasks • Some teachers are not experienced with using Canvas for online teaching. I as a coordinator plan to be present in a lecture when a teacher requires support and help with Canvas. • Since this was also a concern of the students (how are these courses useful to us?), I have decided to meet with all teachers and discuss the common thread of all courses and how they related to the ILOs and the assessment. The outcomes of this discussions will be used by the teachers to explain to the students i) how their lecture/workshops and ii) how they can use what is taught to achieve a better grade. The outcome of this discussion was a slide that all teachers will show in their slides (see Figure 37)
Students (SEQ)	Planned by the QUEST team (more	Performed by the	Tops: <ul style="list-style-type: none"> • No aspect was evaluated below the quality guideline 	Actions: <ul style="list-style-type: none"> • Retain the tops

<p>information in Appendix SEQ results of the minor From Idea to Prototype)</p>	<p>QUEST team</p>	<ul style="list-style-type: none"> • 11th out of 52 minors given at the same time • 4 below average aspects of the previous year moved above average: <ul style="list-style-type: none"> ○ The module was intellectually stimulating for me ○ As a whole, I learned a lot in the module ○ I have learned a lot from doing the project ○ The teaching methods enabled me to learn successfully 	
		<p>Tips:</p> <ul style="list-style-type: none"> • 5 out of 26 aspects still were below average: <ul style="list-style-type: none"> ○ In general, I had enough prior knowledge to successfully do the module ○ The coherence between the module parts or the study units of this module was clear to me ○ The number of feedback moments was sufficient ○ The assessment criteria were clear to me ○ I knew in time how I would be assessed 	<p>Actions:</p> <ul style="list-style-type: none"> • Students thought they did not have enough prior knowledge to complete the module. This may have been a result of the great amount of non-technical students and the imbalance caused by that. Having a more balanced student pool can solve this issue • The coherence between the module parts was indeed in many cases unclear. However, after meeting with all the teachers and aligning their contributions to the ILOs and assessment, I expect this to not be a problem next year. • In order to accommodate for this, this year we will have more feedback instances for the students. Additionally, together with Coralie Johnson and Charlotte Oude Alink we plan to implement the buddycheck software as another instance for feedback. This time from student to student. Another

				<p>step is the implementation of an exercise, where each group will give feedback to each other using the analytic rubric of the minor.</p> <ul style="list-style-type: none"> The assessment criteria for every one of the assessment methods (formative or summative) can be found in Appendix E – Assessment. Since the students have access to all the rubrics, the only thing I can assume is that the rubrics are too complex for the students. Therefore, I will attempt to make the rubrics less detailed and more structured. As there is a very detailed schedule in Canvas, in the manual and in my kick-off presentation with regard to all assessment for the minor, I cannot decode this comment and therefore I have no action to propose.
External Evaluation	Planned by me together with project STRIPES 2021 (more information in Appendix External (Project STRIPES 2021) Evaluation)	Performed by Project STRIPES 2021	<p>Tops:</p> <ul style="list-style-type: none"> Both staff and students see the benefits of interdisciplinarity. Working on a real challenge from a provider is highly motivating. Students learn to appreciate approaches from other disciplines. 	<p>Actions:</p> <ul style="list-style-type: none"> Retain the tops
			<p>Tips:</p> <ul style="list-style-type: none"> Staff team cohesion and integration of the components. Recruitment and involvement of challenge providers. Resources and content support. Minimal structure for guidance (for the process and group work) and interaction. 	<p>Actions:</p> <ul style="list-style-type: none"> Re-evaluation of the curriculum and meeting with the staff team that resulted already in Figure 37. Challenge providers tend to be too dominant or too absent. We experienced this last year. Due to my inexperience with challenge-

			<ul style="list-style-type: none"> • Lack of alignment between objectives, activities (challenge topic) and assessment. • Support and clarity of expectations for staff to balance guidance and freedom for the students. 	<p>based learning I did not deal with this optimally. This year we have extra help from the ECIU University and NovelT and we plan to make our relationships to the challenge providers more explicit and highlight their contributions</p> <ul style="list-style-type: none"> • Regarding resources and more content support from the students we plan more targeted lectures/workshops with a clear contribution to the assessment of the students. • Regarding the lack of alignment noted by the external evaluator, we plan a series of things described above (rubric exercise, buddycheck, better alignment between courses/workshops and ILOs, etc.). • We are aiming to support further the tutors by creating a bi-weekly meeting with all the tutors and the coordinator and also by creating a mini-curriculum with material for tutors, that they can follow asynchronously on their own time.
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Learning Objective		Lectures and Workshops					Project Time
1	Collaborate & communicate with multi-disciplinary team members and stakeholders.	Multi & Interdisciplinary Collaboration	Challenge-Based Learning	Reflection	Stakeholder Analysis and Involvement		
2	Address a given design challenge by:	Research Methods	Research in Design	Scenario-based Design Thinking	Design Requirements		
	a. Analyzing and breaking the challenge down to several specific research questions.						
	b. Applying design-based research and other appropriate research methods.	Research in Design	Scenario-based Design Thinking				
	c. Composing requirements that integrate the needs of different stakeholders and different domains.	Design Requirements	Ethics of Design	Stakeholder Analysis and Involvement	Value Proposition		
	d. Designing several <u>concepts</u> , and compare them based on the composed requirements.	Research in Design	Design Requirements	Behaviour Change Tools	Arduino and Programming	Value Proposition	
e. Using resource management to construct a prototype that considers the trade-off between various requirements in multiple domains (time, costs, personnel, facilities, marketing, etc.)	Research in Design	Stakeholder Analysis and Involvement					
3	Justify and demonstrate the designed solution and elaborate on the design rationale.	Research Methods	Behaviour Change Tools	Arduino and Programming	Value Proposition		
4	Evaluate and critically reflect on:	Ethics of Design	Behaviour Change Tools	Stakeholder Analysis and Involvement			
	a. The impact of the chosen prototype solution on its target group and society.						
	b. Their own contribution to the team, based on their disciplinary knowledge and academic skills.	Multi & Interdisciplinary Collaboration	Challenge-Based Learning	Reflection			
Assessment (Report, Essay and Final Presentation)							

Figure 37 Alignment between the ILOs and the lectures and workshops of the minor based on my discussions with the teachers.

V. Professionalization

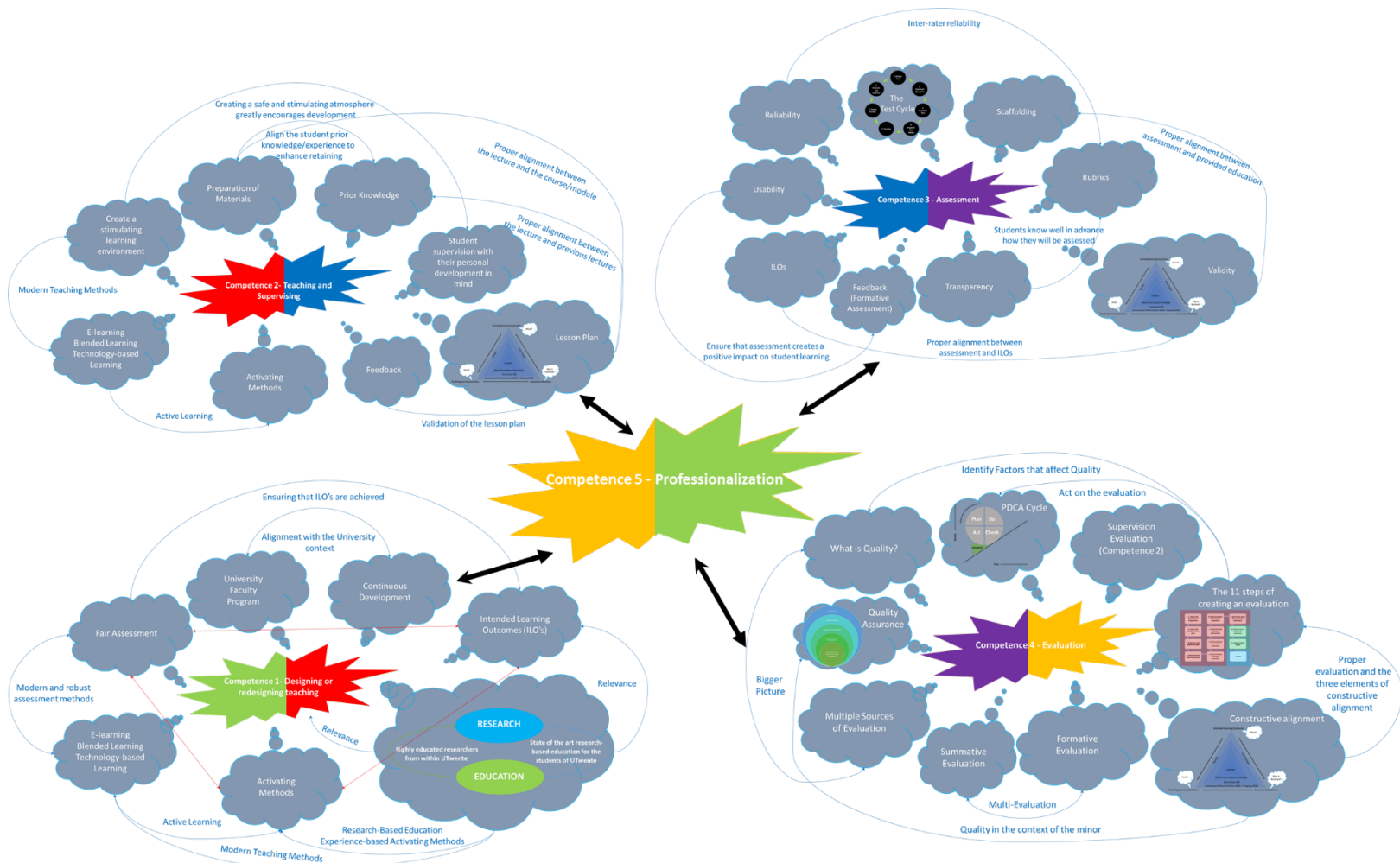


Figure 38 The above mindmap describes the ecosystem of Competence 5, which is nothing more than the combination of the 4 previously described competences! But it is not just the sum of the 4 competences, but also the interactions between those and the teacher (the author). All of those together build my professionalization profile.

In this chapter you will read about the professionalization profile of the author and my personal vision on teaching in a higher education institution. The combination of the competences acquired in the last 2 years and described in this portfolio (see Figure 38) constitute together with their interactions the current approach and the future vision of the author.

1. Educational vision

The 4TU has a framework for interdisciplinary engineering education (Fouw, NJdeFouw, Van der Tang, YvanderTang, & Rooij, n.d.). The IEE framework (Figure 39) shows the importance of educational **vision** together with education and facilitation (support). The last two were extensively presented in the previous chapters of this portfolio. Here, in this chapter the author is going to discuss his personal vision on education mixing personal experiences, conclusions from the past 2 years of teaching experience,

personal opinions and insights from various educational lectures and workshops. Already many examples of my vision are offered in previous chapter implicitly, but here I will try to make them more explicit.

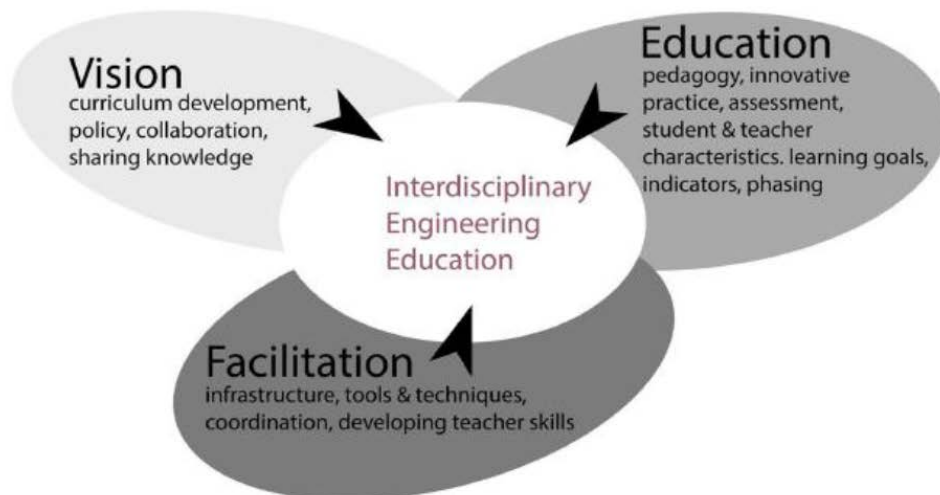


Figure 39 4TU Framework for interdisciplinary engineering education.

My educational vision is split into the following main points:

a. *Research fuelled education and education fuelled research*

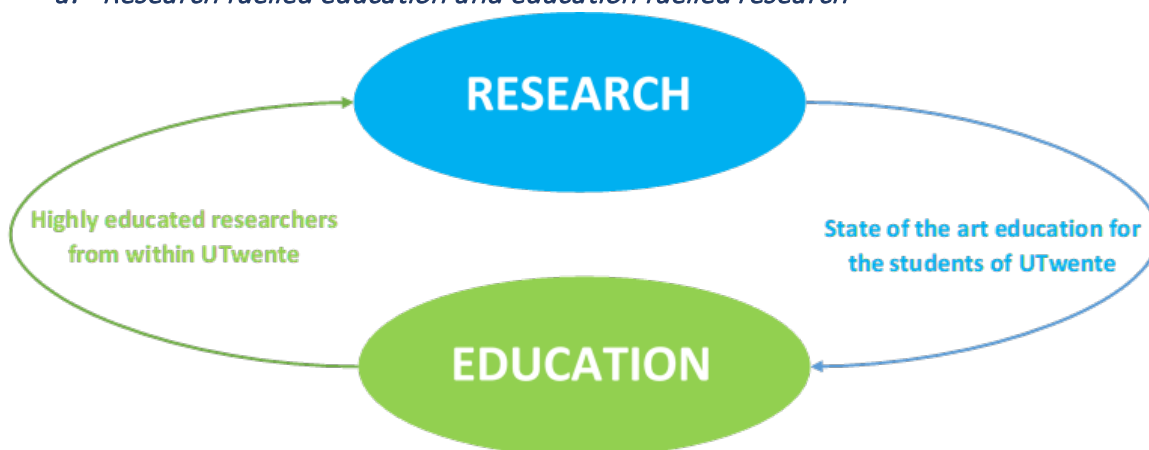


Figure 40 A simplified illustration of the interplay between Research and Education.

Case: The first figure the reader encounters in this portfolio is about how education and research are not opposing but rather completing each other. This is the essence of my educational vision. In an academic world that research excellence is rewarded more than educational competence it is important to find ways to get the best of both worlds. In my opinion, if this balance is disturbed, then research cannot survive internally. Without good educators to prepare the next generation of researchers how can research continue and maintain quality? And without high-level, cutting edge research how can our students receive up to date education and compete in an ever demanding market?

Vision: To answer this question, I suggest that it is important for a young academic to pay attention to both. In my approach so far education and research are convoluted. Examples of this is of course educational research that can be applied in cases such as my minor (as we did with project STRIPES2021), but also supervising Master and Bachelor theses in important topics of my research. Additionally, making students intrigued about research during courses is very important. Whenever I introduce myself to a new cohort of students I present to them some interesting highlights of my research as there is not better way to inspire people as when you talk about the things that make you passionate. Lastly, I am using the results of my research or the research of colleagues to update my curricula. The addition of a design requirements lecture into the curriculum of the minor FltP (Figure 11) is an example of this.

b. Preparing students for their professional future

Case: What is missing in Figure 1, but it is still inherent part of my vision is the context. It is important that the students burst the University bubble and get a taste of real-life. In many cases due to traditional project/problem-based education students do not understand how it is to work in a company until they reach their thesis stage or even later.

Vision: In the minor FltP, I use authentic challenges that come from companies or research groups and deal with real problems. This is greatly appreciated by the students and gives them great insights on the real working life and how companies operate. In addition, to my teaching and research focus, I am one of the 5 co-founders and director of transfer of the non-profit organization Authentia. With Authentia last year we received the incentive fund in order to educate international students about entrepreneurship in the Netherlands, and study their inhibitions in an effort to mitigate them. Additionally, when supervising BSc. and MSc. theses I try to pair my students with relevant companies. This way not only they gain insights but also useful contacts for their future career. Lastly, I treat my students to some extent as colleagues and part of a team of peers. If possible I take them to conferences and professional meetings. To my experience this is very motivating and can unblock even shy students to start feeling part of the whole and not just a little niche.

c. Holistic education (Not only content-based)

Case: Specialization is promoted broadly as a game-changer and as a required skill for every individual. Although to some extent specialization is very helpful, one should not underestimate the impact of personality development in a balanced way. What is the point of a highly specialised individual that is not able to interact and work with other people? Specialization is sometimes narrowing the view down to what is needed today by the industry. For the training of focused individuals and employees, specialization is useful as they are immediately ready for employment. However we live in a dynamic and fluid world and the competencies needed for employment are constantly changing (especially since we teach students today and they will look for a job in a few years). Teaching critical thinking and developing the skills necessary to learning for life instead of a dry mandatory period until becoming an expert. This needs a clear shift in the current paradigm (where education is means to an end), towards a paradigm where education is there to keep improving people (life-long learning).

Vision: As I am part of the systems engineering community myself, I employ also in my research a more holistic view on things. And this is also an integral part of my educational vision. This is reflected in the cases of supervision of students or groups, where I always allocate some time for personal discussions or

fun unrelated to the topic opinion exchanging. Additionally, I like to ask my student to have the freedom to talk to me about more things besides the content (future career prospects, interesting lectures/courses, online material, etc.). The minor itself is also focusing on the overall development of the students as many of the learning objectives are not content based but rather communication and teamwork based, as soft skills, critical thinking, teamwork, flexibility and high-level thinking are very important skills that come into conflict with the specialization paradigm.

All in all a quote from Robert Heinlein is what summarizes my vision and I always show this quote to my students:

A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate, act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialization is for insects.

— Robert Heinlein, *Time Enough for Love*

d. Interdisciplinary education including multiple nationalities

Case: Despite the isolation we are experience in a personal, national, or international level due to the Covid-19 pandemic, in fact the world is getting smaller and the UT is an incubator of international talent. This links also to the holistic educational approach I mentioned earlier. As the influx of more cultures increases it is also a duty of the educator to adapt and accommodate the development of skills such as teamwork. And especially teamwork with people that do not have similar viewpoints. The viewpoints of course are not only related to culture, but as well to disciplines. It is often the case that students from the engineering sciences are biased towards students from the social sciences and vice versa. Such a unique collaboration of nationalities and disciplines is happening in the minor FltP, making me the proud coordinator of a real educational experiment.

Vision: In order to deal with this, despite employing a holistic educational approach, I make good use of the talent and diversity already existing within the department of Design, Production, and Management where I work. By employing tutor from different countries (in some cases even continents), and of different backgrounds, I create a nice team of tutors that can manage a “volatile” group composition. I am a fan of teaching by example, and I think that when the students see and experience education coming from such a multidisciplinary and multicultural group of staff they can relate and appreciate the positive impact of working together with other disciplines. Additionally, we offer a hands-on workshop which keeps improving every year. This year we plan to implement an exercise on how to give efficient and respectful feedback.

e. Continuous professional development and citizen science and lifelong learning

Case: In point b, I mentioned the importance of context in the professional and academic development of students. However, this is a two way street. Students are impacted by the context and the world we are living but what about our impact to the world? Is research the only way to quantify or create impact? Of course not! As the students gain insights from companies, the same way company representatives, interested individuals, and the public itself gain knowledge and become part of a research team. This can have numerous positive effects such as bringing scientific knowledge closer to society. By making science

“edible” to the general public, we can attenuate the idea of the elite scientist that is abstract and godlike. By showing the humane face of science and a proper way that scientific consensus is gained, people can protect themselves from charlatans and fake beliefs. And they will not be protected because someone tells them show by pointing fingers and creating polarization. They will be protected through knowledge and understanding. Additionally, this contact create a loop between educational establishments and industry. Universities can provide with training (continuous professional development) and industry can provide with authentic challenges for the students.

Vision: Within the minor FITP, we have already created bridges with the industry. Additionally, we receive challenges from citizen groups and even individuals with personal or professional challenges (last year we had the father of a boy with disability as a challenge provide and the group tried to find technical solution to the societal inclusion of the boy). Together with ECIU, we are also exploring the opportunities for lifelong learners to become part of the students teams. Those can come from the companies or organizations that provide the challenges or can be citizens. Besides education, lately also research proposals include more and more money on citizen science which is another important approach for bridging of science and society and a very interesting future perspective that can enable science communication.

f. Impact of Covid-19 in Education

Case: The Covid-19 is a great disturbance for our life as whole and created problems and new opportunities for education. Due to the e-learning paradigm employed in the last year and a half we find now ourselves with another dilemma. Should we go back to what we used to do and discard all the effort we have put into adapting education? The pitfall here is that we only consider what is practical for the teachers but let’s not forget that we are here to teach and not to treat education as a chore that can be fully automated. Additionally, online education may increasing and create unfair competitions. There is a possibility that major Universities will provide online degrees that have high impact (and questionable quality), thus decreasing the number of students enrolling in the less major Universities.

Vision: My vision is clearly dedicated to accommodating student needs and provide high quality education. Judging from the feedback of the students, online lectures are not optimal for many of them as they are not so motivated to focus (having the solution of the recording) and therefore student participation is lower. In addition to that many colleagues are considering for the future to use the recording as lectures and provide the students only with Q&A sessions. Then I ask where is the interaction in that? And also what is education without interaction? It is just a person talking and people keeping notes? I do not believe so. This is the exact traditional approach that we try to escape for the last decade by making lectures from a monologue to a dialogue. My plan for the coming years is to slowly return to the physical on campus education. For the next academic period the plan is to provide the students with rooms of supervised project time and keep the lecture online (due to the uncertainty). Ideally, the year after I would like to go back to fully on site education. Having seen the impact of isolation to the lives of all of us I believe that there is a lot of merit to what we had before. However, we should not disregard the lessons learned and some automatizations that were created during corona. Having online meetings with students allows for the supervision of more groups or better quality

supervision as there is time to have more meetings. Additionally, blended learning met an unprecedented development during the Covid-19 pandemic.

g. The use of technology in education (Blended Learning)

Case: The use of technology in education is a very broad topic. Technology can be the use of a learning management system (LMS) and it can also be the use of augmented reality for teaching. As previously said the Covid-19 pandemic acted as a catalyst for the increasing use of blended learning. The use of CANVAS intensified, teachers learned how to use Mentimeter, Miro or Mural, Kahoot and Wonder.me to make online teaching more interactive, and concept such as breakout rooms became part of our daily teaching practices. One of the most interesting things in my opinion is the potential of blended and online learning for further outreach (international educational projects or collaborative efforts when physical presence is not possible). A hybrid form would serve the interests of both students and educators.

Vision: I would like to keep offering to my students a well organized Canvas page and additional materials as I do now in the form of small videos or papers in an online format. Additionally, communicating information online and using Canvas for managing assignments and other submission is making education easier. Additionally, this year we employed an escape room for our student where they could escape only if they answer correctly riddles, questions and tasks related to the content of their education. I also realise that blended learning is the future (and was accelerated by Covid-19), however in my personal vision is a support tool and not the totality of education. I still want to achieve interaction in a more direct and immediate way. And I see that the students also appreciate this. However, I am open to novel technological tools and approaches that can inspire and motivate my students and achieve a good balance between traditional and online learning (for example a flipped classroom approach).

2. Teaching within the general professional context of an assistant professor

The role of an academic is multifaceted. Besides being educators, we also need to be successful researchers and show competence in various elements of our professional context. As described in Figure 5, Figure 6, and Figure 7, education has a large environment/context around it. The author is involved in various of those educational aspects nationally and internationally, as well as in a personal and entrepreneurial level. An overview of such educational activities, committees and actions can be found in **Appendix Overview of Educational activities**.

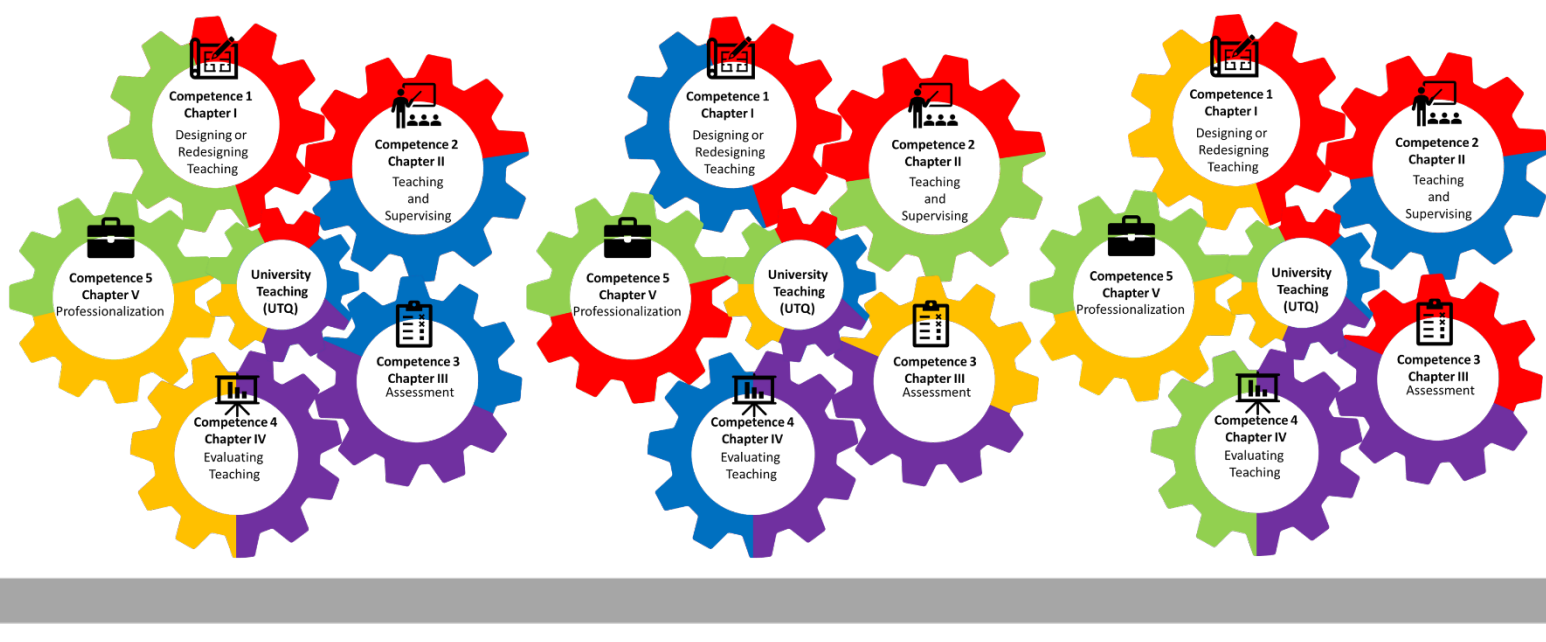
In a nutshell the different contexts include among other things:

- Presence in Master and Bachelor Colloquia both as a supervisor and as an examiner.
- Management of the educational staff involved in the minor (described extensively in previous chapters).
- A weekly meeting with all the educational staff of the program industrial design engineering.
- Participant in the international Erasmus+ project WeCoRD.
- Member of the working group on Challenge-based Learning of ECIU.
- Teaching 2 bachelor courses for the UT/VU Mechanical Engineering Programme.
- Involved in pilots regarding challenge-based learning, citizen science and lifelong learning.

- Director of Transfer of the Authentia non-profit organization with the directive of the establishment of exchange "contracts" with educational institutions from Greece in order to combine the high academic quality of Greek universities with working in a multicultural environment of high technology and professional opportunities.
- I will serve as a coach of an international multidisciplinary group of students remotely as part of the UT Autumn Challenge.
- Applied but rejected from the Programme Committee of Industrial Design Engineering

3. Reflection on Open Ended Challenges and Future Work

The journey of self reflection and application of education that is our job and the reflection needed to complete this portfolio made future open ended challenges apparent. In this chapter I would like to present the most important of them and some of my thoughts in dealing with them. It is very important to note here that in my vision **UTQ is not a static achievement but it is there to serve as a start in our career as educators** (see also Figure 41).



Time

Figure 41 In line with Figure 1 the competencies are presented as gears where their harmonious interaction is highlighted. However the gears are rotating and the teaching competencies of an individual educator are as dynamic as the world and change over time. If one stops exercising education, lose track of the reality, or does not get up to date with modern methods the harmony will break. Therefore the UTQ does not guarantee competence for life but rather a good start.

a. Student Support and student-driven learning

It is very clear that my vision is linked to supporting the students as much as possible, and make sure that I give education of sufficient quality (see also **chapter Evaluating Teaching**). However, one needs to be careful with this and keeping in mind the appropriate amount of support that students need to flourish and yet not become dependent. It is a challenge for me to not impose my opinion and over-support the students and I am still developing the skills that will help me recognize the particularities of the students

and adjust my supervision to those. By gaining more experience, I believe I will be able to recognize the amount of support needed per student and also give them the space to grow on their own.

b. Citizen science and inclusion of lifelong learners

A very important aspect of education is the inclusion of the public (citizens and professionals). However in terms of logistics and practical inclusion of people outside of the University there are multiple challenges. Those can be the collaboration between students and lifelong learners, the distribution of ECs, the accommodation of the timetable of people that have jobs, etc. However, despite the challenges, it is a very interesting path to explore and can have very beneficial impact for the local society as well as for the students. Together with ECIU, we are thinking to include teams of lifelong learners within the minor FITP. Our first step would be to include groups of professionals affiliated with the challenge providers (therefore we will overcome issues of confidentiality). From that we can expand to more people. With regards to citizen science, this year the minor has 1 challenge coming from a citizen initiative (Citizen lab and Wijkvoorziening 't Doesgoor).

c. Constructive Alignment

A pitfall of constructive alignment can be that the students are slowly becoming exam oriented instead of being learning oriented. Constructive alignment is helping with the transparency and reliability of education and especially assessment (see also **Chapter Analyse assessment**). However, with regards to usability (which is related to the positive impact of assessment in the learning experience of the student and it is linked to effective feedback.) it may create students who are just good at using the rubrics and instead of learning and taking responsibility of their education. This is an open-ended challenge which I do not have a clear plan on how to deal with except making my rubrics less analytical but still detailed enough to maintain reliability.

d. Ideas for SUTQ

An aspect of challenge-based learning that I find very interesting and it links also to student-driven learning is the creation of individual learning objectives that a group of students can make together with the educator. In practice this is possible (based on discussions I had people who applied it) with low numbers of students and requires great teaching capacity in order to be applied in larger numbers. My idea for my future development is to explore the concept of student-made learning objectives within the context of the minor FITP and challenge-based learning as part of my SUTQ. Besides this, I plan to become through ECIU an expert in Challenge-based learning and help expand it and apply it within my department and the UT.

e. Increasing number of students

The future is vague but there is a clear trend in the numbers of students every year. This number is increasing and as educators we will have to deal with the ever increasing number of students soon. This will put a lot of strain on our capacity of teaching and if no measures are taken the quality of education might decrease in order to accommodate all the students. The steps forward we made with regards to blended and online learning due to the Covid-19 pandemic may come in use when the student numbers overcome the capacity of the teachers.

f. Covid-19

Another open ended challenge is the effect of that Covid-19 will have in our society and subsequently to the University. This point links to the previous one about the increasing number of students and was discussed extensively in **Impact of Covid-19 in Education**. Soon we will be called to make decisions towards the future of education after Covid-19. There we need to consider the pros and cons of the current situation and ideally have the best of both worlds.

4. A good willed critique on the structure and assessment of the UTQ

The UTQ process itself is in need of redesign and alignment. A UTQ graduate can already see that the processes and methods we learn for designing education could as well be used for redesigning of the UTQ process. The current assessment is very old-timey and traditional and maybe more modern forms of assessment should be employed. Peer-reviewing the educational work of other colleagues, an interview instead of a lengthy report, more presence of evaluators during educational activities (currently there is only one lecture assessment), could be steps towards the right direction. Small assignments may be a more agile way of assessing competencies (separate assessments pre competence in a more streamlined way). There could be tests/assignments/interviews per competence. This way it would feel like a gradual process and not something as tedious as it may seem in its current form.

5. Take-Home Message

As a fitting closing for this document, I would like to offer a brief take-home message in the form of advice (maybe even for my future self). My conclusion is that what makes someone a happy and motivated educator (and maybe skilful) is exposure to all forms of teaching. Do not be afraid to try new strange things even if those are out of your comfort zone. It is the only way to learn and mistakes help towards the goal of becoming a good teacher. After all our job is a privilege and we need to enjoy it as much as possible and find ways to bring our personality forward and responsibly shape the future generations of students.

VI. Abbreviations

CELT	Centre of Expertise in Learning and Teaching
CBL	Challenged-Based Learning
ECIU	European Consortium of Innovative Universities
FitP	From Idea to Prototype
HTHT	High-Tech Human Touch
ID	InterDisciplinary
ILOs	Intended Learning Outcomes
IP	Intellectual Property
LMS	Learning Management System
OOCZW	Out of Comfort Zone Week

PJBL	Project-Based Learning
PBL	Problem-Based Learning
PDCA	Plan – Do – Check – Act
QUEST	Quality Enhancement Support Team
SEQ	Student Experience Questionnaire
UT	University of Twente
UTQ	University Teaching Qualification

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VIII. Appendices

All the files included in these appendices are confidential and are meant only for the intents and purposes of the evaluation of the UTQ portfolio

1. Appendix A – UTQ Competences

UTQ competences and assessment criteria

Competence 1: Designing or redesigning teaching

<i>The teacher can:</i>	<i>The dossier shows:</i>
a. Explain how his course ¹ is embedded in the curriculum or degree programme as a whole.	<ul style="list-style-type: none"> ▪ An explanation on how the intended learning outcomes of the course contribute to the outcomes or competences of the degree programme. ▪ An explanation on how the education connects to ongoing research, or future field of occupation. ▪ An explanation on how the education design fulfils the rules, institutional regulations and educational vision of the University or faculty. ▪ The level of the intended learning outcomes is appropriate to the place of the course in the programme.
b. Design teaching based on the principles of 'constructive alignment'.	<ul style="list-style-type: none"> ▪ Intended learning outcomes that are specific and measurable. ▪ How assignments, modes of instruction and assessments are related to the intended learning outcomes, and demonstrates that the intended learning outcomes are fully covered in a valid and reliable manner.
c. Design active, effective, and efficient learning methods and learning materials.	<ul style="list-style-type: none"> ▪ A variation of activating instructional methods and assignments in the course that enable and support the student to reach the desired learning outcomes. ▪ An explanation of how the teacher provides guidance for students to give direction to their learning activities. ▪ An argued blend of face-to-face teaching and digitally enhanced or online learning
d. Design his teaching with respect to the specific (curricular) characteristics and needs of the students.	<ul style="list-style-type: none"> ▪ An explanation on how the entry level (e.g. prior knowledge, earlier educational experiences) of students is addressed, as well as how the knowledge and interest of the students are taken into account when designing the course. ▪ An explanation on how the diversity of backgrounds and the needs (e.g. culture, functional impairment, learning preferences) of the students is taken into account in the course design (e.g. in the modes of instruction, selected study materials/literature, composition of project teams, explicitness of expectations). ▪ An explanation on how students are stimulated to develop themselves as independent learners / stimulated to think actively for themselves and develop critical self-reflection.

<p>e. Design his teaching in a practically and logistically feasible (do-able) way.</p>	<ul style="list-style-type: none"> ▪ The relevant conditions (e.g. EC’s, budget, roster, hours, place, location, type of meeting) are taken into account. ▪ Both lecturer and student activities (e.g. grading, giving feedback) can be dealt with realistically in the available time.
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¹The term ‘course’ refers to any substantial and specific part of an educational university programme which the teachers designs or teaches. This could be a course or a module but also a series of educational meetings.

Competence 2: Teaching and supervising

<i>The teacher can:</i>	<i>The dossier shows:</i>
<p>a. Prepare an educational meeting.</p>	<ul style="list-style-type: none"> ▪ A lesson plan, containing: <ul style="list-style-type: none"> – Specific intended learning outcomes for the meeting – The context of the meeting (course / module / series of meetings) – An overview for the meeting, including: subjects, lecturer activities, student activities ▪ Materials for the meeting (e.g. exercises, slides, manual etc.) ▪ Justification of the lesson plan.
<p>b. Conduct an educational meeting and reflect on his performance.</p>	<ul style="list-style-type: none"> ▪ An explicit performance of an educational meeting, by video or report of a live observation, which demonstrates: <ul style="list-style-type: none"> – A clear explanation of the purpose and relevance of the teaching session to students. – A clear explanation of the subject matter and/or instructions towards students. – Real interaction with students in order to stimulate the learning process – A good and stimulating atmosphere – Skillful use of technical aids ▪ A thorough reflection of the performance with points for improvement.
<p>c. Supervise students, individually and in groups.</p>	<p>That the lecturer:</p> <ul style="list-style-type: none"> ▪ Has a vision and method for supervision of students over a period of time, including essential milestones. ▪ Has investigated objectives and needs of students, and is capable of using different and appropriate supervision styles, catered to the situation and the student’s needs, as well as referring students to professionals within the organization if necessary. ▪ Gives effective student feedback in meetings with individuals or groups of students. ▪ Demonstrates behavior that supports the group process. ▪ Enhances initiative, independence and autonomy of students and knows how to stimulate this. ▪ Supports students in their development of academic skills.

Competence 3: Assessment

<i>The teacher can:</i>	<i>The dossier shows:</i>
a. Design and implement the assessment of student development and learning outcomes.	<ul style="list-style-type: none"> ▪ How students' progress is assessed regularly and how students receive feedback on their performance. ▪ An assessment matrix which shows congruence between intended learning outcomes, assessment methods and test elements, plus the weighting of each sub-part. ▪ An explanation of how the assessment methods meet the quality criteria: validity, reliability, transparency, usability/practicability and positive impact on student learning. ▪ An example of an assessment and its corresponding answer model. ▪ An explanation how the assessment fits within the assessment policy of the university or faculty (regarding OER, rules & regulations of examination board etc.).
b. Analyze the assessment results and draw conclusions.	<ul style="list-style-type: none"> ▪ Psychometric or any other type of valid quality analysis of the assessment (including e.g. item analysis, reliability of the assessment, relevance of the criteria that determine whether the intended learning outcomes have been achieved). ▪ An explanation on the choice of method used to determine the cut-off point and the grading of the work.

Competence 4: Evaluating teaching

<i>The teacher can:</i>	<i>The dossier shows:</i>
a. Conduct an evaluation and collect information (data) purposefully to improve his teaching.	<ul style="list-style-type: none"> ▪ The purpose of the evaluation relevant to the teaching situation. The evaluation approach (methods, sources and meaningful evaluation questions /criteria) and justification for the choices made within the context. ▪ Evaluation results from students and from other sources (e.g. assessment results, colleagues).
b. Analyze evaluation results, draw conclusions, and pinpoint areas for improvement.	<ul style="list-style-type: none"> ▪ Conclusions about the quality of the course's educational design, teaching and assessment. ▪ Concrete recommendations and intended actions to improve the course's educational design, teaching and assessment ▪ How previous evaluation results have been used in the (re)design of the course.

Competence 5: Professionalization

<i>The teacher can:</i>	<i>The dossier shows:</i>
a. Formulate his own vision on teaching and student learning.	<ul style="list-style-type: none"> ▪ A coherent vision on learning and teaching that is supported with references to literature and/or descriptions of experiences that have influenced this vision. ▪ Examples which illustrate how his educational vision influences his teaching.

b. Manage his work as a teacher and can collaborate in a teaching team.	<ul style="list-style-type: none"> ▪ Examples that show the role of the teacher in teamwork (e.g. role/tasks, constructive contributions to team work, managing student assistants, etc.). ▪ An indication of the relevant committees and boards the teacher should inform when designing/teaching a course. ▪ Description of how the lecturer balances different professional roles (e.g. different teaching roles or the roles of teacher versus researcher).
c. Reflect on his work as a teacher and on his future professional development in teaching.	<ul style="list-style-type: none"> ▪ Reflection on personal strengths, weaknesses and development in relation to all 5 UTQ competences. ▪ Specific plans for further professional development as a teacher.

2. Appendix B – Documentation of the HTHT Minor From Idea to Prototype

a. Manual

b. Brochure

c. Presentation for the annual minor market

3. Appendix C – Personal Information

a. Professional CV

My professional CV including all my research output as well as all the students I have supervised for their Master's and Bachelor theses can be found here.

b. Educational CV and Self-Diagnosis (UTQ Intake)

Attachment 1: Educational CV and Self-diagnosis

Educational CV

General information

1. Personal information	Please fill in:
Name (Surname + initials + title):	Nizamis K. Ir.
Faculty and department:	ET/DPM
Extent of your appointment at the university? (in fte):	1
Extent of educational tasks (in fte):	0.4
Number of years teacher in higher education:	4
Bachelor/Masters programmes, you teach in:	3
Degree programme you do most of your educational work for:	Design and Mechanical Engineering
Other teaching experiences and comments:	Tutor for HTHT minors

2. Courses and/or workshops concerning education that you have taken yourself			
Course name	Educational institution/Company	Study load	Year
1 Impactful active classroom	LISA UTWENTE		2016
2 Tutor training	LISA UTWENTE		2016
3			
4			
5			
6			
7			
8			
9			

Experiences in teaching

1. Level of experience with educational tasks	Please choose:
Execution + direct preparation of education	<input checked="" type="radio"/> < 10 times <input type="radio"/> 10- 20 times <input type="radio"/> > 20 times
(Re)design of education (course/subject/module)	<input checked="" type="radio"/> < 3 times <input type="radio"/> 3 – 6 times <input type="radio"/> > 6times
Coordination- and/or policy- oriented tasks	<input checked="" type="radio"/> never <input type="radio"/> 1 -3 times <input type="radio"/> > 3 tasks

2. My experience with:			Applicable:	
	(Almost) never: <5 times	Sometimes: 5-15 times	Often: > 15 times	Mark if yes
Lectures/educational meetings	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
Activating methods during lectures	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
International classroom during lectures	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
Lectures for > 100 students	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>
Supervising students working in small groups on small assignments (tutorials and/or practicals)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
Supervising students working in Project groups on big assignments	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
Supervising individual students working on final assignments (Masters students/PhD students)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
Electronic learning environments	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Others: ...				

3. University teaching: Subjects you are/were responsible for as a teacher/Module coordinator:				
	Course name (in module)	Teaching methods ¹	Study load Hrs/ EC's	Degree programme and year
1	Biomechatronics	Lectures	2 Hrs	Master Biomedical Engineering (2015-2019)
2	Biorobotics	Lectures/Tutoring/Supervision of small group projects	40 Hrs	HTHT Minor Biorobotics (2014-2018)
3				
4				
5				
6				

4. Other relevant experiences

.....

.....

.....

.....

¹ See question 2

Self-diagnosis

How do you rank your *knowledge/skills*?

Important: Rank all the items of the checklist. The rankings have the following meaning:

1. no knowledge/skills at all; *you feel unprepared and are often uncertain;*
2. some knowledge/skills; *you act mainly on intuition and you are comfortable in routine but have little or no flexibility in new or unexpected situations;*
3. knowledge/skills is good; *you are confident, flexible in new/unexpected situations and can make and justify choices (partly) based on theoretical principles;*
- n. not applicable.

Competence 1: Designing or redesigning education, you can: Please choose:

	1.	2.	3.	N.a.
a. Explain how his ² course ³ is embedded in the curriculum or degree program as a whole.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Design education based on the principles of 'constructive alignment'.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Design active, effective, and efficient learning methods and learning materials.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Design his education with respect to the specific (curricular) characteristics and needs of the students.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Design his education in a practically and logistically feasible (do-able) way.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comments:				

Competence 2: Teaching and supervising, you can: Please choose:

	1.	2.	3.	N.a.
a. Prepare an educational meeting.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
b. Conduct an educational meeting and reflect on his performance.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
c. Supervise students, individually and/or in groups.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Comments:				

² "He/his" can also be read as "she/her".

³ The term 'course' refers to any substantial and specific part of an educational university program which the teachers designs or teaches. This could be a course or a module but also a series of educational meetings.

Competence 3: Assessment, you can:	Please choose:			
	1.	2.	3.	N.a.
a. Design and implement the assessment of student development and learning outcomes.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Analyse the assessment results and draw conclusions.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Competence 4: Evaluating teaching, you can:	Please choose:			
	1.	2.	3.	N.a.
a. Conduct an evaluation and collect information (data) purposefully to improve his teaching.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Analyse evaluation results, draw conclusions and pinpoint areas for improvement.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Competence 5: Professionalization, you can:	Please choose:			
	1.	2.	3.	N.a.
a. Formulate his own vision on education and student learning.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Manage his education and can collaborate in a teaching team.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Reflect on his work as a teacher and on his future professional development in teaching.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other relevant knowledge and skills

.....

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c. Overview of Educational activities

Personal Information

Name (Surname + initials + title):	Konstantinos (Kostas) Nizamis
Faculty and department:	Engineering Technology (ET) - Design, Production, and Management (DPM)
Extent of your appointment at the university? (in fte):	1.0
Extent of educational tasks (in fte):	0.4
Number of years teacher in higher education:	6
Bachelor/Masters programmes, you teach in:	4

Degree programme you do most of your educational work for:	Mechanical Engineering
Other teaching experiences and comments:	Tutor for multiple modules and HTHT minors Supervision of Bachelor and Master Theses

University Teaching: Subjects you are/were responsible for as a teacher/Module coordinator:

Course/Module name	Teaching Methods	Workload/EC's	Degree programme and year
HTHT Minor³ From Idea to Prototype	Lectures Workshops	15	High-Tech Human touch minor for 3 rd year Bachelor students (available to all programmes)
HTHT Minor From Prototype to Society	Lectures Workshops	15	High-Tech Human touch minor for 3 rd year Bachelor students (available to all programmes)
Design Engineering	Lectures Tutorials	1.5	1 st year mechanical engineering bachelor students (for the novel VU/UT Mechanical Engineering programme)
Systems Engineering	Lectures Q&A Sessions	2	2 nd year mechanical engineering bachelor students (for the novel VU/UT Mechanical Engineering programme)
Wecord – Module 4	Online Lectures Micro lectures Hackathon	2	Graduate Engineering students (As part of the Erasmus+ WeCoRD project)

Other educational experience

Course/Module name	Teaching Methods	Workload (EC's/Hours)	Degree programme and year
Master Insert Module – Systems Thinking	I give 1 lecture and 1 tutorial	5 EC	Extracurricular Programme for UT Master students (available to all programmes)

³ This is the minor used as case-study for this UTQ portfolio

ARS Pre-Master	I coach a pair of students that are learning how to perform research as part of their pre-master	15 EC	Part of the Pre-master for the Industrial Design Engineering Master
Biomechatronics	I give one guest lecture and one assignment for all the students	5 EC	1 st year Master students in Biomedical Engineering
Biorobotics	I give 2 guest lectures and assess part of their project report	15 EC	High-Tech Human touch minor for 3 rd year Engineering Bachelor students
WeCoRD 1 st Winter School	I give one guest lecture	2 hours	1 st year master students from various programmes (Engineering, Medicine, Design)
Ethical and Legal Aspects of Wearable Robotics	Developed material for the ethical and legal education of engineers that develop wearable robotics	I received a small grant of 1000 euros to travel to the National Technical University of Athens for this purpose	Part of the European COST action 16116 (As part of working group 4 – Ethical, legal and Societal aspects of Wearable Robotics)
Mentor Bachelor	I am part of the 1 st year mechanical engineering mentoring program	9 students	1 st year Mechanical engineering Bachelor students
Mentor Master	I was part of the International Student Mentor Program for ET from 2017-2019	2 students	1 st year Mechanical engineering

			Master student
Tutoring	I am tutoring for at least 5 modules/minors every year	10 groups of students	Bachelor students (Industrial Design Engineering) Pre-master students HTHT Minor Students
Supervising	I have supervised 19 Bachelor and Master students since 2015	Currently supervising 3 bachelor and 1 Master students	Bachelor and Master students in: Biomedical Engineering Mechanical Engineering Industrial Design Engineering
Challenge Provider	As co-founder of the Authentia Stichting I provided a challenge to the BMS faculty and currently operate as challenge provider for 2 MA students and 1 BA.	3 students	Clinical Psychology
AIM 2021 Conference	Co-Organize an international workshop for the future of robotics education	4 hours	Teachers and Researchers of Robotics from around the world
ECIU University	Part of the challenge-based learning working group of the ECIU	Weekly meetings	N/A

d. Attended courses and workshops

Course Name	Educational Institution/Company	Study Load	Year
Impactful active classroom techniques Workshop	CES-CELT UTwente	4 hours	2016
Tutor Training	CES-CELT UTwente	4 hours	2016
How to plan and Organize your course	CES-CELT UTwente	4 hours	September 2019
Assessing Individual Competencies in Group Work	CES-CELT UTwente	4 hours	May 2019
Practical information lunch and workshop on 'Interdisciplinary team work skills'	CES-CELT UTwente	4 hours	May 2019
With the brain in mind: how to stimulate the learning brain?	CES-CELT UTwente	8 hours	November 2019
Course 1: designing a lesson and a course	CES-CELT UTwente	20 hours	May 2019
course 2a: practical teaching skills	CES-CELT UTwente	20 hours	October 2019
Course 3 : testing and assessment	CES-CELT UTwente	16 hours	June 2019
Course 4: Quality Assurance and Course Evaluation	CES-CELT UTwente	4 hours	December 2019
How to blend your education – Tools & Trends	CES-CELT UTwente	4 hours	March 2020
Successful Collaboration in Student Teams	Marieke ter Maat	1.5 hours	April 2021

e. Certificates of attended courses and workshops (insert link)

f. English language assessment

g. Lesson Plan

LESSON PLAN TEMPLATE – KOSTAS NIZAMIS			
Module	HTHT Minor Biorobotics		
Course	N/A		
Lesson Title	Social Impact and Risk Analysis		
Student Level	Last year of BSc.	Lesson Duration	45 minutes
Student Number	Approx.. 150	Student Background	Various Backgrounds Mainly Engineering
Budget (if applicable)	N/A	Involved Staff (if applicable)	Kostas Nizamis

Course/Module objectives:
<p>At the end of the minor the students are able to:</p> <ul style="list-style-type: none"> • Systematically approach a design project from user requirements to device evaluation. (synthesis and evaluation, with a little bit of application and analysis) • Design a robot for application to a biomedical problem using multidisciplinary knowledge from mechanical, electrical, control and software engineering domains. (application and synthesis)

<ul style="list-style-type: none"> • Create a kinematic model of the robot to control the joints to perform useful movements and tasks. (analysis, synthesis, application and evaluation) • Extract biological signals from the human body that can be used to control a robot. (application and synthesis) 	
Lesson objectives:	
At the end of the lesson the students are able to:	
<ol style="list-style-type: none"> 5. Define social impact 6. Relate design choices to social impact 7. Apply social impact analysis 8. Apply risk analysis 	
Related educational material:	
Articles:	
<ol style="list-style-type: none"> 1. Ethical, legal and social concerns relating to exoskeletons (https://dl.acm.org/citation.cfm?doid=2874239.2874272) 2. Creation of a Care Robot Impact Assessment (https://pdfs.semanticscholar.org/588f/0606d4ab4c5e4ecbd566bf65d2d20dc10730.pdf?_ga=2.17791993.1154309724.1565350551-62981696.1559128529) 3. Engineering in Society (https://www.raeng.org.uk/publications/reports/engineering-in-society) 	
Tools:	
<ol style="list-style-type: none"> 1. Excel Template for Risk Analysis 2. Kahoot 3. Mentimeter 	
Summary of tasks and activities:	
Prior preparation for students:	Class activities:
<ol style="list-style-type: none"> 1. The students need to study one article in order to discuss it in class and use it as a case study for social impact analysis. 	<ol style="list-style-type: none"> 1. Kahoot in order to stimulate recall of prior learning. (Individual) 2. Mentimeter for discussing stakeholder importance. (Individual) 3. Performance of a social impact analysis. (Group) 4. Performance of risk analysis. (Group) 5. Q&A
Equipment needed:	
<ol style="list-style-type: none"> 1. Projector 2. Laptops/Smartphones 3. Tables 4. Printed Articles 5. Internet Connection 	

Homework:
N/A
Evaluation and assessment of the intended learning outcomes:
The students will be evaluated for the intended learning outcomes when they will hand in their group reports. An integral part of the report is the Social impact and risk analysis. The report accounts for 25% of the total grade and the systematic application of the tools discussed in this lecture accounts for roughly 10% of the report grade.
Reflection/Feedback/Improvements:
Notes:

*Educational functions: 1 Motivation, 2 New Knowledge, 3 Examples, 4 Practice, 5 Feedback

TIME	Instructional function* [purpose of instruction/ tasks/ etc.]	Educational activity [The teacher does...]	Student activity [The students do..]	Extra information
2 min.	Introduction	Explain the learning objectives and structure of the lesson	Listen	
8 min.	Recall of prior learning ¹	Use Kahoot	Answer 4 Kahoot questions	Related to their previous lecture on Ethics in design
2 min.	Introduction to Social Impact ²	Share definitions	Listen and take notes	
5 min.	Discuss Social Impact ^{1,4}	Use Mentimeter	Submit their insights in 2 questions related to social impact and stakeholders	We discuss each questions based on the word cloud results
5 min.	Introduction to Social Impact Analysis Steps ²	Share definitions	Listen and take notes	
13 min.	Perform a social Impact Analysis example in the Class ^{1,2,3,4}	Ask them to identify in an article the social concerns and link them to the definition offered in the previous instruction. I will hand them post-its and write the 3 categories on the table. They have to stick the post-it's in the categories offered.	Split in groups and discuss the article. They will try to categorize the social concerns mentioned in the article in 3 categories.	They have to read the article before the lecture (One week notice)
5 min.	Introduction to Risk Analysis and group example in the class ^{1,2,3,4}	Define Risk Analysis and share a tool with the students.	Will use the tool provided to perform an in class example of a Risk Analysis.	
5 min.	Closure of the lecture and Q&A ^{1,5}	Give opportunity for questions and explain the use of this knowledge in their report.	Ask questions and clarifications	

- h. *Self-Reflection*
- i. *Assessment for my educational meeting*
- j. *Slides from my educational meeting*
- 4. Appendix D – Tutor Guidelines
- 5. Appendix E – Assessment
 - a. *Alignment between ILOs and Assessment*

Learning Objective	Peer Review Assessment (10% + 20%)		Reflection Essay Assessment (10%)
	Assessment Criteria		
	Content (66 %)	Organization (34%)	
			1. Shortly describe actions you undertook related to the project (management) role (or tasks) you wanted to perform (for example the role as coordinator, planner, contact person, or just the one responsible for a specific task, etc.). Also shortly describe actions you undertook related to your disciplinary background. What contributions did you have as an expert in ... (psychology, computer sciences, mechanical engineering, applied sciences, civil engineering, etc.) 2. Look back on these actions:· To what extent did your actions contribute to the project and your project role?· To what extent did your actions contribute to the project looking from a disciplinary perspective?· To what extent were you satisfied with your actions? (And why?)· To what extent were you able to use your personal strengths? 3. When describing these actions and consequences, can you filter some essential aspects which contributed and/or blocked your contribution to the project and personal contribution? 4. Based on the aspects you filtered from your experiences, write an alternative method you would use to have a better effect in the future (for example during the module: from prototype to society).· What would you do differently in a future project?· Has working in this project changed your picture of other disciplines in some way? Please explain with concrete examples (tip: remember the stereotypes that were discussed in the workshop about multi-disciplinary teams.
1			
2a			
2b			
2c			
2d			
2e			
3			
4a			
4b			

Figure 42 The alignment between ILOs and the assessment items of the peer review, presentation, and reflective essay as used in the minor.

Learning Objective	Report Assessment								
	Assessment Criteria								
	<ul style="list-style-type: none"> •Description of how the multiple disciplines in the group were utilised •Group process report (in appendix) •Reflection on collaboration with target group and challenge provider <p>Weight 15% of the grade</p>	<ul style="list-style-type: none"> • A clear problem definition based on the provided challenge • Research question and Relevant sub-questions <p>Weight 10% of the grade</p>	<ul style="list-style-type: none"> •Selected appropriate design method • Description of the chosen method• Applied the chosen method accordingly • Including a connection to the discipline(s) needed to address the problem • Description of the design process <p>Weight 15% of the grade</p>	<ul style="list-style-type: none"> • Set of requirements of the to be designed solution • How were the needs of the challenge provider and the target group taken into account? <p>Weight 10% of the grade</p>	<ul style="list-style-type: none"> • Several worked out ideas • Validated selection • Connection to the requirements • Using literature from multiple disciplines <p>Weight 15% of the grade</p>	<ul style="list-style-type: none"> •Description of the use of on-campus and off-campus resources properly (process tutors, facilities, relevant research groups, etc.) <p>Weight 10% of the grade</p>	<ul style="list-style-type: none"> •Description of the value proposition (added value) •Quality of the presented Prototype •Embedding of the solution in the context of the problem provider <p>Weight 10% of the grade</p>	<ul style="list-style-type: none"> • Reflection on context and society <p>Weight 10% of the grade</p>	<ul style="list-style-type: none"> •Quality of reporting meets academic standards <p>Weight 5% of the grade</p>
1									
2a									
2b									
2c									
2d									
2e									
3									
4a									
4b									

Figure 43 The alignment between ILOs and the assessment item of the report.

a. Rubrics

Rubric for the Report

Instructions for the Motivation Letter

Template for the Motivation Letter

Assessment criteria for the Peer-Review and Presentation

Assessment criteria for the reflective essay

Peer-review presentation Group A, Human-machine cooperation and societal impact in the development of a chewing gum removal robot

HTHT minor, from idea to prototype

* Required

Email address *

Your email

Please fill in your name and surname. *

Your answer

Content of presentation

The following questions consider the content of the presentation.

The design problem is clearly proposed. *

Strongly disagree 1 2 3 4 5 Strongly agree

Figure 44 A snapshot of the google form that students use to individually evaluate each group after the final presentation.

6. Appendix F – Evaluation of Education

a. *Student Feedback and Evaluation of supervision*

Group

Biorobotics:

Dear Kostas,

We like that you asked us for feedback on you being our tutor. We came up with some tips and some tops. We hope you will join us for a beer on Friday after the demonstration.

Tips:

* Maybe it is a good idea to give some feedback on the feedback: We gave you some feedback on the module/exams/lectures, but we don't really know what happened with this feedback. We know you appreciated the feedback but we never heard if it would affect us.

* (This would also be a tip for us) Remembering the appointments and being there in time. Again, we are equally guilty in this matter.

Tops:

* You listened very patiently to our problems and we had the idea that you were interested and tried to help us.

* You made very clear that (even negative) feedback on the module or project was very appreciated and that made it easier for us to give the feedback.

* You made your role as a tutor very clear: not being our boss but a part of the group.

* You actually knew what the project was about and you had relevant knowledge and experience.

* If we had a problem which you couldn't help us with you could redirect us to people who could.

General Tip:

* We had the idea that you, and the other tutors, did not know much about the contents of the courses and the organisation of the module. The coordinator should keep you guys more in the loop.

Dear Kostas,

As you told us at the beginning of the project this was your first time being a tutor i would like to give you some feedback on how you did, on how i think you performed. First of all i thing you did an amazing job! but lets start with the things that I didn't like.

To start with the meeting you missed on Friday the 23. I know this can happen and that is no problem as you do the tutorship next to your normal day life, but not showing up really demotivates and loses trust in you as a tutor. I can tell you from experiences that if something like this happens in the start of a project the students in the project group will not take you serious.

Next to that I sometimes had the feeling you were not 100% there when we had a meeting. Most of the time this was fine and I know your busy but dont show this to the students, if you give them the feeling you are on the Uni just for them they will love you from the start!

So those are things you might improve and see them as some tips ;-) I dont like to talk negative about people so im exited to tell you the next things!

As you said yourself we as group are very motivated, but this is not only because of us, you have a really important role in this. I remember the sentence you said when we met for the first time: "WE (so you too!) are gonna nail it!" This was something i never had seen before with a Tutor and it gave me a really big boost in motivation and i think it did for the others as well! This gives the students the feeling they have a extra group member and that is worth gold (as we would say in dutch). Project groups talk about their tutors when they are not there, so we were really proud of having you as a tutor from the start and the other project group knew that from the beginning :-).

After that we heard that the uni didn't allow you to really help us, which i was not surprised about, but the fact that you said that if we do it right and ask the right question we could achieve the things is really good. A bit of rebellion against the Uni always works, especially if it is in the favor of the project group.

During several meetings you provided us with good information. It is really good that you sometimes give information related to the module even though we didn't ask for it. We didn't ask for it because we don't know what you discussed with the other tutors, so this information is really valuable and i can imaging other Tutors won't provide the info unless the project group asks for it. Also the feedback you gave on our work and the way we do work is really good and really valuable. trying to help project groups in their general way of working improves their work outside this project too, and i personally love that.

So all in all I, and i think i can say we, are really glad we have had you as a tutor. I wish you good luck with further projects and new tutorship in other projects! Maybe the way i talk about uni in this mail already showed it, but i do not agree on how the Uni educates in being a tutor in a project. I find they don't take it serious enough but i can tell, having a bad tutor demotivates the students, as, somehow, the tutor represents the Uni it is important that the tutor is good just like you!

Keep up the good work and I'm glad to see you on Friday and present our robot!

Dear Kostas,

Firstly, we think you are a very enthusiastic and spontaneous tutor, a tutor who is willing to help the tutorgroup. You were always available if we had a question. We could mail or visit your office, what was very handy. And we didn't feel encumbered to do so.

During the meetings, you gave us general tips that were very helpful (for example to make an outline, etc.).

Besides that, you knew who we could ask if we had questions about, for example mechanics/designing. So it was good that you sent us with certain questions to the right people.

You also passed on our comments/complaints about the module well to the minor coordinator

A happy tutor is also a happy group, so keep this up ;).

We didn't showed you much of what we had made up to that moment in the first tutor meetings. Maybe it is an idea to ask the group more to show what they have at the moment. The first tutor meetings we asked you more questions, and we talked about the module. But maybe it is an idea to ask the group you are tutoring more to show things and then give some little feedback whether they are going in the right direction. Sometimes we had the idea that module was unclear and was not known what the students to do. This made it for us also difficult. It would be better to make everything more explicit. This is however more of a point for the whole module.

You were officially not allowed to answer specific questions, but sometimes it is really handy to just answer some of them. This could be a real time saver for the group. In the last part of the module we noticed you do this and we liked that. The answer can also be a critical question. This makes the group think about some stuff.

But, you leaded us through the module, to the end result very well! We are looking forward to the drink!

We also made a little Angry birds Robot song on the song 'snowman' from frozen we would like to share with you:

Do you wanna build a Robot?

C'mon lets go and program.

We used to play angry birds,

on our phones,

it's like you've flown away.

We used to be best birdies,

and now you're shot.

I wish you'll manage your anger.

Do you wanna build a Angry birds Robot,

mubles it doesn't have to be an Angry birds Robot.

Go away Sanne,

Okay fly!

From Idea to Prototype:

Dear Kostas

Tops

During the project you were very approachable. Mail contact and face to face contact was good. In addition you replies were fast and you really wanted to help us. You offered several times to help us outside the planned tutor meetings when something was not working the way we wanted. It was also helpful that you immediately took action when we had a question, for instance you called someone immediately if you thought he/she had the answer to our question.

Tips

At the beginning of the project, you mentioned that you won last year with your project group. And that you said we could not win the competition with this robot. It demotivated us a little bit. Maybe you shouldn't say that to the groups you will have next year. But say something like everyone can win if the robot works perfectly, you make a good presentation or something like that. And not depend everything on the robot idea. We were also a bit disappointed when you didn't show up at our presentation, because earlier you said that you wanted to be surprised at our presentation. Therefore we thought that you would come.

Dear Kostas,

Tops:

Overall, working with you was really enjoyable. We think you successfully transferred us your knowledge about the topic, which helped us understand the topic of the project better. The meetings and interactions with you were really casual and friendly, which made them really enjoyable for us. The motivation was really on point, as we were not really into the project topic at the start, but your enthusiasm helped us proceeding with it. Most of the feedback was really useful. However, some additional details or clear examples of how something should be changed/improved might be useful. Your insights in this type of project were useful for us and helped us understand how to proceed and properly work on this type of project.

Tips

One other aspect which needs improvement is the involvement in the business part of the project, as it represents a significant bit of the project. We understand that you do not have the expertise in it, but it might have been useful to receive more information about it from you, being in the position of the case-owner. Time-management was alright. One aspect which might be improved is allocating more time to a meeting, as some of them felt rushed.

Anyway, on behalf of the whole group, we thank you for your help!

Dear Kostas,

Tops:

Due to differences in disciplines there is usually some differing perspectives, however even with that in mind you were rather concrete and precise. I can't think of a sub-optimal aspect from my own experience. From my point of view you were rather direct and to the point most of the time, I prefer that however some may see that as rude. I personally didn't. I learned enough to put it to use in further academic assignments!

Tips:

Perhaps some more in depth or reasoning to feedback would elicit more of the thoughtprocess behind it. Aside from that it was rather useful.

Thank you, you were one of the best tutor/teachers I've had so far!

Individual (the first three can be found here)

MSc. Alex: What I found remarkable about Kostas is that he is so genuinely interested in what others have to say. Kostas and I worked together as he was the external advisor to my master thesis project in Philosophy of Science, Technology and Society, which was initiated by him contacting my first supervisor. To broaden his horizon and connecting his engineering to ethics, he does not avoid discussion and is willing to question his own assumptions. Although my suggestions might have seem strange to him, he always took them seriously. More importantly, he does not only listen to them, but also to the people he is designing his hand orthosis for. His collaboration with people with DMD shows how he pursues the goal of constructing technology that is truly good for people (and not only good for publications). Personally, I would like to mention that our meetings were not only productive, but also enjoyable because of his easy-going attitude. As someone so interested in multi-disciplinary research, he would be a valuable addition to any modern research team.

MSc. Ana: It is rare to find someone so enthusiastic about his work like Konstantinos! I had the pleasure of having Konstantinos as my daily supervisor when I was doing my master's assignment at the University of Twente. Since the first day that I met him, I was amazed by his communication skills and ability to command a room, regardless of who was there. He is committed and focused on the accomplishment of his goals. Furthermore, Konstantinos is always creating opportunities for sharing ideas, has a motivating word for everyone and suggestions of how they can "shine" in their work. It is great to work with him! I can say with conviction that Konstantinos is not only a great researcher, but also a great teacher, and above all the things: a great leader! He would be an asset to any university or company!

Regarding my opinion about your supervision...

It was a pleasure having you as a supervisor! I saw lots of colleagues complaining about their supervisors because they didn't feel any support from them. It was definitely not my case!

Tops:

- Monthly plans and gave me feedback about it (the plans were actually my idea, but I think it is very important to be on time, and your feedback about it is crucial)

- Weekly meetings: the more meetings the better, because it obligates us to show some work, and if we don't need to show stuff, we will feel that we have plenty of time (which is not true)
- The meetings with people of different areas and people with DMD, we learn a lot from them, it's always very nice
- You make me feel very comfortable with since the day one: for me it was very very nice, however, you should be careful with this. Personally, just because you're a nice guy doesn't mean I going to not put the same amount of effort in my work (it actually motivated me even more) but for lots of people, it doesn't work the same way.
- Finally, and more important: the incentive words you gave me every time I did something more or less ok, it was very very very important for me because it gave me the motivation to keep going, it makes you feel that you are in a nice way

Things I don't think its a nice idea:

- Annual plan; in my case in the beginning my assignment was extremely broad, it took me a while to do it, and with the monthly plans, it was not necessary. However, I think it's nice to do a diagram similar the one I did based on the main goals of the assignment
- The literature search is very important, but I don't know if writing a review is a nice idea for 9 months. it takes a long time and a lot of effort.

MSc. Anil: Few people have the opportunity to report to a supervisor who is also a mentor, but I did when I worked with Kostas. I had the pleasure of working with him, during my master thesis in Biomedical Engineering. Kostas' ability for project management and problem-solving helped me get the best out of my research. No matter how busy he was with his own research and supervision of students, he always managed to make some time to help me out with my project. As a team member and a leader, Kostas earns my highest recommendation.

MSc. Gandharva: I had the opportunity to work under the supervision of Kostas for my Master project for Mechanical Engineering. During the course of the project, I got to learn a lot from Kostas. I able to gain technical knowledge and project management skills under his guidance. His expertise and experience helped me utilize my theoretical knowledge to solve real life engineering problems. As my project was multidisciplinary, Kostas was the perfect mentor for me. He was able to guide me through various technical problems and always made sure that I was headed in the right direction. His expertise in the field of engineering and control systems helped me significantly during my project. I was able to develop problem solving skills under his guidance and his dynamic personality assisted me adapt to unseen problems which every researcher/engineer faces during projects. In my opinion Kostas not only has an aptitude for research but also for mentoring. It was a very delightful experience for me to work under his guidance.

- Guidance: It is very important to apply the theories that we learn in educational institutions in real life scenarios. Under the supervision of Kostas,

I was able to do so. I also learnt the skills to solve a problem systematically. I personally felt that his guidance since the beginning of my thesis was on point.

- **Transfer of Expertise:** Since, I did not have experience working with sensors like gyroscopes, he helped me understand the behavior of the sensor and made sure that I was working in the right direction with my project. His expertise in the area of control systems helped me a lot with my thesis as well. I gained a lot of knowledge regarding control systems by working under his supervision.
- **Interpersonal skills:** I personally feel that his interpersonal skills are impeccable. He is very easy to talk to and approachable. I never had a moment where I felt uncomfortable working under his supervision. He is very empathetic as well. During my thesis I went through some difficult times and Kostas understood it and was always there if I needed moral support.
- **Motivation:** While doing a project there are moments where you hit a wall and no significant progress is made or positive results are obtained. I had those moments as well during my thesis. Kostas understood that I was having troubles with my project and made sure that I was always motivated and showed me the bright side of things. This really helped me power through the difficult time and move ahead.
- **Time-Management:** Realistic but challenging goals were set in order to complete the thesis assignment. The goals were broken down into smaller tasks and activities. These were monitored on a regular basis. Despite his packed schedule at the university, Kostas was always active and made sure everything went as per the plan.
- **Organization:** During my thesis inputs were given by various departments (Product Management, Optics, Mechanical Engineering, Electrical Engineering). Meetings were regularly organized with Kostas who helped me work through all these inputs. A structured plan of the meetings was made in advance. Changes were made as the project progressed due to unseen circumstances and a very dynamic approach was taken by Kostas. He made sure that the plan was followed which helped deliver the thesis on time.
- **Feedback:** The feedback provided by Kostas whether they were regarding the research or report related was precise and coherent.
- **Academic Development:** Since my background was predominantly in the field of Mechanical engineering but my assignment had elements of control system and electronics. Kostas made sure that I gained useful knowledge related to my topic. In other areas as well, his guidance helped a lot. In terms of presenting academic papers, he made sure I understood the different approaches and he helped me choose the best approach for my thesis and made sure that I followed that approach.

I honestly do not have any tips. My experience working under his supervision was very pleasant. I am very thankful that I got the opportunity to work under his supervision.

BSc. Fabienne:

- **Guidance:** Since I have worked with you on a project before, I knew that working with you is very pleasant in terms of guidance.
- **Transfer of Expertise:** The tips you gave me thorough the project were helpful.
- **Interpersonal skills:** I appreciated that you were sincerely concerned about my well being during the project and that you kept in check how I was doing. Your understanding made me feel reassured, which I also very much appreciated
- **Motivation:** The confidence you showed in whether I would be able to achieve certain points felt very reassuring and motivating. You showed understanding when I wasn't able to reach certain goals I had set for myself, which I felt was sometimes the understanding I needed.
- **Time-Management:** Your time-management skills were definitely better than mine. It was nice that you were pretty quick in responding to questions and flexible in rearranging scheduled meetings.
- **Organization:** I think that at some points you were better prepared for our meetings than I was, so as far as I could tell your organizational skills were on point.
- **Feedback:** The feedback you gave in a document sometimes only became clear during the meeting. There might be an area of improvement there?
- **Academic Development:** Since I felt that my academic skills weren't the best to start with, I didn't know to what extent they could or should be progressed. In the end, it turned out that my research could have been better. I cannot say whether this was due to the lack of prior knowledge or to a lack of guidance. However, I think that you have tried your best to support and progress me for my thesis.

Working with you was very nice and I would gladly do so again! I very much appreciated your help and guidance during the project and I hope others will also be as satisfied with your guidance as I was! Take care! :)

Pre-Master Ibe:

- **Guidance:** no tips, only tops. excellent guidance skills, at first I didn't even know where to start while writing an acedemic research paper, but at the end I did. The weekly meetings helped a ton in this because they really made us work because we had to deliver something every week.
- **Transfer of Expertise:** I really felt like you knew what you where talking about and therefore could help us a lot. especially with the subject.
- **Interpersonal skills:** just excellent, every meeting felt very useful and helpful, But besides that, I also really liked every meeting. The tone was casual and

fun, and this really help by giving our opinion on stuff, especially because English isn't my first language and I wasn't yet comfortable with talking English.

- Motivation: You kept us motivated at all times, and not by pushing us, but by showing us that ARS can be fun and thereby providing a drive for ARS within ourselves. which is the best and sometimes the only way of motivating me.
- Time-Management: We had meetings every week and that really helped. You also really stimulated us to take a week of in the vacation. (which we unfortunately weren't able to take)
- Organization: Excellent.
- Feedback: All feedback was useful and we learned a lot from it. At the beginning you gave us more feedback, but a long the way you reduced the amount of feedback so we would become more independent. Which was nice.
- Academic Development: Like I said, at the beginning I had heard of academic research papers and I also read a few. They seemed very complex and I therefore had a bit of an aversion towards them. I thought that I would never be able to understand them, let alone write one myself. But you properly introduced me to them and even showed me that they can be fun! what a turnaround! Along the way my skills developed and I got better and better. This was something I didn't really notice myself, But you told us that we should revisit our first paper we shared with you, and it was at that moment where I really saw my growth.

I had a really really pleasant experience working with you, I hope that we will speak each other in the coming future. Unfortunately I failed my premaster so I wont be able to join the UTwente at all. But I had a really great time and I do hope that something can be arranged that I could work with you in the future! thanks a lot!

Pre-Master Jurre:

- Guidance: It was really helpful to have every week a meeting. You gave good tips! Only one thing is that sometimes the meeting were a bit of topic. But I think it was also because of us.
- Transfer of Expertise: You really try to help us with learning new things and helped us to go to a next level. You have shared your knowledge really good.
- Interpersonal skills: The communication was good. It was clear what we both could expected from each other.
- Motivation: You try to stimulate us as students. The weekly meetings were also helpful for our stimulation. Because of this we try to deliver every week something.
- Time-Management: I think you let the time management part more as our responsibility. I think this was a good learning cycle for us. Maybe in the beginning of the writing process you could have help more with this.

- Organization: I really appreciated the way we worked together.
- Feedback: It was really helpful that you give every time/week when we delivered something feedback. This really helps us. Maybe the only improvement is that the feedback from last months looks not so critic as in the beginning.
- Academic Development: The subject ARS really help me to improve my English and my writing skills. You give good tips to write some parts better. And also helped in the beginning with how we could write with a logical structure.

Thank you for all the things you learned us!

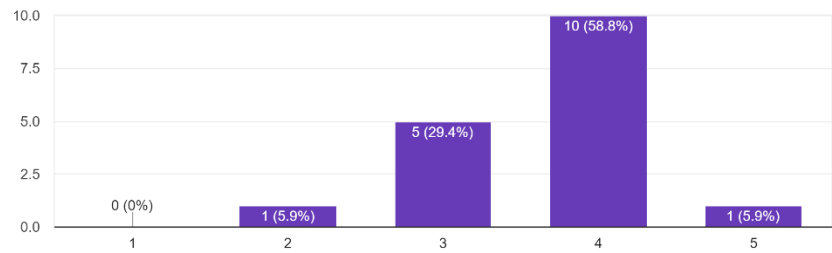
b. Student Feedback and Evaluation of the minor From Idea to Prototype

HTHT Minor From Idea to Prototype 2020-2021

1. Education program: HTHT Minor open to all University Programmes, Bachelor 3rd year
Name of the minor: From Idea to Prototype (15 ECTS)
2. Overall impression of quality: Evaluation of a redesign of a minor
3. Quality assurance: Consolidation of quality
4. Hypothesis: The current educational design of the redesigned minor From Idea to Prototype offers a high quality learning experience regarding the educational content and process.
5. Sub questions based on the hypothesis:
 - a. How would you rate the content of the course?
 - b. How would you rate the didactic processes during this course?
6. Methods for evaluation: Anonymous quantitative questionnaire for the students, using Google forms and items assessed by the 5-point Likert scale. This evaluation will be complemented with: Panel discussion (facilitated by the program coordinator) + Quality evaluation (facilitated by the Quality Enhancement Support Team or QUEST) + Student assessment results (exam)
7. What are the sources of information: Students
8. Who will carry it out: I will share the questionnaire with the students and gather the results
9. When: After the examination but before the students receive their grades
10. How to report the outcomes: Visualizations (graphs), descriptive statistics and highlighting of items in need of improvement
11. How to ensure action taking: Discuss with the semester team and program director after getting the results. Panel discussion and QUEST questionnaires will complement this evaluation and those are shared with the whole program.

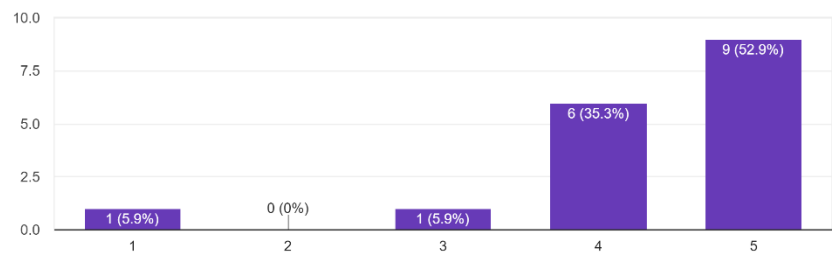
1. The minor was intellectually challenging for me
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The minor was intellectually challenging for me
17 responses



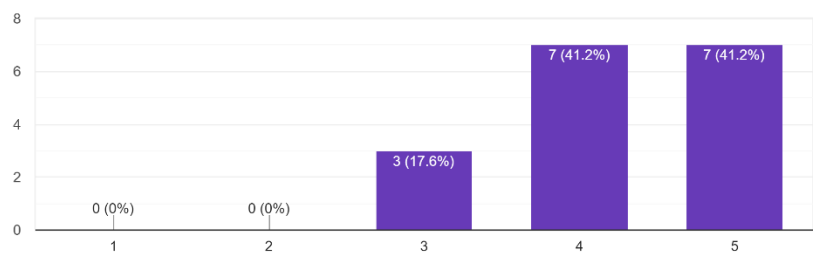
2. The case I worked on was reflecting an interesting real-life challenge
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The case I worked on was reflecting an interesting real-life challenge
17 responses



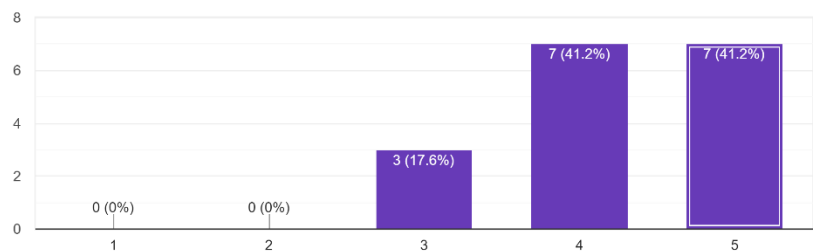
3. The content of the minor was in line with the learning objectives
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

17 responses



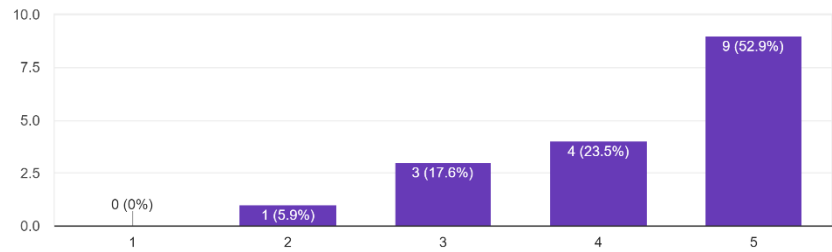
4. The content of the minor was relevant for me
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The content of the minor was relevant for me
17 responses



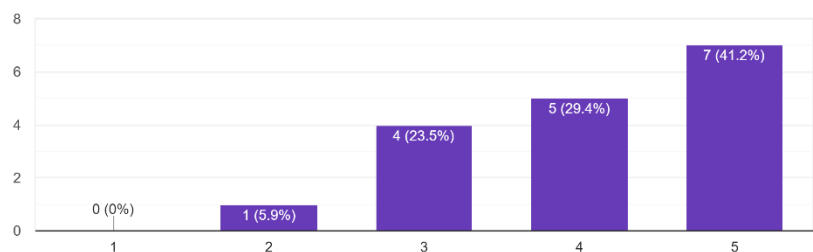
5. The learning objectives of the minor were clearly explained
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The learning objectives of the minor were clearly explained
17 responses



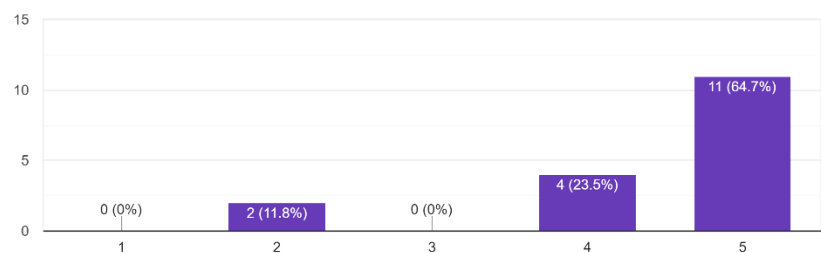
6. The content of the minor met the expectations set by the teaching staff
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The content of the minor met the expectations set by the teaching staff
17 responses



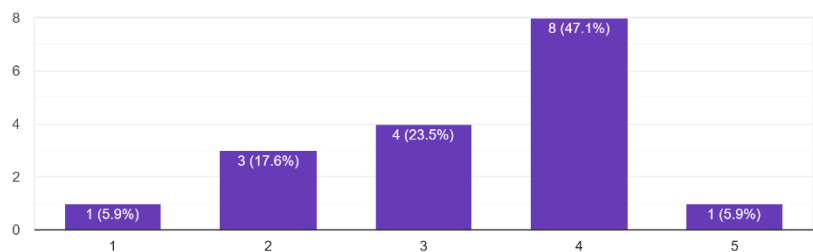
7. I had enough prior knowledge to successfully follow the content of the minor
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

I had enough prior knowledge to successfully follow the content of the minor
17 responses



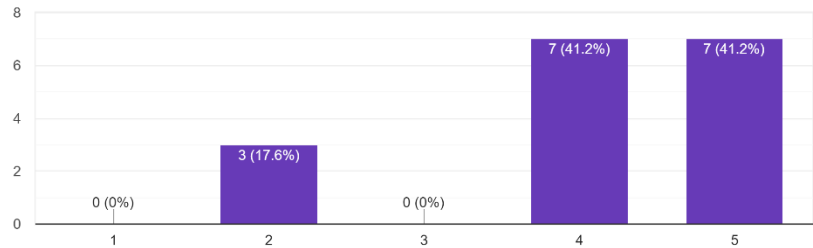
8. The lectures were useful and in line with the learning objectives
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The lectures were useful and in line with the learning objectives
17 responses



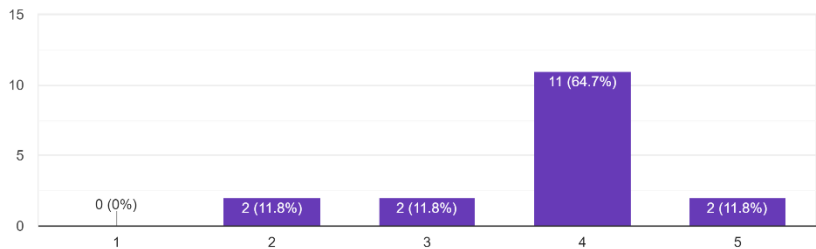
9. The supporting material for the lectures and tutorials was clearly presented on CANVAS
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The supporting material for the lectures and tutorials was clearly presented on CANVAS
17 responses



10. The supporting material for the lectures and tutorials was sufficient and useful.
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

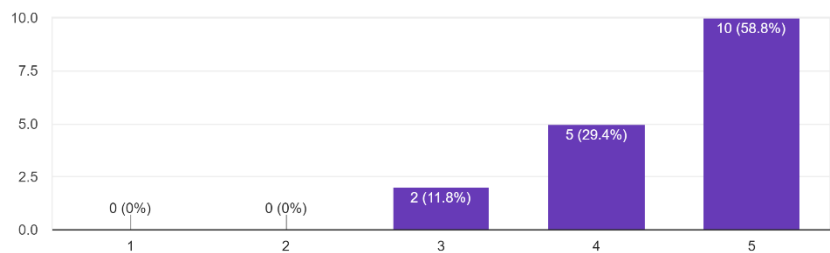
The supporting material for the lectures and tutorials was sufficient and useful.
17 responses



Process/Didactics

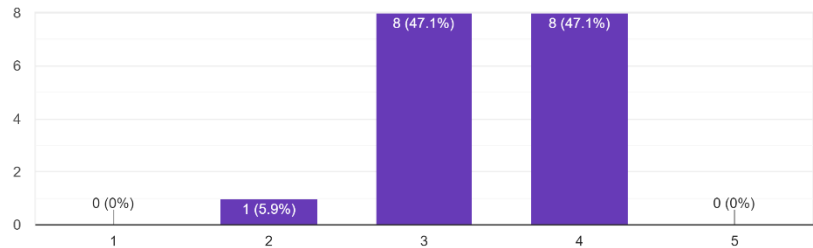
1. The tutoring and support received during the minor was sufficient
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The tutoring and support received during the minor was sufficient
17 responses



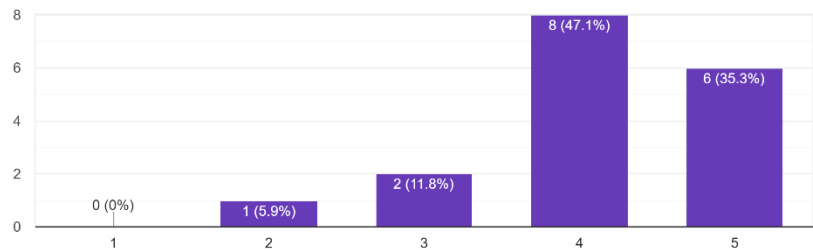
2. The workshops provided were relevant and helped me complete the project successfully
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The workshops provided were relevant and helped me complete the project successfully
17 responses



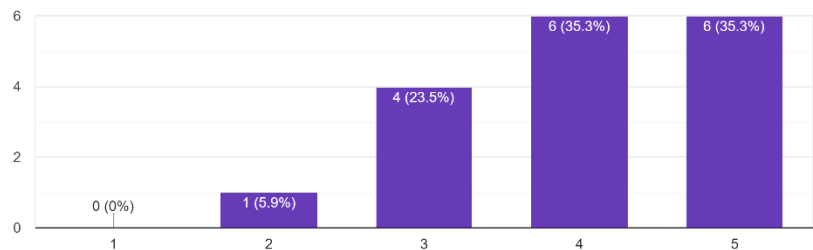
3. The minor had a coherent structure
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The minor had a coherent structure
17 responses



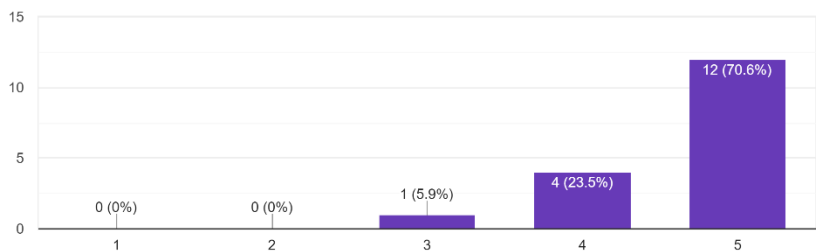
4. The minor was well organized
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

The minor was well organized
17 responses



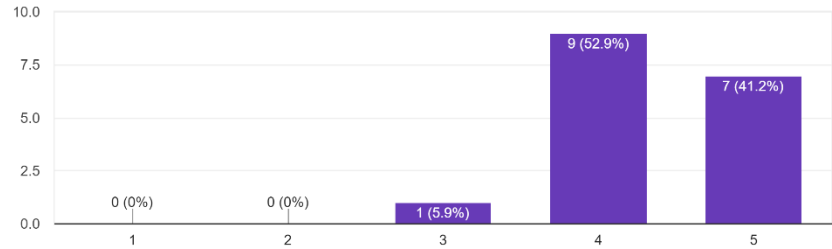
5. My questions and issues were addressed sufficiently and with respect
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree

My questions and issues were addressed sufficiently and with respect
17 responses



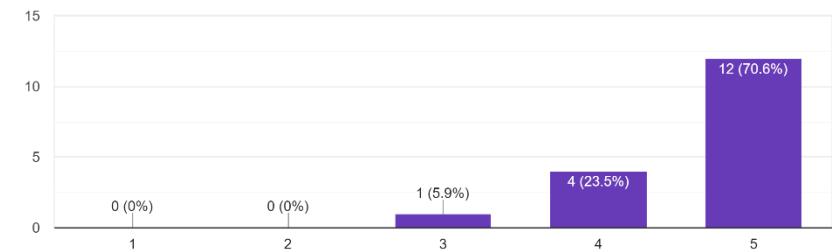
6. I was motivated by the teaching staff
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Dissagree
 - e. Strongly disagree

I was motivated by the teaching staff
17 responses



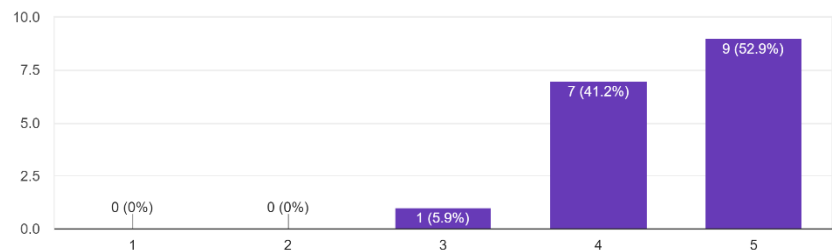
7. The teaching staff's proficiency in English was sufficient
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Dissagree
 - e. Strongly disagree

The teaching staff's proficiency in English was sufficient
17 responses



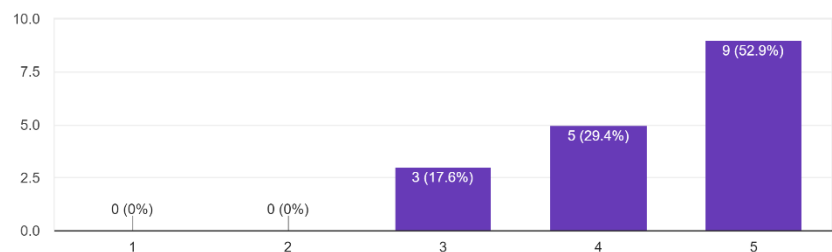
8. In this minor, I was in charge of my own learning (decide how to learn, what to learn and when to learn)
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Dissagree
 - e. Strongly disagree

In this minor, I was in charge of my own learning (decide how to learn, what to learn and when to learn)
17 responses



9. I was informed in time and clearly about the lectures, tutorials and assessment (exam) of this minor
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Dissagree
 - e. Strongly disagree

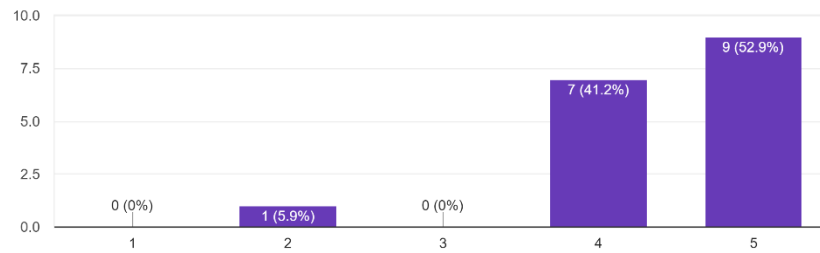
I was informed in time and clearly about the lectures, workshops and assessments for this minor
17 responses



10. I had sufficient time to prepare for the assessment of this minor

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree

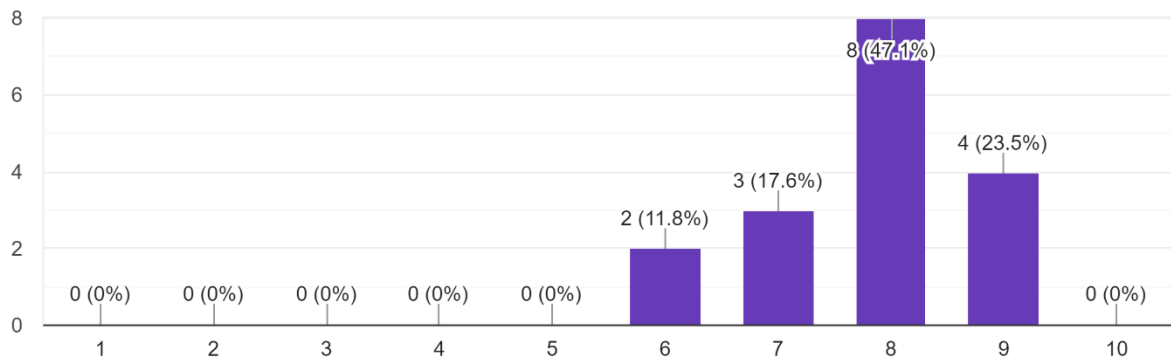
I had sufficient time to prepare for the assessments of this minor
17 responses



1. Overall, I would evaluate the minor on a scale from 1 (very poor) to 10 (excellent) as being:

Overall, I would evaluate the minor as being:

17 responses



Five out of the 17 respondents decided to add additional comments, which are given here:

- I think next time the minor takes place it would be nice to make it very clear to the challenge providers that a group of international people will work for them. For example in my group most people were Dutch and the challenge provider spoke mostly only Dutch, even after my group members told him that I don't speak Dutch he continued and asked me in Dutch if I really don't understand it. Generally it was visible that he really would have preferred Dutch. This was the case in all the following meetings as well. This made me feel very unwelcome and as less part of the team. Especially after telling him that I would really prefer English in order to take part in the discussions and he then still everyone we met spoke Dutch until my group reminded him. Furthermore he never apologized for it. I also heard similar stories from other groups, where the challenge providers for example only provided them with Dutch literature, even though none of the group members was Dutch. I think this is something that really need to be changed next time.

- The students who take this minor is unbalanced, too many psy students and it leads to problems in a team when dealing with a challenge that needs a lot engineering knowledge
- I think most of all the minor was well organized. One thing that could be improved was the team making process in the beginning. I know this would make so much more sense in real life, but just in case it should be done online again, it may be wise to revise that process. Maybe it also partly had to do with the fact that all challenges needed to get a team, and as a result each challenge could only have one team.
- Furthermore I was very pleasantly surprised by how fast requests or questions were reacted to and resolved.
- Kostas did well in supporting the groups, attending to questions and keeping everyone up-to-date about relevant informations for the minor
- You're a great teacher! Very calm, patient and fun. We always felt understood and cared for

c. SEQ results of the minor From Idea to Prototype

SEQ 2018-2019 (Before the redesign) Doc 1

SEQ 2018-2019 (Before the redesign) Doc 2

SEQ 2018-2019 (Before the redesign) Doc 3

In a nutshell:

1. Overall Grade of 6.6/10 (Below the average of 6.9/10 for that year)
2. The motivational presence of staff was valued below the quality guideline
3. 7 out of 22 aspect valued below average including:
 - a. The module was intellectually stimulating for me
 - b. As a whole, I learned a lot in the module
 - c. The module has internal coherence
 - d. I was inspired and motivated by the teaching Staff
 - e. The teaching methods enabled me to learn successfully
 - f. I have learned a lot from doing the project
 - g. The final grade of the minor

2019-2020 (After the first iteration) Doc 1

2019-2020 (After the first iteration) Doc 2

2019-2020 (After the first iteration) Doc 3

2019-2020 (After the first iteration) Doc 4

In a nutshell:

1. Overall Grade of 7.6/10 (Above the average of 7.1/10 for that year)
2. No aspect was evaluated below the quality guideline

3. 4 out of 22 aspects still remained below average:
 - a. The module was intellectually stimulating for me
 - b. As a whole, I learned a lot in the module
 - c. The teaching methods enabled me to learn successfully
 - d. I have learned a lot from doing the project

And 3 from the previous year moved above average:

- a. The final grade of the minor
- b. The module has internal coherence
- c. I was inspired and motivated by the teaching Staff

4. 7th out of 52 minors given at the same time

2020-2021 (After the 2nd iteration and fully online due to Covid-19) Doc 1

2020-2021 (After the 2nd iteration and fully online due to Covid-19) Doc 2

2020-2021 (After the 2nd iteration and fully online due to Covid-19) Doc 3

2020-2021 (After the 2nd iteration and fully online due to Covid-19) Doc 4

In a nutshell:

1. Overall Grade of 7.4/10 (Above the average of 7.2/10 for that year, but slightly decreased)
2. No aspect was evaluated below the quality guideline
3. 5 out of 26 aspects still were below average:
 - a. In general, I had enough prior knowledge to successfully do the module
 - b. The coherence between the module parts or the study units of this module was clear to me
 - c. The number of feedback moments was sufficient
 - d. The assessment criteria were clear to me
 - e. I knew in time how I would be assessed

And all 4 from the previous year moved above average:

- a. The module was intellectually stimulating for me
- b. As a whole, I learned a lot in the module
- c. I have learned a lot from doing the project
- d. The teaching methods enabled me to learn successfully

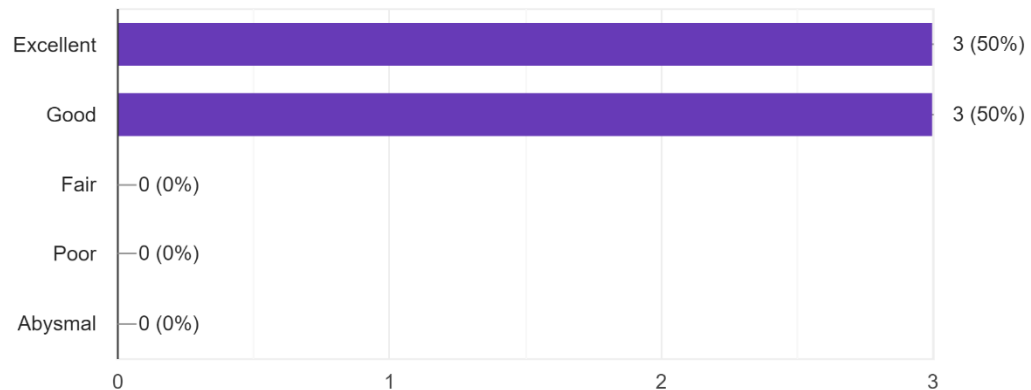
4. 11th out of 52 minors given at the same time

*d. Colleague Feedback and Evaluation of the minor From Idea to Prototype**HTHT Minor From Idea to Prototype 2019-2020*

Tutors (6 responses)

Preparation

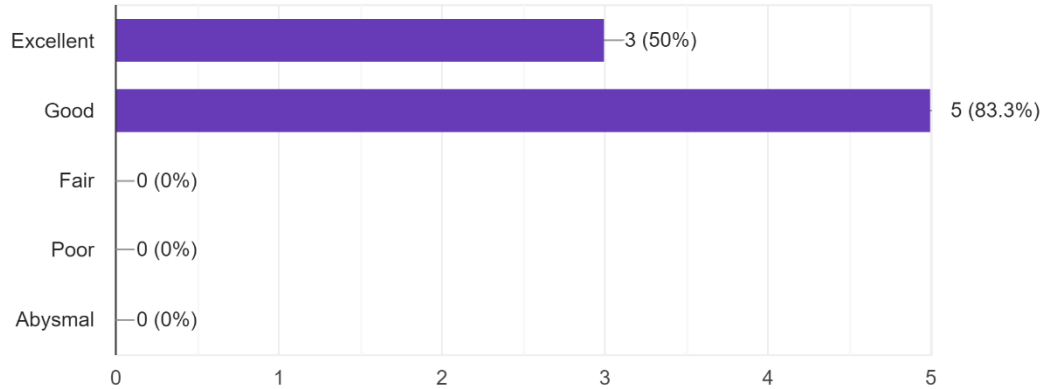
6 responses



- None, open issues were resolved quickly
- It would be great to have a tentative overview of the grading effort before the starting of the course.
- Information about the course was very clear, also deadlines etc were communicated well. However, it would be helpful as a tutor to know what is expected from you shortly written on one page. E.g. grading the report and grading the presentation.
- involvement of case owner. It is not fully depending from the management, but still it should be more present.
- You can never know everything in advance. That is part of tutoring :-)
- I don't really have an additional suggestion. Overall, I liked participating as a tutor in an unfamiliar topic. You learn new things I think.

Time

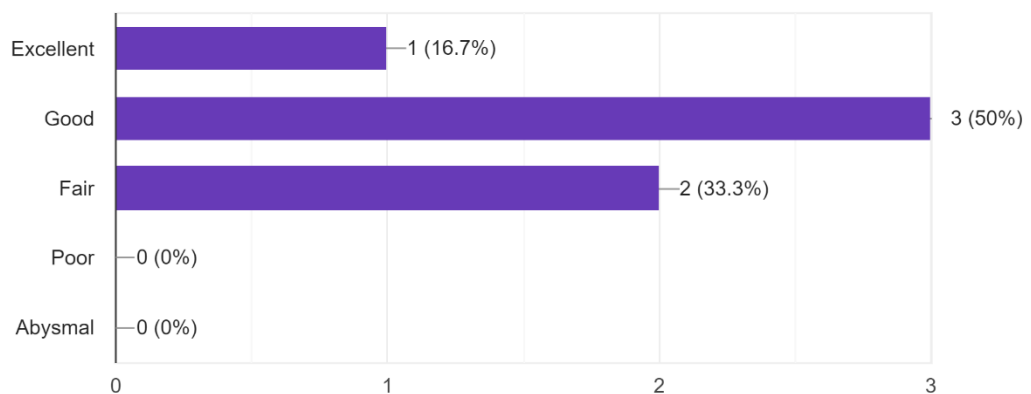
6 responses



- Some of the responsibilities for me were not clear at the start (but maybe I should have read the manual in more detail)
- Students disregarded very much their relation with the process tutor. They should be invited to plan ahead meetings and not to ask too many last minute requests, but be mindful of the tutors time.
- No improvements. However, good to know that my group request meetings only a few times, which is extraordinary I guess.
- Weekly deliverables to provide in Canvas could help the groups to be more on time.
- It really cost little time. More contact with the group, however, could have improved their results.
- It was optimal for me.

Group prior tutoring experience

6 responses



- I think my group used the process tutor well but I heard different stories from my colleagues. A regular meeting with the process tutor should be more or less the standard / even mandatory
- Students were not aware about how a meeting with a tutor should be conducted.
- Experienced in working with a tutor yes, but not experienced with working with multiple tutors and knowing how to find balance here
- Why don't organise a excursion trip for the all the student groups together on a relevant topic for the minor?
- All students have had a tutor before.
- My overall feeling is that as a process tutor, sometimes students may less understand your expectations, which could imply that the expert tutor eventually takes a much broader role, which is the idea behind the module in the first place. Nonetheless, I appreciated participating and would gladly do requested a next time.

General Comments:

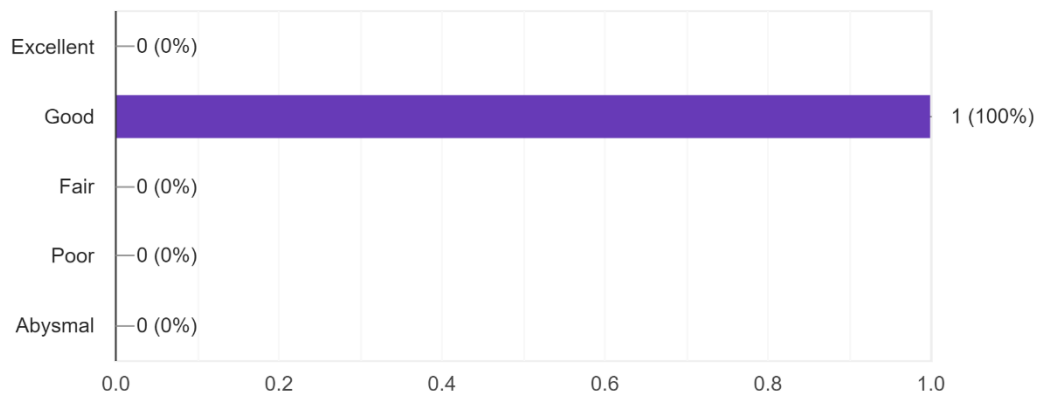
- Expectation management for participating students - students were overall a bit surprised by the actual content of the minor. They were also not super motivated.
- I would reconsider the division between process and content tutor.
- Very happy that I could ask you questions about the module if I needed to! :)
- .
- The groups think of a tutor only as a process tutor, although a tutor can also have skills/knowledge that comes in handy in the project. They do not utilise this
- Great module coordination!

Teachers (No results from teachers for that year. They were asked to fill in the survey but no one responded)

Previous Coordination Team (1 response from the coordinator of the previous year)

Leadership

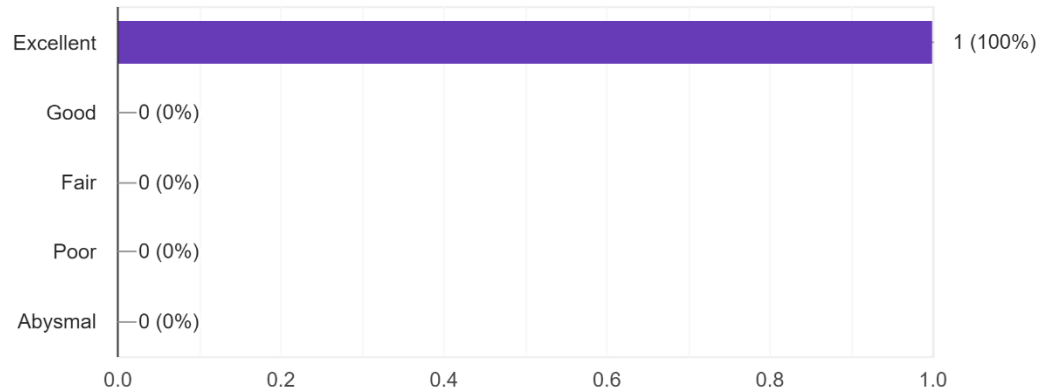
1 response



- You immediately took the lead in all meetings. You were really pro-active, enthusiastic and eager to learn from the start and it was a pleasure to transfer the coordination tasks to you. If I must say something for improvement: don't be afraid to put others to work as well. You do not need to do it all alone.

Initiative

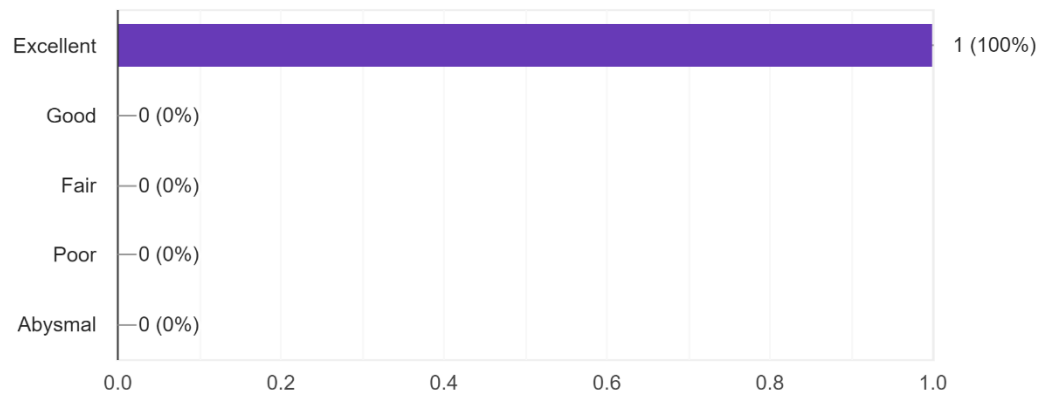
1 response



- You took a lot of initiative and had everything prepared long before the actual start. Great job! Be careful not to prepare too much, and to stay flexible, because you can't foresee everything. Some things can only be done at the latest moment otherwise you need to do things twice.

Interpersonal Skills

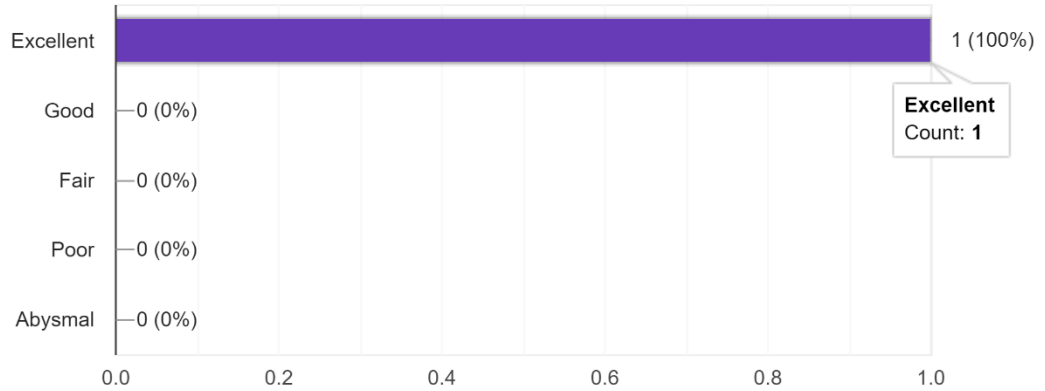
1 response



- Really like your enthusiasm and the fact that we can immediately notice how you are doing. When you were too busy/bit stressed it immediately showed off on you somehow. (and also when you became a bit more relaxed again :)) This might be a good protection mechanism.

Problem-Solving

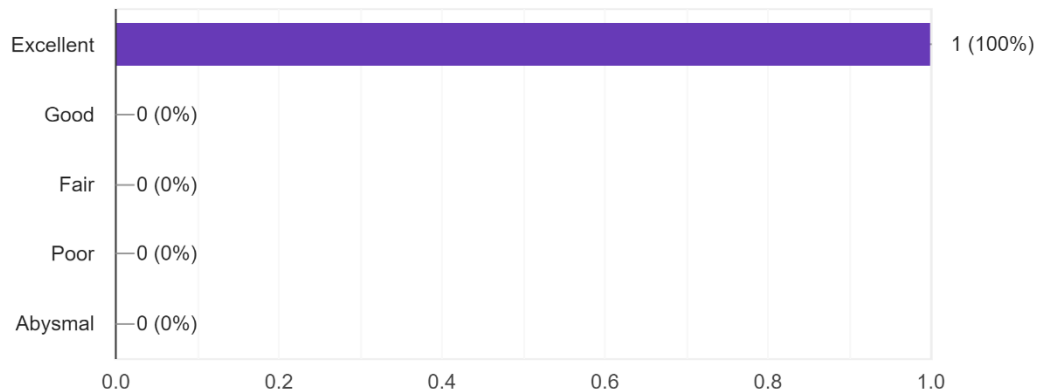
1 response



- Although there might have been some problems behind the screens it didn't show of for others. It is a good thing that you ask around when you foresee some problems/have issues. You don't need to invent the wheel again. Most 'new' employees forget simple things like asking their colleagues. Keep this up!

Motivation

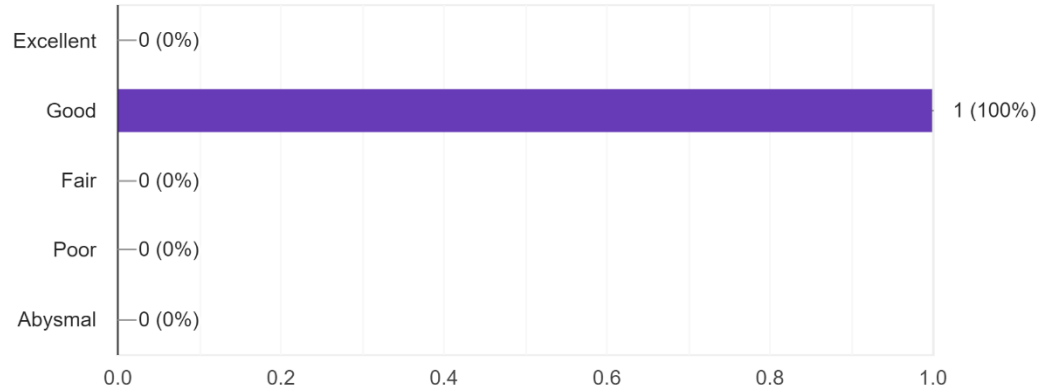
1 response



- Most motivated person in the group if you ask me! Honestly!

Efficiency

1 response



- Don't prepare too much and think practical; you are already done this and have adopted the engineering approach.

General Comments:

Keep up the great work. For me you win the 'best new colleague award' (and for many more I think)!!
Sorry for all the positive feedback, and the lack of negative feedback; It's just the way I think even though I'm a picky person ;-)

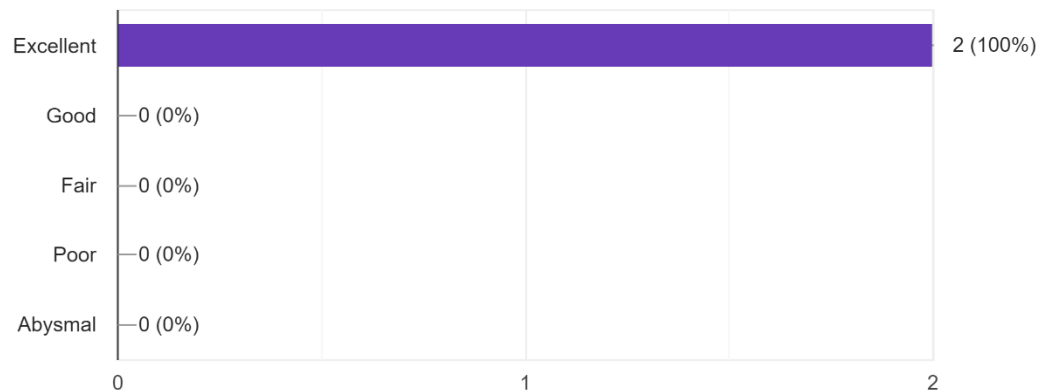
HTHT Minor From Idea to Prototype 2020-2021

Tutors (No responses)

Teachers (2 responses)

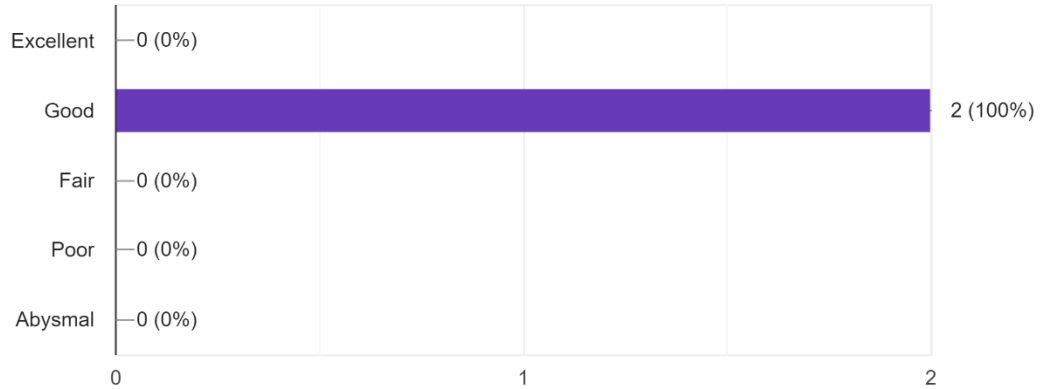
Communication

2 responses



Support and Equipment

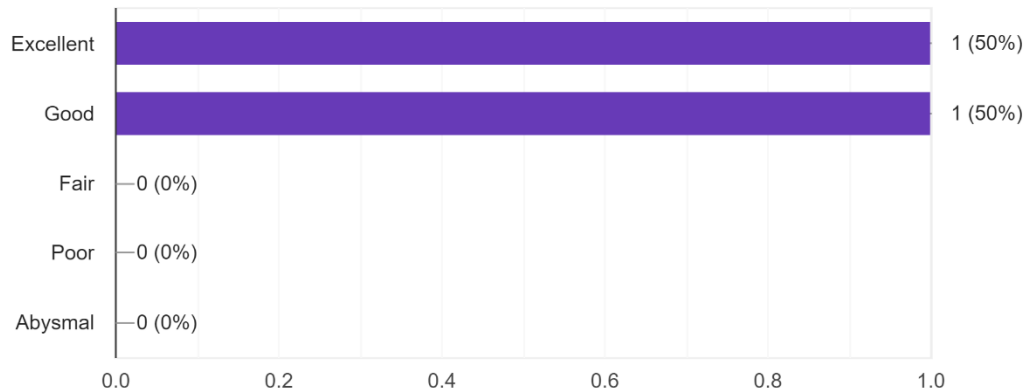
2 responses



- Nothing to add
- I struggled, using Canvas for the first time, with Canvas. It was more the Equipment (Canvas) that is sub-optimal, because you cannot see the students, than the support. Besides that I did not need more equipment

Organization

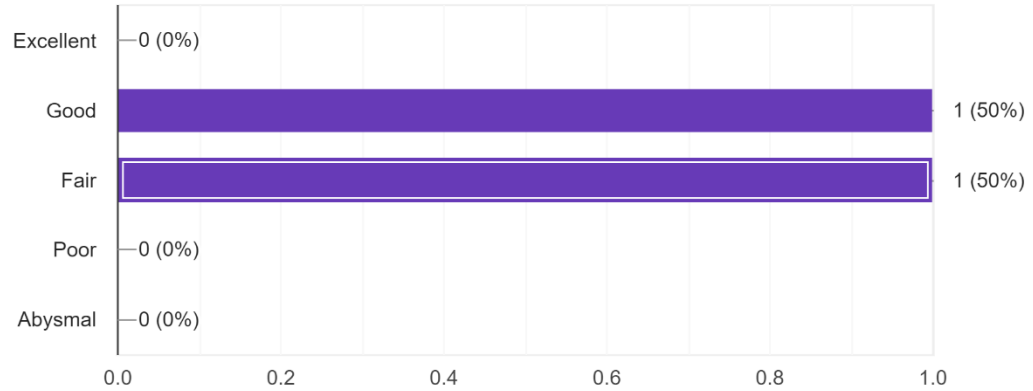
2 responses



- Nothing to add
- Great organization

Relevance

2 responses



- Nothing to add
- Looking just at the lecture, I wonder how the students in the end use the tools I presented and how the quality of this use of tools is secured

General Comments:

- Although my lecture took place online, I was quite satisfied how things went.
- Love to work with you in the future in challenge based learning

e. External (Project STRIPES 2021) Evaluation

This evaluation can be found [here](#)