

Assessment report
Limited Framework Programme Assessment

MA Civil Engineering and Management
University of Twente

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1. Executive summary

In this executive summary, the panel presents the main considerations, which led to the assessment of the quality of the Master Programme Civil Engineering of the University of Twente in Enschede. The programme was assessed according to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, as published on 20 December 2016 (Staatscourant nr. 69458).

The panel established that the programme aims to provide students with the academic competencies that allow them to work independent in the professional practice and conduct research in the field of Civil Engineering. The programme's intended learning outcomes are drafted according the Meijers criteria and match with level 7 of the Netherlands Qualification Framework. The programme's graduates have expert knowledge in at least one of the subareas of Civil Engineering: Water Engineering and Management, Construction Process Management, Transport Engineering and Management and in related areas. The programme offers several specialisations, related to these subareas. The learning outcomes do not address the specific skills and knowledge students obtain in each specialisation. The panel recommends the programme to consider to add specified learning outcomes for each specialisation, next to the general learning outcomes. This also to stronger distinguish the learning outcomes from the master in Construction Management and Engineering, which is offered by the University of Twente as well.

The learning outcomes were benchmarked against international standards for engineering programmes and a selection of ten study programmes. From the comparison to other programmes it seems that certain elements of personal development could be addressed more specifically in the learning outcomes. The programme's connections to the research departments of the University and to the professional practice allow the programme to stay up to speed with academic developments and developments in the practical field of engineering. The panel assessed the intended learning outcomes as satisfactory.

Students choose a specialisation (Construction Management and Engineering, Integrated Civil Engineering Systems, Transport Engineering Management and Water Engineering and Management) and within each specialisation they choose a profile. Each profile consists of a core set of courses, which are compulsory and a set of elective courses from which students choose several. In addition, students elect courses that aren't related to their specialisation. The programme has several formal and informal instruments in place to ensure that students obtain all learning outcomes, however, the relation between learning outcomes of the programme as a whole and the individual study path of a student could be improved.

The programme uses a varied set of educational methods, which suit the programme's ambitions and is adapted to the student population for each course. The programme allows students to obtain competency in research. After completion of their coursework, students develop a proposal for their thesis project, which is carried out either at a company or organisation or in one of the research groups of the University of Twente. The panel has established that staff members involved in the programme are experts on their subject as well as qualified teachers.

The study success rate of the programme could be improved, the panel recommends the programme to take measures in this regard. The panel concludes that the programme's teaching and learning environment allow students to obtain the learning outcomes and is therefore assessed as satisfactory.

The programme's system of assessment is based on the university-wide policies. These policies use constructive alignment as a basic principle through which education can be organized. The quality assurance system ensures revision and improvement of assessment. The examination board has the responsibility to safeguard the quality of assessment and performs its tasks according to the policies. The panel discussed the thesis assessment form and suggests improvements can be made in order to clarify the grade given to students. The panel is especially positive about the recently introduced peer-review system in which lecturers review each other's assessment. The panel assessed the third standard, assessment, as good.

The panel studied 15 theses, which show that the programme's graduates have expert knowledge and are able to conduct research in the field of engineering. The panel discussed the extent to which students show that they are able to reflect on the used methodologies and suggests the programme could strengthen this aspect in the setup of the thesis. The programme's graduates are successful in pursuing their career and employers are positive about the performance of its graduates. The panel is positive about the realised learning outcomes, and assesses this standard as satisfactory.

The panel that conducted the assessment of the Master programme in Civil Engineering and Management of the University of Twente assesses this programme to meet the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, judging the programme to be satisfactory. Therefore, the panel recommends NVAO to accredit this programme.

Rotterdam, 25 March 2019

Prof. dr. P. Bosch
(panel chair)

Jetse Siebenga MSc.
(panel secretary)

2. Assessment process

The evaluation agency Certiked VBI received the request by the University of Twente in Enschede to support the limited framework programme assessment process for the Master Civil Engineering and Management of this University. The objective of the programme assessment process was to assess whether the programme would conform to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, published on 20 December 2016 (Staatscourant nr. 69458).

The management of the programmes in the assessment cluster Civil Engineering convened to discuss the composition of the assessment panel and to draft the list of candidates.

Having conferred with management of the programme, Certiked invited candidate panel members to sit on the assessment panel. The panel members agreed to do so. The panel composition was as follows:

- Prof. dr. Petra Bosch, Professor of Management, Technology and Innovation, Chalmers University of Technology (Chair);
- Prof. dr. Jos Arts, Professor of Environmental and Infrastructure Planning, Rijksuniversiteit Groningen;
- Dr. Ir. Adriëne van der Sar, staff of the Delta Programme Commissioner;
- Quinten Swanborn BSc, student Master Industrial Engineering & Management, Rijksuniversiteit Groningen.

On behalf of Certiked, J.W. Siebenga MSc. served as the secretary in the assessment process. The overall coordination of the assessment cluster Civil Engineering was executed by drs. W. Vercouteren.

All panel members and the secretary confirmed in writing being impartial with regard to the programme to be assessed and observing the rules of confidentiality. Having obtained the authorisation by the University, Certiked requested the approval of NVAO of the proposed panel to conduct the assessment. NVAO have given their approval.

To prepare the assessment process, the process coordinator convened with management of the programme to discuss the outline of the self-assessment report, the subjects to be addressed in this report and the site visit schedule. In addition, the planning of the activities in preparation of the site visit was discussed. In the course of the process preparing for the site visit, programme management and the Certiked process coordinator regularly had contact to fine-tune the process. The activities prior to the site visit have been performed as planned. Programme management approved of the site visit schedule.

Well in advance of the site visit date, programme management sent the list of final projects of graduates of the programme of the last two complete years. Acting on behalf of the assessment panel, the process coordinator selected 15 final projects from this list. The grade distribution in the selection was ensured to conform to the grade distribution in the list, sent by programme management.

The panel chair and the panel members were sent the self-assessment report of the programme, including appendices. In the self-assessment report, the student chapter was included. In addition, the expert panel members were forwarded a number of final projects of the programme graduates, these final projects being part of the selection made by the process coordinator.

A number of weeks before the site visit date, the assessment panel chair and the process coordinator met to discuss the self-assessment report provided by programme management, the procedures regarding the assessment process and the site visit schedule. In this meeting, the profile of panel chairs of NVAO was discussed as well. The panel chair was informed about the competencies, listed in the profile. Documents pertaining to a number of these competencies were presented to the panel chair. The meeting between the panel chair and the process coordinator served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs.

Prior to the date of the site visit, all panel members sent in their preliminary findings, based on the self-assessment report and the final projects studied, and a number of questions to be put to the programme representatives on the day of the site visit. The panel secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions with the programme representatives during the site visit.

Shortly before the site visit date, the complete panel met to go over the preliminary findings concerning the quality of the programme. During this preliminary meeting, the preliminary findings of the panel members, including those about the final projects were discussed. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were discussed as well.

On 8 and 9 November 2018, the panel conducted the site visit on the University of Twente Campus. The site visit schedule was in accordance with the schedule as planned. In a number of separate sessions, the panel was given the opportunity to meet with Faculty Board representatives, programme management, Examination Board representatives, lecturers and final projects examiners, professional field and students and alumni.

In a closed session at the end of the site visit, the panel considered every one of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented a broad outline of the considerations and conclusions to programme representatives.

Clearly separated from the process of the programme assessment, the assessment panel members and programme representatives met to conduct the development dialogue, with the objective to discuss future developments of the programme.

The assessment draft report was finalised by the secretary, having taken into account the findings and considerations of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited the final report. This report was presented to programme management to be corrected for factual inaccuracies. Programme management were given two weeks to respond. Having been corrected for these factual inaccuracies, the Certiked bureau sent the report to the University Board to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO: M Civil Engineering and Management
Orientation, level programme: Academic Master
Grade: MSc.
Number of credits: 120EC
Specialisations: Construction Management and Engineering
Transport Engineering and Management
Water Engineering and Management
Integrated Civil Engineering Systems
Location: Enschede
Mode of study: Full-time (language of instruction: English)
Registration in CROHO: 21PH-60026
Name of institution: University of Twente
Status of institution: Government-funded University
Institution's quality assurance: Approved

4. Findings, considerations and assessments per standard

4.1 Standard 1: Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

The Master Civil Engineering and Management of the University of Twente is a two-year (120 EC), research-based, interdisciplinary master programme in the domain of Civil Engineering. The University of Twente offers, in addition a Bachelor and another Master programme in this domain, the latter being the Master in Construction Management and Engineering.

The programme's objectives are to qualify students for independent professional practice in Civil Engineering and to prepare students for enrolment in PhD-programmes and PDEng-programmes in the field of Civil Engineering. Graduates have expert knowledge in subareas (water, transport and construction) of Civil Engineering and Management as well as knowledge of related fields such as mathematics, physics, business administration and public administration.

The learning outcomes conform to the Meijers Criteria, which have been developed by the 3TU Federation and are related to the Netherlands Qualification Framework (NQLF). An international benchmark has been made through comparison with the IDEA League qualification profile in engineering, developed by leading European Universities, and the ABET (Accreditation Board for Engineering and Technology) criteria which are used in the USA. From the comparison it became clear all learning outcomes, which are addressed in other programmes are reflected in the programme's learning outcomes. Some other international programmes more explicitly address competencies regarding personal development and the ability to work in an international environment.

The programme in Civil Engineering and Management states that students have to be able to identify gaps in scientific knowledge, formulate research problems, contribute to acquiring scientific knowledge and combine appropriate theories from business and /or public administration with technical knowledge and apply this in an integral way within civil engineering systems, projects or processes. Students learn how to take contextual factors into account when designing solutions for the three subfields Building and Infrastructure, Traffic and Transport Systems and Hydraulics of Natural Water Systems. To these subfields the programme related its specialisations, which are: Construction Management and Engineering, Transport Engineering Management, Water Engineering and Management and Integrated Civil Engineering Systems. There are no specific learning outcomes for each specialisation. Students should be able to incorporate subfield-specific knowledge in the design of civil engineering constructions, systems, projects and processes.

The programme's specialisation in Construction Management and Engineering is similar to the 4-TU master programme of Construction Management and Engineering, as executed by the University of Twente. The former has a more technical approach whereas the latter is stronger focused on managerial aspects within the field of Civil Engineering.

The research institutes related to the programme are of high stance and allow the programme to be up-to-speed with regard to academic developments. In addition, these research groups are connected to organisations and entities closely involved in the practice of Civil Engineering, allowing the programme to closely follow developments in the field of Civil Engineering. The Dutch OCIB (Stichting Universitair Onderwijs Civiele Techniek voor Bedrijfsleven en Overheid) regularly reflects on the learning outcomes of the Dutch Civil Engineering programmes. The OCIB is an advisory council representing industry and

government. During the site visit, the representatives of OCIB, other representatives of the professional field as well as alumni expressed their appreciation for the programme's learning outcomes, and emphasized the importance of the distinguishing profile of the programme in terms of attention for business/public administration and soft skills.

Considerations

The panel is positive about the learning outcomes of the programme. They reflect a master's level and are well-formulated. The programme maintains a clear profile, which is recognized and appreciated by the professional field. The panel advises the programme to stronger distinguish between the specialisation of Construction Management and Engineering and the separate 4-TU master programme in Construction Management and Engineering. The differences between these programmes is not clear from the intended learning outcomes. The learning outcomes of the programme provide insight to what can be expected of graduates of the programme, and give, in general terms, insight in the specialised character of the programme's graduates. The benchmark performed by the programme shows that the programme is aware of its comparative value. With regard to skills concerning personal development, the panel suggests the programme to consider whether or not to strengthen them in the learning outcomes and advises them to address these in terms of the ability to reflect upon one's role in processes and projects and one's personal development. In addition, the panel suggests the programme could maintain some general intended learning outcomes for the programme as a whole and develop specific learning outcomes for each specialisation. This will allow the programme to more specifically emphasize the differences between the specialisations and align the learning outcomes and the curriculum accordingly.

Assessment of this standard

These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be satisfactory.

4.2 Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Organization and student body

The programme is offered by the department of Civil Engineering. The programme director is responsible for the day-to-day management of the programme, the MSc. Programmes and the graduate school. The programme director is assisted by the programme coordinator. The Programme Committee, being composed of lecturers and students, advises programme management on the quality of the programme. The Examination Board has the authority to ensure the quality of the examinations and assessments of this programme and the other programmes in the field of Civil Engineering.

The programme admits students with a relevant BSc. degree from an approved university and with sufficient mastery of the English Language (IELTS 6.5, TOEFL 90). Students with a Civil Engineering bachelor degree from a university of applied science are admitted to a pre-master programme as well as students with a deficiency of more than 15 EC in relevant courses. Students with a deficiency less than 15 EC can start the programme and have to recuperate the missing knowledge during the programme.

The number of students entering the programme is about 45 students per year with most students entering the programme with a BSc. from a Dutch Technical University. During the site visit, the panel learnt that students with a BSc. from another university than the University of Twente, and especially certain groups of international students, seem to have less developed soft skills and are less used to project work. They have to get used the mode of study at the University of Twente. During the site visit, the panel learned from the students that within due time these students get accustomed to the programme's approach.

The programme

Within each specialisation of the programme (Construction Management and Engineering, Transport Engineering and Management, Water Engineering and Management and Integrated Civil Engineering Systems) students choose a specific profile, containing a specific focus within the field of specialisation. Most specialisations contain two profiles, except for the specialisation Integrated Civil Engineering Systems, which consists of four profiles. Examples of the profiles offered are: Transport Planning and Modelling, River and Coastal Engineering and Smart Cities. The structure of the programme changed recently. From the academic year 2018-2019 onwards, each module consists of 5 EC, whereas before each module consisted of 7,5 C. The change allows the programme to provide students a broader choice of electives. The structure of each profile is in the current situation as follows: Each profile consists of several profile courses (30 EC – 40 EC compulsory courses) and profile electives from which students follow a selection (30 EC – 40 EC). In addition, students can choose a maximum of 15 EC free electives. The programme allows students to do an internship or to go abroad.

All students follow a Master thesis preparation course of 5 up to 10 EC and the 30-EC thesis itself. Part of the education in research is in most but not all profiles a specific course on research methodologies and skills. In case there is no specific course devoted to research methodologies and skills, students are equipped with the relevant knowledge and skills in other core courses within the profile. In the vast majority of the courses, students are confronted with research in a passive and in an active way. In a passive way since students have to study scientific literature and in an active way because they get assignments which are aimed at strengthening students' competencies in doing research.

The programme's learning outcomes are translated into goals and objectives for individual courses and communicated to students through the course information system. The panel discussed during the site visit how the programme ensures that all students obtain the learning outcomes of the programme, since there is a wide variety of courses taken by students. The panel learned that it is the student's responsibility to select courses and develop a study path. Students have to think about their choices in an early stage and discuss their choices with a profile coordinator. The profile coordinator takes into account the interest of the student, the intended learning outcomes of the programme and the coherency of the courses in guiding the student. Students are not obliged to discuss their programme with the profile coordinator, but the programme stimulates students to do so, by for example a lunch with all the students that chose a certain profile and the profile coordinator at the very beginning of the programme. A formal measure in place is a check performed by the University Administration on whether students have obtained all learning outcomes before the student graduates. To this end the University Administration uses a matrix containing all courses and their relation to the learning outcomes of the programme. If a student lacks a certain learning outcome he or she will have to follow an additional course.

Current developments within the field of Civil Engineering stress the importance of familiarizing students with digital technologies used in Civil Engineering. To this end, the programme incorporated several courses (amongst others BIM, 5D planning, Visualisation and Simulation in Construction, Simulation in Transport, Data Analysis in Water Engineering and Management) through which students get an academic perspective on how these digital technologies can be used as instruments in Civil Engineering processes and products. At the same time, students improve their skills in using these technologies, which is important to the future employers.

The main objective of the thesis is for students to independently carry out a large individual research or design project in one of the sub-fields of Civil Engineering and Management, applying state-of-the-art scientific knowledge of the sub-field. The project can be carried out externally at a Civil Engineering entity or internally within one of the department's research groups. The programme improved the thesis writing process by making the aims and learning objectives of the thesis and of the thesis preparation course more explicit. Students who struggle to finish their thesis are invited to a writing group in order to stimulate student's progress. From the cohorts 2012-13, 2013-14 and 2014-15 the average percentage of students who completed the programme after two years is 26% and from the cohorts 2013-14 and 2014-15 the average percentage of students who completed the programme after three years is 76%. Students who stay abroad or do an internship typically study longer than two years.

The programme uses a variety of teaching methods such as lectures, tutorials, practicals, tutor sessions, excursions as well as guided self-study. The programme has provided a table which shows the extent to which a student with a typical profile is made familiar with research, either by being exposed to examples of research, reading scientific papers or doing research or design assignments. Courses that are considered large by the programme are followed by 40-60 students, courses which are regarded small are followed by 10-15 students. Students feel that the relatively small scale of the programme allows them to easily communicate with staff members and strengthens the sense that there is a real academic community. Study guidance is available to all students who are in need of advice.

Staff

The vast majority of the staff has obtained a PhD (91%) and is involved in both teaching and research. The percentage of staff members with a University Teaching Qualification (UTQ) is 74%, in case a staff member did not obtain a UTQ this is mostly because of a recent appointment. The programme aims to attract more international staff members, currently 20% of the staff members have an international background. The amount of staff members seems sufficient to ensure that the programme is delivered on the appropriate level of quality, however, during the site visit, the panel learned that the work-load of staff members is high.

Considerations

The panel has established that the learning outcomes are translated into the learning objectives of the modules. Although the programme's elective part is an important element, the programme has measures in place to stimulate that all students follow a coherent programme and that the individual student's programme allows him or her to obtain the intended learning outcomes. Since all profiles contain a set of compulsory courses and elective courses, which are related to the profile as well, the programme offers the basic structure to enhance that students follow a coherent study programme. The panel suggests the programme to reflect on whether a formal approval on the elected courses and their coherence, before the student starts his or her electives would help to safeguard that students do not have to follow additional courses after they have requested for graduation. The panel further suggests the programme to reflect on the number of electives on offer, preventing that too many courses are followed by a small student body, which can lead to inefficient use of staff's capacity.

The admission policies are adequate and clearly communicated to those interested in the programme. Students with a BSc. from another University than Twente are able to study the programme with the same effectiveness as students with a Bsc. of the University of Twente. The staff is of high quality and the quantity of staff is sufficient to deliver the programme.

The educational methods used provide students with a varied learning experience. The panel felt that students are challenged throughout the programme, in their intellectual, creative and communicative capacities. The programme provides students with insight to developments which are relevant to the field of Civil Engineering. It aims to cater to students interests where possible and within reasonable limits. The programme offers interesting electives and the small-scale character of the programme adds to its charm. It allows students to explore their interests and develop their own learning path as part of the academic community. The programme should however take measures in order to enhance study success rate. The links to practice provide students with a clear outlook on their future career possibilities. The panel is therefore positive about the teaching and learning environment of the programme and assesses it as satisfactory.

Assessment of this standard

These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be satisfactory.

4.3 Standard 3: Student assessment

The programme has an adequate system of student assessment in place.

Findings

The programme's examination and assessment rules are derived from the university's assessment policy. This policy describes constructive alignment as an important principle through which assessment should be developed on a programme level. Other principles and procedures for the examinations are worked out in various documents such as the rules and regulations from the examination board and a description of quality assurance concerning assessment policies.

The programme uses various assessment methods, which include assignments, open question exams. Multiple choice exams, combined exams, oral exams, open book exams and presentations. A number of courses contain group work. The assessment methods are selected in line with the nature of the course goals to be assessed. Lecturers compile a module manual, which describes the content, the learning objectives and the assessment methods used in the module. The programme closely monitors student's satisfaction with regard to assessment. In the national student survey, assessment scores 3.8 on a 5-point scale. Although this score is above the national average of 3.65, the programme aims to improve the assessment and installed a peer-feedback system in which lecturer's evaluate each other's test plans, assessment methods, student workload and the results of student evaluation, after completion of a course. Since this peer-review system has not been in use before the date of the site visit, the panel could not discuss experiences and the results of the system with the lecturers or programme management. However, the panel believes the system has the potential to allow the programme to systematically pinpoint what kind of improvement can be made in the assessment of students.

Other quality assurance processes on assessment, which the programme has in place contain ex-ante and ex-post checks on the assessment. Ex-ante checks are a check of the actual tests by an assessment expert from the faculty, and the approval of a course manual by the programme director. Ex-post checks are primarily the responsibility of the lecturer. After the exam a lecturer receives the results of the student survey and evaluates the exam based on an analysis on the grading and the results of the student survey.

Students prepare their thesis during the course 'Preparation MSc. Thesis'. The thesis proposal is graded by the department's supervisors with the same form as is used for grading the actual thesis. The form lists four criteria and contains a grading scale. The grading scale is used as a calibration mechanism and has to ensure that grades given by different graduation panels follow a certain standard. The panel discussed the use of the form and the grade scale during the site visit, mainly because from the theses and theses assessment forms the panel studied, it was not clear why students got a certain grade. The graduation committee consists of a chairperson (often a full professor), the daily supervisor and an external supervisor. The external supervisor informs the committee on what the student has accomplished at the company or organisation where the thesis was written. The graduation ceremony consists of an oral defence after which a student receives his/her grade, provided by ample (oral) feedback from the graduation committee.

The examination board has the authority to monitor the quality of examination and assessment processes and products of the programme. The board spot-checks theses on a regular basis and all board members attend a student's defence at least twice a year as an observer. If the examination board disagrees with the mark given, it will discuss this with the lecturer. In addition, the examination board invites a lecturer to its (monthly) meetings during which the lecturer presents the assessment for a certain course. The examination board discusses the assessment with the lecturer and gives feedback to the lecturer.

Considerations

The panel is positive about the assessment system. The programme pays high attention to quality (assurance) of assessment. The system ensures that a test is being reviewed before and after the test is held. The panel is positive about the installed peer-review system, which has a lot of potential of improving the assessment practices executed by the programme- not solely through the outcome of the reviews but by drawing lecturers' attention to assessment practices.

Students are provided with information on the assessment criteria and the assessment method(s). The panel has also established that to students it is clear why they receive a certain grade and that students receive ample feedback on their thesis during the graduation ceremony. The assessment form used in order to assess the thesis makes it difficult to derive why a certain grade was given since the criteria are very limited and the comments of the supervisor on each criterion are limited as well. The panel recommends the programme to review the thesis assessment form.

The examination board ensures that assessment is carried out in compliance with the programme's policies. Because of the structural high attention for assessment quality and the assurance thereof, the panel assesses this standard as good.

Assessment of this standard

The considerations have led the assessment panel to assess standard 3, Student assessment, to be good.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

The programme collects information about graduate's success on the job market. Graduates of the programme find positions in a wide range of job fields. 10% of the programme's graduates continue their study with a PhD. The majority of the graduates (63%) find their first job at large companies (>1000 employees). About 96% of the programme's graduates report in a survey performed by the programme to find a job easily, with 75% of the graduates finding a job within three months after graduation. The programme's graduates appear to be highly satisfied with the programme and score positive on the extent to which they feel that they have accomplished its intended learning outcomes. This was confirmed by the programme's alumni during the interview on the day of the site visit. From the survey it appears that all graduates (96%) feel they are able or very well able to: work systematically and methodically, manage complex assignments in a multidisciplinary team, enhance his/her expertise, act in different roles depending on the situations and have the attitude to endorse personal development. Competencies of which three quarter of the population feels that they master are the ability to generate novel ideas and the extent to which one is able to adhere to existing academic contexts. The survey indicates that almost all graduates feel that they are well prepared for their jobs. Employers are positive about the process approach of U-Twente graduates as well as their ability to deal with multidisciplinary problems.

The panel studied 15 theses from all specialisations and profiles. The theses contain in-depth studies of problems situated in a civil engineering context and provide either a (direction for) solution to the problem or a design with which solves the problem. The programme deliberately chose to ask for student's reflection on the use of methodology in the thesis's proposal, and therefore such a reflection is only to a limited extent present in the thesis itself.

Considerations

The theses the panel reviewed reflect the programme's profile, a number of theses are clearly oriented towards processes relevant to Civil Engineering, such as the procurement process. Student's use both qualitative and quantitative methods to develop their solutions and designs. They have developed adequate models, analysis and designs of real-life problems. In addition, the theses contain recommendations for the company or organization with which the student writes his or her thesis. In the eyes of the panel, these recommendations could sometimes be more elaborate. All theses show that students have attained the MSc. level but most of the studied theses contain less reflection on the use of methodology than the panel deems appropriate for an academic thesis. From the studies thesis proposals, the panel concluded that the students are able to reflect on the use of methodology. However, in order to safeguard this important academic component in the student's work, the panel recommends the programme to more explicitly require students to elaborate on this reflection after execution of the investigation in the thesis document.

The panel is positive about the extent to which graduates find a job and feel able to perform as expected and above. The appreciation for the programme's graduates as expressed by the professional field reflects the panel's impression that the programme succeeds in delivering highly knowledgeable and skilled graduates. The extent to which the programme has mapped the realised learning outcomes, allows the programme to deliberately steer on graduates' quality.

Assessment of this standard

The considerations have led the assessment panel to assess standard 4, Achieved learning outcomes, to be satisfactory.

5. Overview of assessments

Standard	Assessment
Standard 1. Intended learning outcomes	Satisfactory
Standard 2: Teaching-learning environment	Satisfactory
Standard 3: Student assessment	Good
Standard 4: Achieved learning outcomes	Satisfactory
Programme	Satisfactory

6. Recommendations

In this report, a number of recommendations by the panel have been listed. For the sake of clarity, the most important ones have been brought together below. The panel recommends the programme:

- to specify the programme's learning outcomes and clearly distinguish the learning outcomes of each specialisation;
- to distinguish the programme's learning outcomes from the Master Construction Management and Engineering the University of Twente offers;
- In relation to the previous recommendation, consider a formal approval of students' chosen study path in order to ensure that students have obtained all learning outcomes and therewith improving the extent to which the programme strengthens the execution of the constructive alignment principle to which the assessment policies of the University of Twente adhere;
- to stronger connect the thesis preparation module and the thesis, so as to ensure that a reflection on the methodologies used will not only be part of the preparatory phase but will also be part of the actual thesis;
- to improve the thesis assessment form so that it provides a clearer explanation of why a student received a certain grade;
- to take measures to improve the study success rate.