Analysis of the current situation
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2 INTRODUCTION

2.1 DESCRIPTION

This document is the output O1 from WP1/A1: Report on the transition from secondary education (SE) to higher education (HE) and learning analytics: current situation in partner institutions.

The report includes the facts and numbers relevant for the transition from secondary to higher education:

- educational context (admission policy),
- overview of existing initiatives in the transition from secondary to higher education,
- current practices in student counselling, and
- existing formative feedback initiatives and guidance in the transition from SE to HE both concerning intake and progression.

The data available at the different partner institutes concerning the transition from SE to HE (academic analytics) is subject of a separate document.

Furthermore current practices in learning analytics deployed at the partner institutes are summarized, with special attention for learning analytics in the context of the transition from SE to HE.

2.2 DIFFERENT PARTNERS

2.2.1 KU LEUVEN

KU Leuven is a university, located in the centre of the historic town of Leuven in the Flemish part of Belgium. With more than 55 000 students during the academic year of 2014-215 (http://www.kuleuven.be/prodstudinfo/50000050/dash.html), KU Leuven is the largest university in Belgium and the low countries. KU Leuven has a very long tradition as a centre for learning. Today, it is Belgium’s largest and highest-ranked university and, founded in 1425, one of the oldest and most renowned universities in Europe. As a leading European research university and co-founder of the League of European Research Universities (LERU), KU Leuven offers a wide variety of international bachelor and master’s programmes, all supported by high-quality, innovative, interdisciplinary research.

As of 2014, KU Leuven ranks as 55th globally according to Times Higher Education, 82nd according to QS World University Rankings and 96th according to the Academic Ranking of World Universities. KU Leuven is consistently considered to be within the top 100 universities of the world and considered as the best Belgian university (together with UGent).

KU Leuven offers about 55 bachelor programs, 130 initial master programs, and 48 master after master programmes in Dutch. Furthermore KU Leuven offers international programmes in both English, French, and Spanish, and more than 2000 courses in English, including 8 Erasmus-Mundus programmes.

KU Leuven employs more than 11 000 persons: more than 1500 professors (ZAP), 5000 researchers (BAP), 1500 educational staff (AAP, OP1, OP2, OP3), and 3500 administrative and technical staff. In 2011 the research expenses were 365 million euros, 635 PhDs were successfully obtained, and 98 spin-off companies were created.

The numbers above show that KU Leuven is both a renowned research university and educational institute.
The faculties and centres of KU Leuven involved in the project are the Faculty of Engineering Science, the Faculty of Science, the Faculty of Engineering Technology, the Faculty of Medicine, the Faculty of Psychology and Educational Sciences, the Faculty of Arts, and LESEC.

The Leuven Engineering and Science Education Centre LESEC (see http://set.kuleuven.be/LESEC), founded in 2009, is a centre specialized in the domain covered by the project. The overall objective of LESEC is to contribute to the advancement of Engineering and Science education on the basis of research evidence. The three main project promoters of KU Leuven Tinne De Laet (Faculty of Engineering Science), Greet Langie (Faculty of Engineering Technology), Carolien Van Soom (Faculty of Science) lead the LESEC research team that focuses on a better orientation of incoming students. Finally, Tinne De Laet is the chair of the centre.

2.2.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)

TU Delft was founded in 1842 as the Royal Academy by King Willem II and has been known as the Delft University of Technology (TU Delft) since 1986. TU Delft closely cooperates with many educational and research institutes, both in the Netherlands and abroad. The quality of our research and teaching is renowned. TU Delft has numerous contacts with governments, trade associations, consultancies, industry, and small and medium-sized companies. The university website provides a detailed description of the study programmes offered and the ongoing research activities. The university takes responsibility towards society by focusing its research on four global themes: Energy, Environment, Infrastructures, and Health. It is partner in two recently granted KIC’s (Knowledge and Innovation Community) Environment and ICT. Since 2006 TU Delft has invested substantially in the development of Open Course Ware (OCW) and online education (both online masters & MOOCs). TU Delft has now over 150 OCW courses open available at http://ocw.tudelft.nl and has a significant online presence on i-Tunes U. TU Delft is a sustaining member of the OCW Consortium (presidency 2011-2013). In September 2013 TU Delft launched their first two MOOCs on the edX platform (70.000 enrolled, 6.000 certificates) and is one of the few European (core) partners of the edX consortium, founded by MIT & Harvard. TU Delft have developed 17 MOOCs on engineering, science, and design. In September 2013 TU Delft also started with three online master degree programmes (of which two 30 EC modules), to enable lifelong learners all over the world to enhance their knowledge or improve their career opportunities.

One of the MOOCs, pre-university calculus, is especially targeted to better prepare high-school students for their Bachelor programme. This summer the course will run for the first time and we are eager to see the effect on the study progress of our first year students in 2015-2016. With learning analytics we will track the students and identify the students at risk.

The coming years TU Delft will expand their existing relationships with secondary education, lifelong learners, companies, like Shell, Unilever, KLM, and many SME’s to adjust online education to their needs.

2.2.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

More than 200 years of research and teaching in society’s service make Graz University of Technology one of Austria’s most venerable scientific institutions. The University’s success throughout its eventful history has been based upon the achievements of outstanding personalities in science, research and their application. Richard Zsigmondy, who received the Nobel Prize for Chemistry in 1926, but also names such as Hans List, Otto Nußbaumer or Friedrich Nikola Tesla account for the excellent reputation of Graz University of Technology in the past and present. Today engineers have more responsibility than ever for the quality of life of generations to come. This awareness and a modern understanding of technology are the guiding principles of the students, teaching staff and researchers of Graz University of Technology.

Graz University of Technology is the oldest of Austria’s three universities of technology and has more than 16000 students studying a range of 20 bachelor’s programmes, 30 master’s programs, two teacher-training
studies and three doctoral programmes as well as 11 other postgraduate courses. Already 11 of the master’s programmes are transitioning from German to English. About one third of all programmes are done in cooperation with University of Graz (NAWI Graz).

The Faculty of Computer Science and Biomedical Engineering comprises 11 Institutes and covers main subjects such as software engineering, information systems, computer graphics and vision, security and biomedical engineering. The Institute for Information Systems and Computer Media (IICM) has a long tradition in research and development of multimedia information systems for various application domains, such as digital libraries, knowledge management systems, e-education systems, and new media technologies. The IICM does not only have a strong proven record in research in the areas mentioned above, but is also proud of some 20 business spin-offs, such as Hyperwave (Document & Information Management System), and of research organization spin-offs, such as the Know-Center (Competence Centre for Knowledge Management) or the HMS (the Institute for Hypermedia Systems of JOANNEUM RESEARCH). The IICM has been involved in various EU funded and national funded research projects as coordinator and academic research partner. Most recent projects involved include the following EU funded research projects: EPHRAS (e-learning system for foreign languages), BERNSTEIN (digital library for managing paper, based on images visualizing the paper’s structure), APOSTDLE (system for enhancing knowledge worker productivity by supporting informal learning activities), and Sprichwort (system for language learning). Additionally, the IICM has been involved in the network of excellence project PROLEARN (e-learning), DELOS (digital libraries), ALICE (complex learning experience and new assessment methods), and CBVI (entrepreneurship training applying virtual worlds). Active research topics of IICM currently are "Adaptive Systems", "Cross Media Information Retrieval", "Digital Libraries and Information Systems", "e-Learning", "Information Visualization", "Innovative Media Technologies", "Plagiarism and Similarity Detection" and "Usability".
3 EDUCATIONAL CONTEXT

The presence of different educational contexts is required to guarantee the transferability of the projects’ results to other countries within Europe. As highlighted in the ATTRACT project (2012), the educational context in the different countries in Europe is different in many aspects: the admission requirements for higher education, the student fees, the organization of pre-university education, the university funding, etc. In this report we use the comparison framework proposed by the ATTRACT project to compare the educational contexts of the different partner countries and institutes.

3.1 ORGANIZATIONAL STRUCTURE EDUCATION SYSTEMS

The table below gives an overview of the organisational structure of the education systems in the partner countries.

<table>
<thead>
<tr>
<th>Age</th>
<th>Belgium</th>
<th>The Netherlands</th>
<th>Austria</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pre-school</td>
<td>primary school</td>
<td>secondary education</td>
<td>upper secondary education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>secondary education</td>
<td>upper secondary education</td>
<td>part-time (3 or 4 yrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>primary school</td>
<td>full-time compulsory education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>secondary education</td>
<td>part-time compulsory education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper secondary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>further education</td>
<td>full-time compulsory education</td>
<td></td>
</tr>
</tbody>
</table>

As shown in the ATTRACT project, many European countries operate different categories of school in the secondary and/or upper-secondary school systems. Often, students choose between a general/academic strand of upper-secondary education, or a vocational one. This choice usually has implications for the subjects the students would then study. In many cases, learners choose at a relatively early age (typically 15) which pathway they will follow, and the choice they make can limit the fields of study open to them later on. The table below shows the proportion of students following each of the main curriculum types in the partner countries.
The universities represented within the project differ in terms of size, programmes offered, etc. The table below provides background information about the participating universities.

<table>
<thead>
<tr>
<th></th>
<th>Belgium</th>
<th>The Netherlands</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>academic</td>
<td>35%</td>
<td>16%</td>
<td>?</td>
</tr>
<tr>
<td>vocational</td>
<td>TSO: 33%, BSO: 30%</td>
<td>25%</td>
<td>?</td>
</tr>
<tr>
<td>other</td>
<td>KSO: 2%</td>
<td>51%</td>
<td>?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>KU Leuven</th>
<th>TU Delft</th>
<th>TU Graz</th>
</tr>
</thead>
<tbody>
<tr>
<td>country</td>
<td>Belgium</td>
<td>The Netherlands</td>
<td>Austria</td>
</tr>
<tr>
<td>university type</td>
<td>general</td>
<td>technical</td>
<td>technical</td>
</tr>
<tr>
<td>core funding sources</td>
<td>government</td>
<td>75%</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td>private sources/contracted research</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td>other</td>
<td>10%</td>
<td>8%</td>
<td>3.80%</td>
</tr>
<tr>
<td>national ranking³</td>
<td>#1</td>
<td>#1</td>
<td>#5</td>
</tr>
<tr>
<td>World university ranking³</td>
<td>#35</td>
<td>#65</td>
<td>#351-400</td>
</tr>
<tr>
<td># full time students³</td>
<td>42,503</td>
<td>19,613</td>
<td>7,542/16,498⁴</td>
</tr>
<tr>
<td>Student:staff ratio³</td>
<td>41.9</td>
<td>19.4</td>
<td>12.5</td>
</tr>
</tbody>
</table>

³ These numbers are according to the World University Rankings 2015-2016: https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking#!/page/0/length/25
⁴ Number of Students enrolled in 2016 according to CampusOnline, the Software used at TU Graz: https://online.tugraz.at/tug_online/Studierendenstatistik.html?pAuswertung=1&pSJ=1036&pSemester=S&Gruppierung=1
<table>
<thead>
<tr>
<th></th>
<th>18%</th>
<th>25%</th>
<th>16%</th>
</tr>
</thead>
<tbody>
<tr>
<td>International students³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female:Male ratio³</td>
<td>54:46</td>
<td>26:74</td>
<td>22:75</td>
</tr>
<tr>
<td>Performance breakdown:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>teaching³</td>
<td>59.9</td>
<td>55.0</td>
<td>26.0</td>
</tr>
</tbody>
</table>

3.2 ORGANIZATIONAL STRUCTURE ACADEMIC YEAR

The table on the next page presents the organization structure of the academic year for the different partners.
KU Leuven

TU Delft

TU Graz


- start and end academic year
- exams
- resits
- teaching period
- dedicated study time
- orientation initiative or summer course before the start of the academic year
- holidays
## 3.3 ADMISSION

The table below provides a comparison of the university admissions procedures and requirements in partner institutes. Since admissions criteria represent a substantial formal barrier to higher education, it is important to highlight these criteria across each of the countries within the project.

<table>
<thead>
<tr>
<th>KU Leuven</th>
<th>TU Delft</th>
<th>TU Graz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>centralized admission</strong></td>
<td>no (except central admission test for Medicine, involved in project)</td>
<td>yes</td>
</tr>
<tr>
<td><strong>does university have power over student selection?</strong></td>
<td>only for some programs, including English master programs</td>
<td>only for foreign students</td>
</tr>
<tr>
<td><strong>prior experience/qualifications (mature student entry)</strong></td>
<td>yes (for &gt; 21s)</td>
<td>only for Master</td>
</tr>
<tr>
<td><strong>access for foundation program</strong></td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>alternative routes of entry to the university</strong></td>
<td>aptitude test</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>other</strong></td>
<td>n/a</td>
<td>First-year HBO (higher professional education) certificate in Technology or Science</td>
</tr>
<tr>
<td><strong>general admission</strong></td>
<td>school exams certificate</td>
<td>yes</td>
</tr>
</tbody>
</table>
### 3.4 INCOMING – PROGRESSION

#### 3.4.1 KU LEUVEN - FACULTY OF ENGINEERING

##### 3.4.1.1 INCOMING STUDENTS

Generation students are students that subscribe to the university for the first time. Since 2009, the number of generation students for the bachelor of engineering science has been fluctuating around 450. The percentage of girls is around 14%. The percentage of generation students with a non-Belgian nationality and migrant background is around 3%. About 15% of the students have a study allowance. This shows that the programme is mainly recruiting male, Belgian students with a non-migrant background.

The programme assumes students followed secondary education with more than 6 hours of mathematics in their program. Typically, at least 95% of the generation students had 6 hours of math or more in their prior education. The vast majority of the students followed prior education that prepares well for the bachelor of engineering. Moreover the majority of incoming students took a program on science and mathematics (64%) or in Latin-science (24%).

##### 3.4.1.2 PROGRESSION

#### 3.4.1.2.1 SITUATION

When analysing progression and drop-out it is important to take into account the specific situation of the bachelor of engineering science at KU Leuven. The most important characteristics are:
• Open access: all students with a secondary education diploma can enter. There is neither a requirement on prior education nor on prior achievement. An except are for the bachelor diplomas in Medicine and Dentistry (entrance examination).
• The subscription fee for the bachelor programs in Flanders is around 890 euro per academic year (2015-2016).
• KU Leuven has binding conditions after the first (only introduced recently in 2015-2016) and second year. The binding conditions look to cumulative study efficiency.

3.4.1.2.2 STUDY PROGRESS MEASURES (SUCH AS BINDING STUDY ADVICE)

Students that show insufficient study progress can be refused enrolment as a measure of progression monitoring. The size of the refusal can vary but in any case it applies to all contract types, so for registrations with a degree contract, credit contract, and examination contract.

KU Leuven uses three types of refusals which can also occur as mutual combinations.

1. Refusal on the basis of a very low study efficiency (only introduced in 2015-2016)
   Starting Bachelor’s and bridging programme students who have a very low CSE after one year (<30%) cannot continue with the same programme.

2. Refusal after unmet binding conditions
   Starting Bachelor’s or bridging programme students who have a relatively low CSE after one year (<50%) are given binding conditions in accordance with the CSE. After the second year within the same programme, a refusal to register ensues if the CSE is still too low (<50%). This refusal applies to all undergraduate programs and transitional programs at KU Leuven.

3. Refusal after sufficient examination opportunities for the same course
   Students who repeatedly fail the same course, receive a refusal to register for the programmes containing that course. In some cases this happens after two years, in other cases after three years. The scope of the refusal of registration is for all programmes in which the course is included and for all continuous programmes to those programmes and for all separate registrations for courses occurring in those refused programmes. The refusal applies to all contract types.
   - Refusal after two years of examination opportunities
     If the student is registered with a credit contract, the refused registration will be for one year after two years of failing the same course.
     If the student is registered for a Bachelor’s, bridging or Initial Master’s programme the refused registration will be for one year after two years of failing unless your cumulative study efficiency (CSE) is at least 50%. In that case you will get another third year to pass the course, or if possible to take another elective.
     In the other programmes the student will not yet be refused after two years.
   - Refusal after three years of examination opportunities
     If the student has been able to include the course in his study program for three years and if the student has not passed after those three years (and also cannot use a tolerance), then the student will be refused registration for the next five academic years.

Additionally, students also get a refusal if they do not have learning account (Flemish measure). If a student’s learning account is less than or equal to 0, the student cannot register with a credit contract at the KU Leuven. Furthermore, the student cannot register for a diploma contract or exam contract for the programs that work with study credit, unless the student already has a Master’s diploma.

KU Leuven invests heavily in giving students interim advice and guidance.

Postponement of any of the above study progress measures is possible on the grounds of individual circumstances such as illness, disability, and exception family circumstances (non-exhaustive list).
3.4.1.2.3 ADDITIONAL IMPORTANT REGULATIONS FOR STUDY PROGRESS

3.4.1.2.3.1 TOLERANCES

Under certain conditions, in a Bachelor’s programme students can use tolerance credits for courses which they failed. Using a tolerance credit is a way of furthering the study progress.

Each student gets a tolerance entitlement of 10% of the number of credits which they effectively have to take within a programme. It follows that the tolerance entitlement in a Bachelor’s programme of 180 credits, without exemptions, amounts to 18 credits. If a Bachelor’s student has to obtain more than 120 credits in order to graduate, then at this point he/she can use no more than 12 credits of the remaining tolerance entitlement.

Using a tolerance is subject to multiple conditions:

- The students has a cumulative study efficiency (CSE) of at least 50%
- The fail mark is a 8/20 or 9/20
- The student has sufficient remaining tolerance entitlement
- The course is tolerable.

If courses are not tolerable or if there are restrictions, then this is stated in the faculty education and examination regulations or in the programme catalogue of the study programme: Sometimes only a restricted number of credits is tolerable within a specific group of courses. This is for instance the case for the programme: Bachelor of Engineering Science: architecture. More info on: https://www.kuleuven.be/english/education/studyprogress/monitoring-studyprogress/tolerances

3.4.1.2.3.2 ORDER OF ENROLMENT – PREREQUISITES

Each course can specify binding prerequisites, i.e. other courses that you have been taking or have passed before you can subscribe to the considered course. Different type of “order of enrolment specifications exist”:

- STRICT: You may only take this course if you have passed or applied tolerance for the courses for which this condition is set.
- FLEXIBEL: You may only take this course if you have previously taken the courses for which this condition is set.
- SIMULTANEOUS: You may only take this course if you also take the courses for which this condition is set (or have taken them previously).
- DEGREE: You may only take this course if you have obtained this degree level.

These specifications originate from content-related matters and have as the final goal to ensure that a student has the proper prior knowledge before subscribing to a course. On the other hand, these specifications might have an impact on the study progress of students.

3.4.1.2.4 DROP-OUT AND STUDY DURATION

Almost 60% of incoming students obtain a bachelor diploma of engineering science, resulting in a drop-out of about 40%. The percentage of students obtaining a diploma has increased steadily increase over the last years (2009-2010 +7.1% with respect to 2005-2006). Similarly the drop out has steadily decreased over the last years (2009-2010 -10% with respect to 2005-2006). Despite the increase of student obtaining a bachelor diploma, the study duration has not increased significantly. Around 11% of the incoming students obtain a bachelor degree with one year delay and 2.5% with two year delay. Despite the lack of binding requirements before the end of
the second year (kick out) until 2015-2016, 71% of the drop-outs already drop out before the start of the second year (and even 21% during the first year). This is a result of the efforts of the Faculty to give early data-based feedback to students. As the KU Leuven has binding requirements after the second year (see introduction), the drop-out after the second year is, as desired, very low: only 4.31%.

![Figure 1: Study duration of cohort 2009-2010.](image)

### 3.4.1.2.5 STUDY EFFICIENCY FIRST YEAR

Another important measure for study success, especially in the case of open access to the bachelor program, is the study efficiency of students, expressed as the percentage of the credits obtained.

Over the last five years about 45% of the students obtain a very high study efficiency (>90%) after the first year. A longitudinal analysis shows that about 91% of these students obtain their bachelor degree within the nominal duration. Around 20% of the students obtain a very low study efficiency (<30%). The longitudinal analysis shows that none of these students obtained a bachelor diploma in the past. Around 16% of the students have a study efficiency between 60 and 90% and 18% between 30 and 60%. The longitudinal analysis shows that these students are at risk of study delay or drop out.
3.4.1.3 OUTGOING GRADUATES

3.4.1.3.1 BACHELOR AND MASTER

Around 60% of the students that started the bachelor program obtain a master degree. Around 35% of the students do not obtain a bachelor degree. Only a minority of less than 5% obtain a bachelor degree but not a master degree. This low number is not unexpected nor undesired since the bachelor degree of engineering science is not considered as finality, but as a preparation for the master of engineering science.

3.4.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)

3.4.2.1 INCOMING STUDENTS

Since 2011, the number of first year (first time) students that enrol in TU Delft’s Bachelor program has steadily increased from 2,721 in 2011 to 3,154 in 2015. The percentage of women in the Bachelor program was 26,1% in 2014 and 25,1% in 2015. The percentage of new students with a non-Dutch nationality in the Bachelor was 6,3% in 2014 and 8,4% in 2015.

Students can only enrol in the Bachelor program if they have a pre-university secondary education (vwo) diploma with proven knowledge of Mathematics B and Physics at the appropriate proficiency level (can also include Chemistry and / or Biology, depending on the specific Bachelor). Most of the first year students have completed their pre-university secondary education with either a "nature and technology" profile, or a "nature and health" profile with Mathematics B and Physics as electives.

3.4.2.2 PROGRESSION

3.4.2.2.1 SITUATION

When analysing progression and drop-out it is important to take into account the specific situation of the Bachelor program at TU Delft. The most important characteristics are:
• Students can only enrol in the Bachelor program if they have a pre-university secondary education (vwo) diploma with proven knowledge of Mathematics B and Physics at the appropriate proficiency level (can also include Chemistry and / or Biology, depending on the specific Bachelor).
• The tuition fee for full-time enrolment as a student in the Netherlands is set (by law) at €1951 per year for students from EU/EFTA/Surinam, and €8678 per year for non-EU students (2015-2016 rates).
• TU Delft has implemented a ‘Binding recommendation on continuation of studies (BSA)’ for first year students.
• Due to increasing numbers of students TU Delft, TU Delft uses a ‘numerus clausus’ system for three programs. Both the Bachelor’s programme Industrial Design Engineering and Aerospace Engineering use decentralised selection and direct admission for selecting students for the available places. The Bachelor’s programme for Clinical Technology only uses decentralised selection.

3.4.2.2.2 STUDY PROGRESS MEASURES (BINDING RECOMMENDATION)

TU Delft considers it important for that students spend time during your first year to decide whether they have chosen the right programme. If a student gets very few credits, it is likely that he/she has chosen the wrong programme. Therefore students receive a binding recommendation on continuation of studies (generally known by its Dutch abbreviation BSA) at the end of the first year.

All students taking a Bachelor’s degree programme at TU Delft receive a BSA recommendation at the end of their first year of study. This means that students will have to gain a certain minimum of 45 ECTS credits during their first year of studies in order to be allowed to proceed to the second year. This is 3/4 of the total number of credits a student can achieve during the first year.

If a student fails to achieve this norm, the student’s registration for the programme will be terminated and he/she will not be allowed to register for the same programme for four years. It goes without saying that you will receive interim advice and guidance during the year.

Postponement of the binding recommendation on continuation of studies can be requested on the grounds of the following personal circumstances:

1. Illness (including mental health problems)
2. Disability
3. Exceptional family circumstances
4. Pregnancy
5. Membership of the Faculty Student Council, the Central Student Council or the Board of Studies
6. Late registration for studies (after 30 September)
7. Athletes with a TU Delft top-class sports status

In addition, the Bachelor-before-Master rule has been in force at TU Delft since 2010. Since the implementation of the Bachelor-before-Master rule students wanting to take a general Master’s degree programme are not allowed to begin the programme until they have completed their Bachelor’s degree programme. The rule was implemented nationwide in 2012 when it was incorporated into the Higher Education and Research Act (WHW).

3.4.2.2.3 ADDITIONAL IMPORTANT REGULATIONS FOR STUDY PROGRESS

3.4.2.2.3.1 ORDER OF ENROLMENT – PREREQUISITES

Some courses in the different Bachelor programs have specific binding prerequisite courses, i.e. other courses that a student needs to have taken or have passed before being allowed to follow the course.
These specifications originate from content-related matters and have as the final goal to ensure that a student has the proper prior knowledge before subscribing to a course. Failing to meet the prerequisites in time, could have an impact on the study progress of students.

### 3.4.2.3 DROP-OUTS AND STUDY SUCCES

#### 3.4.2.3.1 POSITIVE BINDING RECOMMENDATION ON CONTINUATION OF STUDIES (BSA)

The number of starting students with a positive BSA recommendation has slightly decreased from 68% in 2010-2011 to 61% in 2014-2015. Note that the required amount of ECTS to get a BSA recommendation went up in the past years: from a minimum of 40-46 ECTS (depending on the Bachelor programme) in 2009-2011, to 40 ECTS across the board in 2011-2012, to 45 ECTS across the board from 2012-2013 on. In 2014-2015 about 36% of the first year students either suspended their studies or received a negative BSA recommendation.

#### 3.4.2.3.2 BACHELOR OF SCIENCE DEGREE IN FOUR YEARS, DROP-OUTS AFTER THREE YEARS

The total number of students that obtain a Bachelor of Science degree within four years has steadily increased from 25% for the 2004 cohort to 55% for the 2011 cohort. The number of students with a positive BSA recommendation that drop out of the Bachelor programs after 3 years has decreased university-wide from 11% in 2004 to 7% in 2011. A number of factors contribute to these changing percentages, including amongst others the introduction of the binding recommendation, and increased limitations on and changes in the governmental student loans system.

![Percentage of students with a Bachelor degree in 4 years (TUD and faculties)](image)

*Figure 3: Percentage of students obtaining a bachelor degree in four years (TU Delft and faculties)*
3.4.2.3.3 STUDY EFFICIENCY FIRST YEAR

Another important measure for study success is the study efficiency of students, expressed as the percentage of the credits obtained in a given academic year. The study efficiency for first year students has steadily increased in the past years, from 56,5% (33,9 ECTS on average) in 2005 to 71,3% (42,8 ECTS on average) in 2014.

3.4.2.4 OUTGOING GRADUATES

3.4.2.4.1 BACHELOR AND MASTER

The average percentage of students in the Bachelor programs that obtain a Master’s degree within seven years has varied between 34% and 37% in the past years. Around 7% (2011) of the students with a positive BSA recommendation do not obtain a Bachelor’s degree. Only a minority of less than 6-7% obtain a Bachelor’s degree but not a Master’s degree.
3.4.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

3.4.3.1 INCOMING STUDENTS

In the winter-term 2015/2016, there were 1880 new Bachelor of Science students at the Graz University of Technology, which expresses the average number from recent years with a fluctuation around 5%. About 26.6% of the freshman are women and 38% have a non-Austrian nationality and migrant background (https://online.tugraz.at/tug_online/Studierendenstatistik.html).

3.4.3.2 PROGRESSION

3.4.3.2.1 SITUATION

Basically every person with a secondary education diploma is allowed to study at university in Austria. In recent years in consequence of the increasing number of students, some specific majors introduced restrictions. To apply for those majors the student has to pass an entrance exam.

Regular students from Austria or any other country from the European Union don’t have a tuition fee, but there is a mandatory fee for the Austrian Students’ Union (deutsch: österreichische Hochschülerschaft, short ÖH) for an amount of € 18.50 per semester. This “no-tuition-fee policy” is only active for students who have at least a minimum of performance and the student needs to finish the studies within the minimum semester-count plus two semesters (which is for Bachelor studies 6+2 semesters and for Master studies 4+2 semesters), otherwise the tuition fee increases to € 363.36 for each following semester. For foreign students outside the European Union the tuition fee is € 726.72 for each semester (https://www.tugraz.at/en/studying-and-teaching/studying-at-tu-graz/financial-matters/tuition-fees-and-the-austrian-student-union-fee/).

Since 2011 all universities in Austria established the introductory phase (deutsch: Studieneingangs- und Orientierungsphase, short STEOP). During this phase the student has to successfully complete specific courses of the Bachelor studies, otherwise the student is not allowed to continue with the studies. This was established to prevent students from following a wrong path and to show them if the studies fits their expectations (http://mibla.tugraz.at/14_15/Stk_15/Wissensbilanz_2014_TUGraz.pdf).

3.4.3.2.2 DROP-OUT AND STUDY DURATION

As mentioned earlier, the introductory phase was established to prevent students from following a wrong path and to show them if the studies fits their expectations. This should reduce the drop-out rate of the students at a later time in the studies as well as the duration of study in the long run. Also some new programs have been initiated to inform potential future students and give them more insights in the study they are interested in.

A folder with detailed information about the individual studies and possible working fields are available in German and English. The folder also includes further information about living in Graz and the campus as well as information about organizations that support students on their journey.

The Graz University of Technology organizes information days to inform about the university and the studies, offer discussions with students, show projects, supports women by promoting the technology for women program, offer guided walks at the university for school classes, participated in the university for kids and cooperates with various upper secondary schools. Additionally, the support for students who have to work has been improved as well as the opportunities for child care during the semesters.
All this measures had and will have a positive impact on the reduction of the drop-out rate and study duration. More information is available at http://mibla.tugraz.at/14_15/Stk_15/Wissensbilanz_2014_TUGraz.pdf.

3.4.3.3 OUTGOING GRADUATES

3.4.3.3.1 BACHELOR AND MASTER

In the study year 2013/14 TU Graz had 2022 students who finished their studies, which is an increase with 27% compared to the previous year. The Bachelor and Master programs had a positive impact on the duration of study: The graduation rate in Bachelor courses increased by 12.6% (1361 people) compared to the previous year with 3.9%. The graduation rate in Master courses increased by 47.8% (661 people) compared to the previous year with 11.4%.

3.4.3.3.2 CAREER INFO-SERVICE

In 2014 more than 2400 students completed their studies of various technical and scientific fields at TU Graz. The Career Information Service operates as the official recruiting platform of the TU Graz and offers students and young graduates jobs and labour market information. In 2014 around 330 jobs have been offered at the Career Start Page and sent to numerous electronic Career & Alumni newsletters to interested students and graduates. In addition, companies and institutions have the opportunity to directly address students and young graduates of the Graz University of Technology, within the meaning of the “knowledge and technology transfer via heads” program. Around 90 companies presented themselves and recruit interested students at the TECONOMY, which is just one of numerous events co-organized by the TU Graz in 2014.
4.1 CAREER GUIDANCE IN SECONDARY/UPPER SECONDARY EDUCATION

<table>
<thead>
<tr>
<th>Standardized counselling system</th>
<th>Flanders</th>
<th>The Netherlands</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

Qualifications required to become a guidance counsellor

<table>
<thead>
<tr>
<th>Flanders</th>
<th>The Netherlands</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>master in psychology, pedagogy, or educational sciences</td>
<td>-</td>
<td>?</td>
</tr>
</tbody>
</table>

Primary background

<table>
<thead>
<tr>
<th>Flanders</th>
<th>The Netherlands</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>humanities</td>
<td>-</td>
<td>?</td>
</tr>
</tbody>
</table>

Below, each of the partners describes in more detail the career guidance in their country.

4.1.1 FLANDERS/ KU LEUVEN

The central Flemish agency that handles the career guidance in secondary education is the “Centrum voor leerlingenbegeleiding (CLB)”. They help individual students and assist schools in providing career guidance to students.


The Flemish government organized career information fairs (SID-ins), where students can explore future career possibilities: both including the possibility of continuing education or for making the transition to professional employment ([http://onderwijs.vlaanderen.be/sidin](http://onderwijs.vlaanderen.be/sidin)).

The school of secondary education have a big responsibility in the career guidance. Often they offer different opportunities for students to explore possibilities, make a self-reflection, etc. Moreover, the school provides the student with a recommendation at graduation time, which is supported by a commission of school teachers.

The universities and university colleges also share responsibility in informing students. Different universities offer different opportunities including: program information days, online platforms for study choice ([https://www.kuleuven.be/luci/](https://www.kuleuven.be/luci/) and [https://vraaghetaansimon.be/registreer](https://vraaghetaansimon.be/registreer)), “trial” lectures, individual counselling, etc.

4.1.2 THE NETHERLANDS/ TU DELFT

Individual secondary schools have individual approaches to career orientation and guidance (COG, Dutch: “loopbaanorientatie en -begleiding”, ‘LOB’) in the Netherlands. To improve the quality of the career orientation and guidance processes within schools, the national Secondary Education Council (“VO-raad”) launched the ‘Promotion COG’ programme in 2009. Within this programme, schools are provided with more...
information about COG, exchange best practices with other schools, and specific courses are developed for deans and school mentors.

The ‘Promotion COG’ programme aims to increase the quality of the career orientation and guidance processes in secondary schools\(^5\). The programme encourages schools to approach career orientation and guidance in a more integral way, by involving stakeholders from within and from outside the school. The ‘Promotion COG’ programme is organized around three major themes:

1. **Integral responsibility**

Secondary education only party determines the efficacy of career orientation and guidance. For this reason, the ‘Promotion COG’ programme aims to more actively involve both parents and follow-up educational institutes in career orientation and guidance processes. This is done by creating increased awareness about their mutual dependency in the education chain and its surroundings. The main goals of this theme are more fluent transitions between secondary education and follow-up education, and a more prominent role for students and parents in this process.

2. **Responsible and proficient**

People that inspire, guide, and have a good understanding of the jobs market are crucial in career orientation and guidance. Successful career orientation and guidance processes are dependent on the will and competencies of the people involved. For this reason, the ‘Promotion COG’ programme aims to improve the skills and competencies of counsellors, managers, and executives involved. The main goals of this theme are more professional deans, mentors, and school guidance counsellors, and executives with an improved understanding of how to implement career orientation and guidance.

3. **Intensification chosen path**

In 2012, the first phase of the programme was concluded. For the next phase it was decided to stay on the chosen path, but intensify certain aspects of it. An important instrument from the first phase of the programme was defining the ‘quality’ of career orientation and guidance processes and sharing these metrics with secondary schools. Due to the instrument being used mainly by ‘vmbo’ schools, it was decided to shift the programme’s focus more to ‘havo / vwo’ schools. The main goals of this theme are a stronger focus on ‘havo / vwo’ and increased exchange of best practices between secondary schools.

4.1.3 **AUSTRIA/ TU GRAZ**

Each year the Austrian government organizes career information fairs (deutsch: *Messe für Beruf, Studium und Weiterbildung*, short BeST) where students from secondary education can explore study and future career possibilities.

Further the TU Graz has various programs targeting students from secondary education. In school co-operation associates of the TU Graz provide lectures on technical curriculum support at schools or help them on project-oriented teaching. Additionally, educational consultants are invited to become acquainted with innovations in their discipline, to lighten the orientation to career and university studies for the pupils (http://portal.tugraz.at/portal/page/portal/TU_Graz/Gleichstellung/schulkooperationen/).

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\(^5\) Source: [http://www.lob-vo.nl/over-het-project](http://www.lob-vo.nl/over-het-project)
The transinstitutional university for children offers free participation in different activities to inspire the attending children and teenager for the world of science and inspire the young audience and answer their curious questions ([http://www.kinderunigraz.at/](http://www.kinderunigraz.at/)).

The Woman in Technology program informs female high school students about study opportunities at the Graz university of technology and encourages them to technical and scientific studies to increase the career prospects ([https://www.fit.tugraz.at/](https://www.fit.tugraz.at/)).

On Open House Day the Graz University of Technology offers a comprehensive overview of the entire university courses. Free shuttle buses provide a rapid transfer between locations, were information tours are available for pupils, students, teachers, and parents at the different institutes and lectures on individual studies are given.

The Long Night of Research is Austria's largest research event on science communication. Current projects, new knowledge and technologies are presented in innovative, understandable and entertaining way from the services of the local institutions are accessible to the general population ([http://www.langenachtderforschung.at/index.php](http://www.langenachtderforschung.at/index.php)).

The Department of Academic Advising (ger.: Referat für Studienberatung) at the Students’ Union Graz University of Technology (HTU Graz) accompanies newcomers at the start of university life. The freshman counseling helps in overcoming bureaucratic hurdles, conflict management between students and the teaching staff. Additionally, a team of volunteer students offers comprehensive support in studying, study organization, housing and student finance ([https://htu.tugraz.at/deine-htu/studienvertretungen](https://htu.tugraz.at/deine-htu/studienvertretungen)).

### 4.2 STUDENT COUNSELLING IN HIGHER EDUCATION

This section describes how the student counselling (ranging from mental health, housing, etc. up to course-specific guidance) is organized at the different partner universities, with a special focus to the first year of higher education.

<table>
<thead>
<tr>
<th>KU Leuven</th>
<th>TU Delft</th>
<th>TU Graz</th>
</tr>
</thead>
<tbody>
<tr>
<td>kind of tutors</td>
<td>professional</td>
<td>professional, student</td>
</tr>
<tr>
<td>tutorial services at faculty</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>student counselling services</td>
<td>yes (study advice, student deans and student psychologists)</td>
<td>yes (academic, legal, social)</td>
</tr>
</tbody>
</table>

Below, each of the partners describes in more detail the student counselling at their institute.

#### 4.2.1 KU LEUVEN

KU Leuven works with three levels of student counselling

1. **Academic advisors:** The academic advisors are located at the different faculties. The organization might differ for the different faculties. All faculties however provide study pathway guidance. The
main task of counsellors for study pathway guidance is to help student in making decisions concerning their study pathway and study program. Typically, students can use these counsellors for all questions having an impact on their study, ranging from personal problems to course related questions. Depending on the question, the student is guided to the right branches of study support. Additionally, most faculties are offering Tutorial services, which focus on helping students in the first year with course related question, study methodology, etc.

2. **Study advice centre**: The Study Advice Service is located at university level and provides advice and support for both national and international students on study-related matters. Students can consult the study advice centre at any point in their study career: before you enter the university, while you are studying at KU Leuven and after you have graduated. They organize private consultations and workshop on specific themes such as “planning”.

3. **Student services**: The Student Services are located at university level. Different services are available: social service, service for students with disabilities, student employment service, student legal services, religion and philosophical diversity contact point, housing service, and the student health centre.

### 4.2.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)

TU Delft works with three levels of student counselling⁶:

1. **Academic counsellors at faculties**: Academic counsellors are available to students at all TU faculties. They are involved with everything that has to do with students’ living and academic conditions. Students are always permitted to consult student counsellors, especially when they have encountered problems.

2. **Student Counsellors from Career & Counselling Services**: The Student Counsellors from Career & Counselling Services are available to assist all TU Delft Students. Students can also approach them if they’re considering choosing a study programme with TU Delft or if they would like to discuss the next steps following the completion of their study programme. Advice sessions with the Central Student Counsellors are offered free of charge to TU Delft students.

3. **TU Delft Career Centre**: The TU Delft Career Centre team helps students with “(re)thinking their study”, Master options, or future career orientation. The Centre offers students a wide range of workshops and activities to enhance their skills and help them find a new course, job or internship. The TU Delft Career Centre also organises informal opportunities for companies, students, PhDs, PDEngs and recent alumni to become better acquainted.

### 4.2.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

TU Graz works with three level of student counseling

1. **Academic advisors**: The Austrian Students’ Union by statutory body (deutsch: Österreichische Hochschülerinnen- und Hochschülerschaft, short ÖH) is the general students’ representative in Austria and serves as the students’ government by federal law. Apart from that it is member of European Students’ Union. In Austria every university has their own representative ÖH-organization. The organization at the TU Graz is called “Students’ Union of Graz University of Technology” (short HTU Graz). From an academic point of view it represents the students per study and the students union of the university as well as on a national level. The members of the ÖH-organization have a say in spending, regulations, etc. on the level they were elected for. Additionally, the HTU Graz dispatches students to other boards, e.g. for curriculum creation and the university’s senate.

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2. **Study advice centre:** The office for student affairs from HTU Graz is providing for each study an individual “Basisgruppe”. This group is the first information point for all matters concerning the chosen study that a student can have during his or her study. Five mandatories, whom are also students of that particular study, are selected by the students of this field every two years. Student volunteers are helping students supporting the mandatories in their work. These groups are also preparing the Freshman Tutorial.

3. **Student services:** The Department of Academic Advising at the Students’ Union Graz University of Technology (HTU Graz) offers comprehensive support in all areas of students’ life with the help of student volunteers. It counsels all topic concerning social support for living and working, study law, student advisory, equal opportunities and support for incoming students. Additionally, the department offers financial assistance for students who are in financial distress (e.g.: per-meal discount, free entrance for cultural events). Last but not least it provides service for students in terms of Copyshops (On-campus students’ office supply, university merchandise, scripts, 3-D printing), space for studying on campus and much more.
5 OVERVIEW OF EXISTING GUIDANCE IN THE TRANSITION FROM SECONDARY TO HIGHER EDUCATION / INTAKE GUIDANCE

The use of preparatory courses, tutoring and/or student counsellors during the transition from secondary to higher education is very different among the partner universities. The table below sheds a first light on these differences.

<table>
<thead>
<tr>
<th></th>
<th>KU Leuven</th>
<th>TU Delft</th>
<th>TU Graz</th>
</tr>
</thead>
<tbody>
<tr>
<td>preparatory courses</td>
<td>yes (summer + online SPOCs)</td>
<td>yes (‘trial lectures’, online lectures, MOOCS)</td>
<td>n/a</td>
</tr>
<tr>
<td>positioning test</td>
<td>yes (except for Medicine with admission test)</td>
<td>some (e.g. for teachers’ program)</td>
<td></td>
</tr>
<tr>
<td>kind of tutors</td>
<td>professional</td>
<td>professional, student</td>
<td>student</td>
</tr>
<tr>
<td>use of learning analytics in transition</td>
<td>n/a</td>
<td>n/a (except MOOC)</td>
<td>n/a</td>
</tr>
<tr>
<td>tutorial services at faculty</td>
<td>yes</td>
<td>yes (matching day, trial lectures, aptitude tests, reflection)</td>
<td>n/a</td>
</tr>
<tr>
<td>central student counselling</td>
<td>yes (study advice, student health centre, social)</td>
<td>yes (study advice, student deans and student psychologists)</td>
<td>yes (academic, legal, social)</td>
</tr>
</tbody>
</table>

Finally, the table below provides the opportunity to highlight one of the initiatives per project partner taken to support the student in the transition from secondary to higher education.

**Tutoring practice in the picture**

**KU Leuven**
- Tutorial services of faculties e.g. [http://eng.kuleuven.be/studenten/studentenbegeleiding](http://eng.kuleuven.be/studenten/studentenbegeleiding)

**TU Delft**
- Try to Study [http://www.meeloopdagen.tudelft.nl/](http://www.meeloopdagen.tudelft.nl/)
- MOOC pre-university [https://www.edx.org/course/pre-university-calculus-delftx-calc001x](https://www.edx.org/course/pre-university-calculus-delftx-calc001x)
- Online Study Trial [http://www.proefstuderen.tudelft.nl/](http://www.proefstuderen.tudelft.nl/)

**TU Graz**
- “Try to study” [http://www.studierenprobieren.at/](http://www.studierenprobieren.at/) - organized by the students union
Below, each of the partners describes in more detail the initiatives at their institute concerning the transition from secondary to higher education.

5.1 KU LEUVEN / FACULTY OF ENGINEERING

5.1.1 ENGINEERING POSITIONING TEST – IJKingstoets

The engineering positioning test – iJKingstoets is a non-obligatory and non-binding test that tests the prior knowledge and competences of future students before the start of the bachelor. How are the prior knowledge and competences with respect to the expectation of the program and with respect to the other participants? As explained in more detail in appendix, the test serves three purposes. First for the students that succeed (60%) in the test, it gives confidence in their abilities for the engineering program. Second for the students that nearly failed the test, it is a stimulus to make extra efforts, take a summer course, or an individual study program. Third for the students that badly failed the test, it encourages them to analyse their performance, and if they do not expect to be able to do better, to stimulate to choose another study program.

The guidance for students related to the positioning test is organized by the Tutorial Services of Engineering Science. The guidance (except summer course) is free. During the positioning test, all students receive an information brochure listing all possibilities for guidance and feedback. To prepare for the positioning test the student can consult the website (http://eng.kuleuven.be/ijkingstoets/begeleiding) containing example questions and all questions and answers of previous sessions. Furthermore, videos with hints are available that can help students when solving the exercises. After receiving their result and personalized feedback, participants can request for individual feedback of the tutors of the Tutorial Services via email. Furthermore, the student receives feedback on the expected impact of the result of the positioning test on the study pathway (see Figure X in appendix).

During the positioning test, the Tutorial Services organizes an information session for parents where questions like “Which guidance is available at the university?” “What is tolerating a course?”Student scan meet the tutors and study counsellors and ask questions informally.

5.1.2 ENGINEERING POSITIONING TEST – MORE DETAILS

Until 2003, students subscribing to the bachelors of engineering science and engineering science: architecture had to pass an entrance examination. This entrance examination had a long lasting history of more than 100 years. The entrance examination stimulated a thorough preparation for the program. This contributed to a high level of mathematics in secondary education and a good international reputation (Oecd, 2005), and to a high study success in the bachelor programs. In 2004 the Flemish government decided to abolish the entrance examination, despite strong academic objections. The bachelor programs subsequently adapted their programs by, among others, offering more mathematics in the first year. Despite these efforts, the study success in the first year decreased significantly. In 2012, the Flemish universities took the initiative to organize a new test that takes into account this new context. This initiative is also supported by the SoHo- rapport (SOHO-overleggroep, 2010). The concrete result is the so-called positioning test “ijkingstoets”.

5.1.2.1 EXAMINATION MOMENT

The iJKingstoets tests the prior knowledge and competences of future students before the start of the bachelor. How are the prior knowledge and competences with respect to the expectation of the program and with respect to the other participants? The test serves three purposes (Figure 6). First for the students that succeed (60%) in the test, it gives confidence in their abilities for the engineering program. Second for the students that nearly failed the test (quintile Q2), it is a stimulus to make extra efforts, take a summer course, or an individual...
study program. Third for the students that badly failed the test (quintile Q1), it encourages them to analyse their performance, and if they do not expect to be able to do better, to stimulate to choose another study program.

![Diagram of positioning test](image)

**Figure 6: Desired histogram of the positioning test (ijkingstoets) showing its three goals.**

Bottom 20% gain consult and rethink the study choice

20% < Q3 < 40% 20% with repairable deficiencies, special training

60% < Q4 < 80% Top 60 (-70)% succeeds for the positioning Test & receives 1 study point free.

Upper 20% quintile Q0

On the one hand, the positioning test is the end of the orientation process during the transition from secondary to higher education. On the other hand it is the start of a remediation and guidance program during and after the subscription to university. The examination moment is as short as possible after the end of the secondary education. The engineering positioning test organises a second examination moment in the middle of September. The positioning test is non-binding and non-obligatory: the result has no consequences for the admission to the bachelor program. The positioning test is now part of an orientation trajectory in high schools and in a coaching trajectory in the first year of engineering at KU Leuven (Figure 7).
After a pilot in the summer of 2012, organised by the Faculty of Engineering Science of KU Leuven, the positioning test was deployed more broadly in 2013 (Callens & Vandewalle, 2013). Since then, it has grown into a mature instrument of four of the five Flemish universities (KU Leuven, Universiteit Gent, Universiteit Antwerpen en de Vrije Universiteit Brussel) with positioning test for 16 bachelor programs. Students can take the positioning test at any Flemish university; it has no impact on the university they should subscribe to.

5.1.2.2 STIMULANS

Special for the bachelor of engineering science and the bachelor of engineering science: architecture is that students that pass the positioning test can request an exemption (EVK) for the course ‘wiskunde voor probleemoplossen’ (Mathematics for Problem Solving) for one credit within the bachelor of engineering science and the bachelor of engineering science: architecture This exemption stimulates a serious participation to the positioning test, as will be shown below.

The engineering positioning test tests important competences for courses in the first part of the bachelor program. The content of the question builds on the math of a six hour program in secondary education. The competences a student needs to start the engineering program go beyond the mastering of mathematical calculation rules. Can he/she combine several mathematical techniques? Can he/she interpret an applied problem and divide it into subproblems? Can he/she find the correct mathematical techniques to solve the subproblems? Can he/she combine the results of the subproblems to formulate an answer to the original question? As good spatial visualisation is also important for the future engineer, the engineering positioning test will also test this.
The positioning test consists of multiple choice questions. The examination format demands on the one hand a well-considered design of the test, but allows on the other hand giving feedback fast. Within a couple of days more than 800 participants receive an email with their result, their position with respect to the other participants, and a reference to further guidance and remediation that is organised by the participating universities.

5.1.2.3 SUCCESS RATE

In 2014 872 students participated in the engineering positioning test (KU Leuven, UGent, and VUB), an increase with 17% with respect to 2013. Figure 6 shows the results of the participants. The largest portion (82 percent) participated in the July positioning test, where 62% of the participants passed. Almost half (46 percent) of the students that did not pass subscribe for the September positioning test. One fourth of these participants passed in the end. For the students that participated for the first time in the engineering positioning test in September, the success rate was lower (46 percent) than in July.

Figure 8: Student flow of participants of the engineering positioning test for the two examination moments in 2014

Figure 9 shows the effect of the positioning test on the subscription behaviour of the academic year 2014-2015 in Leuven. While the positioning test is not obligatory, only a small part of the students subscribes for the engineering bachelor programs without participating in the engineering positioning test. This portion of students decreased from 28% in the academic year 2013-2014 to 18% in 2014-2015.
The engineering positioning test is non-binding. A considerable portion of the students that did not pass the engineering positioning test (68 percent) still subscribes to the program of engineering science. Together with the students that did not take the engineering positioning test they are not exempted for the course ‘wiskunde voor probleemoplossen’ in the first months of the academic year. Furthermore, these students are additionally informed about the support offered by the Tutorial Services of Engineering Science. The exemption that students passing the engineering positioning test receive is a strong stimulant for motivated participation and explains the large portion participants in Leuven. The exemption creates a unique stimulus for serious and motivated participation.

5.1.2.4 GOOD INDICATOR

Can the engineering positioning test predict study success? We looked at the participants of the first positioning tests in 2013 that subscribed afterwards to the bachelor of engineering science and the bachelor of engineering science: architecture at KU Leuven (Vanderoost, Callens, Vandewalle, & De Laet, 2014) in the meanwhile they have completed the complete first academic year.

Figure 10 shows the student flow of the students that both participated in the 2013 positioning test and subsequently participated in the June examination of 2014. Students that passed all courses or who just failed one or two courses (8/20 or more), completed the bachelor program and belong the green category of ‘passed’ in June. An analysis of the previous academic years shows that 97% of these students will obtain the bachelor degree in the nominal duration of 3 years. For students that have five or more non-tolerable courses (<8/20), this analysis shows that 75% will never obtain the bachelor degree. This is the red category of ‘limited study success’. Some students already quit the bachelor program during the first academic year and do not participate in the June examinations.
Figure 10: Student flow of the participants of the engineering positioning test in 2013 until the June examinations of 2014 for the bachelor of engineering science and the bachelor of engineering science: architecture at KU Leuven.

The engineering positioning test is a good indicator for study success in the bachelor. Passing the engineering positioning test is a good indicator for later study success. Passing the engineering positioning test is however no guarantee for success: hard work, motivation, and a good study method are obviously mandatory for all students.

The experiences of the engineering positioning test show that a high quality of the test is essential and that a considerable effort is necessary to guard the validity of the test. The cooperation between the Flemish universities is necessary to organize one positioning test for one program at one common examination moment. This is essential for the acceptance of future students and teachers. The current decentralized examination at different universities and campuses is effective and cost efficient.

5.1.2.5 OUTREACH

The Faculty of Engineering Science also uses the positioning test for outreach towards secondary education. Since two years, the faculty organizes workshops for high school teachers in mathematics and physics in order to explain the role of the positioning test, and its achievements, and above all in order to discuss the problems presented in the positioning tests. These interactions will continue in the future and prove to be an excellent instrument in order to design these exams even better. Moreover the professors that teach in the first year of engineering are asked to inform the design team of the positioning test about relevant problems or gaps in the skills of the students, so as to prepare questions on these topics.

5.1.3 SUMMER COURSE

In the month September, before the start of the academic year, the Faculty of Engineering Science organizes in cooperation with the Faculty of Science a summer course on mathematics. During five full days the students repeat theory and make exercises. This course ensures a good start for the academic year. The summer course is targeting all students, not only the students that did not pass the positioning test. More information and the course material is available at: http://set.kuleuven.be/apps/zomercursus/inschrijven/modules_wiskunde.php
5.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)

5.2.1 POSITIONING TEST AND STUDYCHOICECHECK

For the BSc programmes with a Numerus Clausus (Aerospace Engineering, Industrial Design Engineering and Clinical Technology) prospective students have to do a positioning test. These tests include an online questionnaire and a test day at the faculty. Contents of both the questionnaire and the testing day are defined by each programme. Generally the applicants are tested on academic skills, motivation, and preliminary knowledge of the field of study. All BSc programmes without Numerus Clausus offer a Matching test (StudyChoiceCheck, Dutch: “Studiekeuzecheck”) to prospective students. This test is meant to let prospective students assess their choice for the programme, both with additional information about the programme and professional perspective, and questions about skills and motivation. The test, an online questionnaire, is non-obligatory and non-binding, but highly recommended by secondary schools and university. Dutch law makes it possible for universities to make the StudyChoiceCheck mandatory; some universities did. TU Delft communicates about the test with prospective students as it is part of the application process, so approximately 75% of the prospective students do the test. The result of the test is shared with the applicants as feedback; some programmes give an advice, which is non-binding, but mostly followed.

5.2.2 STUDYCHOICECHECK – MORE DETAILS

In the Netherlands, applicants can apply for a maximum of four BSc programmes, one of which can be a Numerus Clausus programme. For programmes without Numerus Clausus applicants who apply before May 1st, have a right to do the StudyChoiceCheck. Some universities make this test mandatory, but TU Delft does not.

As soon as prospective students apply for a BSc programme at TU Delft (without Numerus Clausus), they get an email with confirmation of application and information about the test. Students are asked to login to the Student Tracking System and activate the questionnaire of the BSc programme involved. Each programme has composed a questionnaire with relevant questions. All questionnaires assess the marks for Mathematics and Sciences and the way the applicant orientated on the BSc programme. Applicants are also stimulated to seek information in the Digital Study Guide of the programme to be able to answer some questions. Some programmes add relevant statements for the applicants to check, other programmes add first year issues / sums to show exactly what to expect. After filling in the questionnaire the applicant gets an email with feedback. Some programmes give a (non-binding) advice: red, orange or green (traffic light). Some programmes invite applicants with orange or red advice to come to the faculty to do Matching activities or have a talk with a teacher, academic counsellor and/or student. Matching activities include a trial lecture with assessment, reflective questions and a talk.

TU Delft offers activities like (online) Trial Study, ‘Student for a day’, workshops, and Masterclasses for prospective students. These activities are meant to let them orientate on their future field of study. This orientation process is divided in several phases from exploring to making a decision.

5.2.2.1 SUCCESS RATE

Many other Dutch universities made a distinction between activities as describes above and activities related to the StudyChoiceCheck; mostly universities who made the StudyChoiceCheck compulsory. BSc programmes are

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free to offer activities related to the StudyChoiceCheck. The programmes who did, experience a heavy workload and a slightly positive effect on study success/decrease of failure in the freshmen year. This positive effect might be related to the SKC activities, but also to changes in the BSc curriculum or finance system for students.

Most BSc programmes experience that the predictive value of the secondary school marks for mathematics and physics are the most reliable indicators for study success, so that is the most important factor to base their advice on, together with the way and intensity of orientation on the university and the BSc programme. Another important factor for study success is motivation, but it is very hard to assess motivation, whether with a questionnaire or in a face-to-face talk. Prospective students that have already made their choice of BSc programme tend to not be willing to change their plans because of a negative or doubtful advice.

The TU Delft intends to evaluate the StudyChoiceCheck extensively. This is done by determining the impact of the StudyChoiceCheck on freshmen’s choice for a BSc programme, related to results. The StudyChoiceCheck is performed by and related to TU Delft’s Student Tracking System.

5.2.2.2 OUTREACH

Outreach activities towards secondary schools are partly organised and executed by the University corporate office: Open days, (online) Trial studies, Scholierenlab, Junior TU Delft, Math & Science Class and Last question day. These activities are described below. “Student for a day” programmes are organised by the BSc programmes and differ in shape and execution, from simply coupling a pupil to a student to trial lectures, assessments and presentations by academic counsellors, teachers and students. Moreover BSc programmes and individual teachers also organise outreach activities, some on an incidental base.

Open days and Last Question Day

For pupils in 4th and 5th grade of secondary school TU Delft organises exploring open days once a year. Pupils are able to visit all BSc programmes and get general information about studying at higher technical education. For pupils in 6th grade (final year) an in-depth open day is organised in October of their final year. Pupils can visit maximum two BSc programmes to get in-depth information. In March of their final year pupils are able to visit the “Last Question Day”, this year this event is held online. A team of so-called Student Ambassadors is online to answer all questions applicants might have.

Online trial studies

Some BSc programmes offer an online trial study programme of 3 weeks in which pupils get webinars and do assessments guided by a teacher and teaching assistants. Purpose of these programmes is to give pupils get in-depth knowledge of what to expect in the BSc programme. TU Delft is currently working on online trial programmes for all BSc studies.

Scholierenlab (“Pupil’s Lab”)”

Scholierenlab is an online community focused on supporting pupils when they do their final project at school (Dutch: ‘profielwerkstuk’). All pupils who are a member of the community can post their questions on the forum; six students moderate the forum and seek for the answers of the pupils. As it is an open community everybody can give an answer or a tip for a particular question. Since the Scholierenlab exists for 15 years, there is a huge database of questions and answers to consult as a knowledge base.

Junior TU Delft

Junior TU Delft is a pre-university talent programme for pupils in 5th grade. Schools select pupils who are enthusiastic and seek for more challenges and stimulate them to apply for the programme. In January the
programme runs for five Fridays in a row. The programme consists of four project blocks representing the domains of TU Delft: Science, Engineering and Design. In five weeks pupils work towards a final design, product, or solution for a particular problem. They get the theory and work with teachers and students on an academic level.

Math & Science Class

Another pre-university talent programme for smart pupils who are looking for more challenges is Math & Science Class. Its purpose is twofold: bridging the gap between mathematics at school level and academic level and introducing state of the art science research. Pupils come to TU Delft for 22 Friday afternoons. Two hours per day are spent on learning how to solve mathematical problems in an academic way; two hours are spent on a science lecture by professor or on designing and making a solar boat. Currently this programme is under construction to make it more sustainable and available to a broader group of pupils.

5.2.2.3 PRE-UNIVERSITY CALCULUS MOOC

TU Delft offers a free online Pre-University Calculus course through the edX platform. This mathematics course is part of the edX High School Initiative, which was launched in 2015 and consists of 26 free online courses (MOOC’s) covering a wide variety of subjects preparing participants for future education. TU Delft is the first and so far the only European university participating in this initiative.

Students following beta programmes at universities around the world often find the mathematics component in their degree programme challenging as the pace is higher than they are used to. This TU Delft course can help prospective students to get a better understanding of what the mathematics component in a Science programme looks like, discover the fun side of the subject, and optimally prepare themselves.

5.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

Austria and the TU Graz provide various initiatives concerning science, which also includes the transition from secondary to higher education. The next view sections provide excerpts of these programs.

5.3.1 SCHOOL CO-OPERATIONS

The TU Graz provides co-operations with various upper secondary schools through the province school board (deutsch: Landesschulrat, short LSR). Associates of the TU Graz give lectures on technical curriculum support at schools or help them on project-oriented teaching. Additionally educational consultants are invited to become acquainted with innovations in their discipline, to lighten the orientation to career and university studies for the pupils. The cooperation schools include: BRG Keplerstraße, BRG Körösistraße, BRG Petersgasse, BG/BRG Oeverseegasse, BG/BRG Seebachergasse, BG/BRG Carnerigass, BG/BRG/MG Dreihackengasse, G/WiKu RG Sacre Coeur, BG/BRG Lichtenfelsgasse and BORG Birkfeld (http://portal.tugraz.at/portal/page/portal/TU_Graz/Gleichstellung/schulkooperationen/).

5.3.2 CHILDREN’S UNIVERSITY

The transinstitutional university for children offer free participation in different activities to inspire the attending children and teenager between 8 and 19 years for the world of science.

Therefore, lecturer of the University of Graz, Medical University of Graz, University of Music and Performing Arts Graz, University of Teacher Education Styria, Catholic University College for Education Graz, CAMPUS 02
University of Applied Sciences, FH Joanneum University of Applied Sciences and the Graz University of Technology inspire the young audience and answer their curious questions.

The program is adapted to the needs of the children and teenagers; and provides a close look at the student's university life, since such events take place directly at the university or college. Additionally the lectures are combined with workshops, so that the students of the Children’s University get to know different perspectives and the opportunity to do the experiments themselves (http://www.kinderunigraz.at/).

5.3.3 WOMAN IN TECHNOLOGY

The Woman in Technology-program (deutsch: Frauen in die Technik, short FIT) informs female high school students about study opportunities at the Graz University of Technology and encourages them to technical and scientific studies to increase the career prospects. Through discussions with graduates, barriers for women in engineering should be eliminated and access to technology prior technical education institutions should be promoted (https://www.fit.tugraz.at/).

5.3.4 OPEN HOUSE DAY

On Open House the Day the University of Graz, the Medical University of Graz, the University of Music and Performing Arts Graz and the Graz University of Technology offer a comprehensive overview of the entire university courses. Free shuttle buses provide a rapid transfer between universities, were information tours are available for pupils, students, teachers and parents at the different institutes and lectures on individual studies are given. More information about the Open House Day is available at http://portal.tugraz.at/portal/page/portal/TU_Graz/Services/BDR/Oeffentlichkeitsarbeit/Tag_der_offenen_Tu er.

5.3.5 LONG NIGHT OF RESEARCH

The Long Night of Research is Austria's largest research event on science communication. Current projects, new knowledge and technologies are presented in innovative, understandable and entertaining way from the services of the local institutions are accessible to the general population and everything is admission free. Since 2005, the biennial event now listed with a growing program increased interest in all walks of life and ages (http://www.langenachtderforschung.at/index.php).

5.3.6 ENROLMENT COUNSELING OF THE STUDENTS' UNION

The Department of Academic Advising at the Students’ Union Graz University of Technology (HTU Graz) accompanies newcomers at the start of university life. The freshman counseling helps in overcoming bureaucratic hurdles, conflict management between students and the teaching staff. Additionally, a team of volunteer students offers comprehensive support in studying, study organization, housing and student finance. More information is available at https://htu.tugraz.at/deine-HTU/studienvertretungen and https://htu.tugraz.at/news/news/hilfe-beim-studienstart-HTU-erstsemestrigenberatung.

5.3.7 I-DAY FOR FOREIGN STUDENTS

The I-Day is an information day for foreign students, were all the presentations are held in english. The foreign students get informed about topics like insurance, work, residence permit and studies (http://foreignstudents.oehunigraz.at/iday/).
6 OVERVIEW OF EXISTING GUIDANCE IN THE TRANSITION FROM SECONDARY TO HIGHER EDUCATION / PROGRESSION GUIDANCE

6.1 KU LEUVEN / FACULTY OF ENGINEERING

This guidance during the bachelor consists of three pillars subject-related and learning process guidance, study-path guidance, and ombudsman service.

6.1.1 ORGANIZATION

The tables below show the organization of the progression guidance.

Table 1: Organisation of progression guidance. The colours indicate if the same service/people are providing the guidance. The absence of lines refers to the continuity in person guiding the student.

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<thead>
<tr>
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<th>Study-path guidance</th>
<th>subject-related learning guidance</th>
<th>process guidance</th>
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<td>3rd bachelor</td>
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<td>departmental ombuds</td>
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</table>

The study-path guidance for the first three semesters is organized by the Tutorial Services. More information on the Tutorial Services is available in appendix. During the last three semesters the study pathway guidance is organized by the program director of the major, ensuring expertise concerning the specific major.

The content-related and learning process guidance during the first year is organized by the Tutorial Services. For the remaining semesters, the didactic teams provide this guidance.

The tutorial service organizes the ombuds during the first two years of the bachelor. For the last year of the bachelor a departmental ombuds, related to the major of the student is responsible.

6.1.2 TUTORIAL SERVICES

The Tutorial Services of Engineering Science can only provide this service thanks to its highly qualified staff. The staff members all have a master diploma in Engineering Science or Science rendering them subject-experts. Furthermore, they have excellent coaching skills, such that they can provide the students with personalized coaching on top of the subject-related support. The Tutorial Services of Engineering Science is continuously aiming at optimizing its service and adapting to new trends in student counselling. To this end, they actively participate in conferences such as the European First Year Experience Conference (http://www.uib.no/en/efye_2015).

- Subject-related guidance on technical courses:
  - For each course a student counsellor helps the students with subject-specific questions. The student counsellor considers these questions as a possible starting point for supporting the
student’s skills (such as study methodology and study planning). A student can make an appointment with the student counsellor individually or with a few fellow students. These appointments are made through an online appointment system (https://mirw.kuleuven.be/emonitoraat/).

- The Tutorial Services organize on a regular basis StudySpace+. During StudySpace+ students can come to study in a designated classroom. At these times, the students can study individually or in small groups while student counsellors are present to answer questions. This way, student counselors are easy accessible.

- At key moments in the study process student counsellors organize group sessions that combine subject-specific information and information regarding study methodology and planning.

- On the electronic forum (vragentrommel, https://vragentrommel.mirw.kuleuven.be/question-overview) a student can ask (anonymously if desired) subject-related questions. Student counsellors and teaching assistants answer these questions. The questions and corresponding answers are visible to all students. Furthermore, a search engine allows efficient searching for previous questions and answers.

- **Study-path guidance:**
  - A study counsellor guides the students in defining the optimal study path. Students can make an appointment through the online appointment system at any time in the academic year (https://mirw.kuleuven.be/emonitoraat/).
  - The Tutorial Services of Engineering Science uses a path of feedback and guidance that cuts across the entire first year. (see appendix)

- **Ombudsman service:**
  - Students can consult the ombudsman with their non-study related issues that affect the studies (illness, disability, working student, sports, etc.). Students can make an appointment through the online registration system (https://mirw.kuleuven.be/emonitoraat/).

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**6.1.2.1 THE IMPLEMENTATION**

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### 6.1.2.2 THE PATH OF FEEDBACK AND COACHING

During the academic year 2014-2015 the Tutorial Services of Engineering Science developed a path of feedback and guidance for the students in the 1st year of the Bachelor of Engineering Science and Bachelor of Engineering Science: Architecture.

The 1st year of these bachelors has a large number of students (> 500) and busy schedules (up to 40 contact hours per week). This renders offering high quality feedback challenging. Nevertheless, there is much need for feedback, especially for starting students who are still discovering the challenges in the transition from secondary to higher education.

The developed feedback process is built around four key ideas:

1. Every student needs feedback to position him/herself in relation to the objectives of the bachelor (courses) and in relation to his/her fellow students.
2. Each student must be provided with information about the impact of his/her current position on his/her future study path.
3. The feedback must be easy accessible and understandable.
4. The feedback has to be tailored to the study process of the student and should be “just-in-time”, corresponding to the key moments in the study process (e.g. deadlines for reorienting).

The Tutorial Services of Engineering Science translates the above key ideas into a path of feedback and coaching that uses a synergy of group sessions and an individual approach. This synergy is essential for large groups of students with high demand for feedback. The details of this path are available online: [https://eng.kuleuven.be/studenten/studentenbegeleiding/feedback/](https://eng.kuleuven.be/studenten/studentenbegeleiding/feedback/).

### 6.1.2.3 PATH OF FEEDBACK: EXAMPLE

To concretise the key ideas of the path of feedback, they are illustrated below based on of the concrete initiatives “feedback evening for Math for Problem Solving (MPS)".
**Background:** MPS is a first semester course and aims at strengthening the mathematical basic knowledge and its application in technical and scientific problems. Students that succeed the positioning test get an exemption for MPS. MPS can be seen as a “remediation course”. The examination already takes place in the fifth week (first half of the 1st semester).

**Feedback evening:** The students receive their grade and feedback during a feedback evening. The session is organized before the deadline for reorientation deadline of 15/11 (just-in-time principle). The feedback evening consists of:

**Plenary feedback session:** During the first part, the teacher gives feedback according to the content of the examination (e.g. commonly made errors) and the global exam statistics. During the second part, the tutorial services frames the results by giving results regarding the expected impact of the result on the study path by using Sankey flow diagrams that give a clear graphical representation of the study pathway (Figure 11 and Figure 12) of former student with similar results. These flow diagrams are complemented with additional information and interpretation. At the end of the feedback session, each student receives an individualized feedback form (Figure 13 and Figure 14) with their results, framing of the result and information regarding future appointments and possible reorientation.

**Feedback fair:** During the feedback fair, immediately after the feedback session, the student can look into his/her own exam copy and discuss with the teacher. Additionally, the Study Advise Service and the Faculty of Engineering Technology are present to answer questions regarding reorientation in an easy accessible manner.

**Individual appointments after feedback evening:** The study counsellors offer sufficient time slots immediately after the feedback session for individual appointments with students.
Figure 11: Flow diagram of study pathway of generation students of 2013-2014 that passed the course Mathematics for Problem Solving (WPO) the year before. (Figure 14 shows an example of an interpretation).

Figure 12: Flow diagram of study pathway of generation students of 2013-2014 that did not pass the course Mathematics for Problem Solving (WPO) the year before. (Figure 14 shows an example of an interpretation).
Naam: "Voornaam" «Naam» | Studentennummer: «Studnr»

Resultaat OLA Wiskunde voor Probleemoplossen (H03Y7a): «H03Y7a»/20

- Deelpunten open vragen: «openvragen»/10
- Deelpunten meerkeuzevragen: «meerkeuze»/10

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Info ECTS fiche

In het geval de student voor ieder OLA een resultaat van 8 of meer op 20 behaalt, wordt het eindresultaat berekend aan de hand van het gewogen gemiddelde (weging op basis van de studiepunten van de OLAs) van de deelresultaten. In het geval de student op één ola lager scoort dan 8 op 20, wordt voor het eindresultaat het gewogen gemiddelde (weging op basis van de studiepunten van de OLAs) van de deelresultaten genomen met een MAXIMUM VAN 7/20.

Als het resultaat van één OLA hoger is dan 10/20 wordt het punt automatisch overgedragen naar de derde examenperiode, tenzij de student zelf aangeeft dat hij/zij wil herkansen. In dit laatste geval is een lagere score mogelijk.

Infobeurs

Je bent jammer genoeg niet geslaagd voor Wiskunde voor Probleemoplossen.


Veel succes!

Dienst Studentenbegeleiding Faculteit Ingenieurswetenschappen

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Figure 13: First page of the individualised feedback form each student receives at the end of the plenary feedback session. It contains information on the grade, the position with respect to fellow students, and the information on the course (ECTS-file) and more detailed information on the feedback fair and other occasions for a meeting with study advisors.
Stroomdiagram studenten vorig jaar:
Het onderstaande stroomdiagram toont de studentenstroom voor generatiestudenten die vorig academiejaar niet geslaagd waren voor het OLA Wiskunde voor Probleemoplossen (WPO) tot na de september-examens.

Studentenstroom Bachelor Ir KU Leuven - generatiestudenten 2013-2014

Uit dit stroomdiagram blijkt het volgende:

- Maar 1 van de 77 studenten (bovenste stroom na juni) die vorig academiejaar niet geslaagd waren op WPO behaalde goede resultaten op de juni-examens. Deze student zit op traject om zijn/haar bachelor zonder studievertraging te behalen (Een analyse van de voorbije jaren leert dat 97% van de studenten in deze situatie de bachelor behaalt in de beoogde drie jaar.)
- 22% van de studenten (tweede stroom na juni) die vorig academiejaar niet geslaagd waren op WPO behaalt een beperkt aantal onvoldoendes in juni. 71% van deze studenten slaagt erin om dit in september goed te maken en heeft op deze manier uitzicht op het behalen van het bachelor diploma zonder studievertraging.
- 60% van de studenten (derde stroom na juni) die vorig academiejaar niet geslaagd waren op WPO doen het niet goed op de juni-examens. Slechts 13% van deze studenten slaagt erin om dit in september enigszins goed te maken. Deze studenten kunnen hun bachelor behalen met een beperkte studievertraging. De overige 87% zal waarschijnlijk het bachelor diploma niet behalen of een aanzienlijke studievertraging oplopen.
- 17% van de studenten (onderste stroom na juni) beslist tijdens het eerste academiejaar om te heroriënteren.

De bovenstaande cijfers zijn natuurlijk enkel geldig voor de studenten van vorig jaar, we moeten daarom voorzichtig zijn met besluiten. Toch willen we een duidelijke boodschap geven. Overdenk het traject dat je hebt afgelegd, zet de positieve punten verder door naar de rest van het academiejaar en zoek ondersteuning voor punten die je moet verbeteren. Bekijk je toekomst rekening houdend met bovenstaande cijfers en analyseer of het halen van een bachelor diploma burgerlijk ingenieur een haalbare doelstelling is. Als je bij het overdenken van je traject of het zoeken naar ondersteuning een gesprekspartner zoekt of gewoon vakhoudelijke vragen wil stellen: de Dienst Studentenbegeleiding staat voor je klaar!

Figure 14: Second page of individualised feedback form that each student receives at the end of the plenary feedback sessions. It contains a graphical representation and interpretation of the study pathway of student in previous years that were in a similar situation as the student receiving the form (in this case: did not pass the exam “Mathematics for Problem Solving”). Last, the form elaborates on the information provided and tries to give the student a clear message.
6.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)

6.2.1 ORGANIZATION

Student and academic counselling during the first phase of the programme has two dimensions at TU Delft. All Bsc programmes have their own way of supporting students and the University Corporate Office gives guidance and support offered by Career & Counselling Services.

Guidance and support differs from faculty to faculty and from BSc programme to BSc programme. Some programmes have a tutor system where freshmen are paired with senior (second and third year) students to get guidance and support. Other programmes have a mentoring system where freshmen are supported by (student)mentors. The student counsellors at the faculties might invite students some weeks after the start of the academic year to see if they ‘landed’ well; other faculties leave it to the students (if you encounter problems, you know how to find me).

The central department of Career and Counselling Services offers workshops, masterclasses, walk-in hours and help in case of emergency or crisis. Subjects include study skills, personal skills, intercultural skills and skills and support to start a career in Engineering.

6.2.2 ACADEMIC AND CAREER COUNSELLING

TU Delft aims to give students support (for up to a year after unenrolment) in a range of different issues that students may encounter as a student (or a PhD candidate). For this reason, students have a number of different services available to them, both within and outside the faculty.

6.2.2.1 WITHIN THE FACULTY

Within the faculty, students can enlist the services of academic counsellors, internship coordinators and international exchange coordinators:

Academic counsellors

Every study programme at TU Delft has one or more academic counsellors. Students can contact the academic counsellor with questions about degree programmes and everything related to it. Academic counsellors are available to students at all TU faculties. They are involved with everything that has to do with students’ living and academic conditions. Students are always permitted to consult student counsellors, especially when they have encountered problems. The student counsellors can be consulted for:

- Information about the degree course, the educational program and the regulations applying to the degree course.
- Help with academic planning, for instance in cases of a delay in studies.
- Choosing an academic program (subjects).
- Exemption from exams and exam disciplines.
- Transfer from a polytechnic to the university.
- Help with applications for financial support under the Graduation Assistance Regulations or from other TU Delft funds.
- Registering delays in studies, and help with withdrawal and possible refunds in case special circumstances beyond the student’s control.

Source: http://studenten.tudelft.nl/en/students/academic-and-career-counselling/
• Advice on discontinuing one’s studies, also for students who wish to leave TU Delft and continue their studies elsewhere.
• Advice on transfers, that is when transferring from degree courses within TU Delft.
• Referral to a student psychologist, a central student counsellor or the TU Delft Career Centre.

Internship coordinators

Some faculties have several internship coordinators, depending on the type of internship location (company, research institute) or country (the Netherlands or abroad). The availability of an internship coordinator varies per individual faculty.

International exchange coordinator

The international exchange coordinator offers advice and support to students that are interested in, or want to study abroad.

6.2.2.2 OUTSIDE THE FACULTY: CAREER & COUNSELLING SERVICES

Outside the faculty, TU Delft students can contact Career & Counselling Services (C&CS). C&CS includes all the services offered by the TU Delft Career Centre, the Psychologists and the Central Student Counsellors. They also offer workshops and training courses, and can put students in touch with a so-called “study buddy”.

Career & Counselling Services (C&CS) supports prospective students right from taking the StudyChoiceCheck and BSc- and MSc students, as well as PhD students in the development of personal, study related or career skills. A team of experienced and expert psychologists, central student counsellors and programme choice and careers counsellors advise students and help them find the best type of support to suit their needs.

Career & Counselling Services has a vast array of (mostly free) workshops and personal coaching or counselling options for students that want to improve their study skills, need to deal with personal issues, want advice on their choice of programme and / or are looking for career support.

Examples programs that C&CS offers are: Constructive thinking for fear of failing / perfectionism; Mindful stress relief; Time-management for Master students; Finding a job in the Netherlands; and How to pick the right Master course. TU Delft also provides special facilities that make it possible to combine top-level sporting activities with studying for a degree.

6.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

This guidance during the bachelor is divided into TU Graz own initiatives and programs of the Students' Union Graz University of Technology (HTU Graz). The TU Graz organizes the Welcome Days and offers an ombudsman service at the level of the University as well as on national level. The HTU provides a tutorial for first semester students and the student council.

6.3.1 WELCOME DAYS

In cooperation with alumniTUGraz 1887, Graz University of Technology organizes the initiative of the Welcome Days every year to promote study, research, and teaching. The freshmen receive the most important information for a successful start of the study at the TU Graz as well as an insight into the working world of engineers. In addition to the welcome by the rector and other representatives of the university, students gain access to information about:
• student service,
• the study abroad,
• about library services and general IT services,
• to the TUGRAZonline and the e-learning platform TeachCenter,
• on social issues such as scholarships and grants,
• and several other services of the TU Graz.


### 6.3.2 OMBUDSMAN SERVICE

The ombudsman service is available for all students of the TU Graz. It offers unprejudiced acceptance of criticism, complaints and suggestions from students with problems in the study, teaching or testing operation. In the next step, the service evaluates these complaints, tries to clarify them with the responsible authority or person and searches together for an acceptable solution. If a problem is not solvable at an institutional level, the Ombudsman Service acts as a mediator between the involved parties. Furthermore, the Ombudsman Service supports measures to correct or fix inadequacies and system deficiencies. On request, all requests are treated strictly confidentially ([http://portal.tugraz.at/portal/page/portal/TU_Graz/Services/ombudsstelleStud](http://portal.tugraz.at/portal/page/portal/TU_Graz/Services/ombudsstelleStud)).

### 6.3.3 FRESHMAN TUTORIAL

The Department of Academic Advising at the Students’ Union Graz University of Technology (HTU Graz) accompanies newcomers at the start of university life. Students of different disciplines offer advice about studying, study organization, housing and student finance ([https://htu.tugraz.at/news/news/hilfe-beim-studienstart-HTU-erstsemestrigenberatung](https://htu.tugraz.at/news/news/hilfe-beim-studienstart-HTU-erstsemestrigenberatung)).

### 6.3.4 OFFICE FOR STUDENT AFFAIRS

The Office of Student Affairs takes care of matters concerning all areas of curricular activities and aids every student on his or her individual path of study by continually rethinking and improving course organization as well as offering personal counselling. The freshman counselling helps in overcoming bureaucratic hurdles, conflict management between students and the teaching staff. The Office of Student Affairs answers questions about new requirements for a specific field of study and course credit transfers. It represents the student body when it comes to decision making. Every two years, students will have the opportunity to directly elect the student representatives at the Austrian National Union of Students ([https://htu.tugraz.at/deine-HTU/studienvertretungen](https://htu.tugraz.at/deine-HTU/studienvertretungen)).

The Office for Student Affairs offers advices and events in the following areas:

- Information about social support for living and working as a student, both nation-wide benefits and local ones focussing on Graz and Styria. Specific topics are studying with an infant/child, handicapped students and public financial aids.
- University/study law: In case of questions concerning rights and responsibilities concerning the study of a student, e.g. examinations, grading, etc.
- The Student Advisory Counselling helps starting and changing your university degree, either general information or for a specific field.
- Equal opportunities: It helps inadequately treated students, e.g. due to gender, origin or sexual orientation.
• Incoming students: The Erasmus Student network is a part of HTU Graz and as such organizes events and provides knowledge for students that are at TU Graz for a semester or two.
• Financial Assistance via HTU Graz

More information about the Office of Student Affairs and its services is available at https://htu.tugraz.at/deine-htu/en-services-overview.

6.3.5 MENTORING WITHIN THE ICE

In the Information and Computer Engineering (ICE) Master studies all students have to choose a professionally competent mentor. The mentor will accompany and advise the student in the creation and design of the individual study, in particular the meaningful choice of courses. The working group of study commission of the ICE creates the list of available mentors and publishes it on the website of the appropriate deanery. Students can apply for a change of mentor or mentor in charge of Legal Affairs study organ without giving reasons (http://ice.tugraz.at/img/ICE_Masterstudium_2015.pdf).
This section provides an overview of the existing learning analytics applications inside the institute. The focus is on higher education. If there is wider experience, this can be added.

The existing learning analytics applications are positioned according to the six key dimension of learning analytics (Drachsler & Greller, 2012). Furthermore, within the six key dimensions we emphasize the different level of applications: microlevel (individual learners and teachers, as well as learning communities around courses), mesolevel (school, university, training department) or the macrolevel (society at large). Another key aspect highlighted is the focus on visualisation (empower, reflection, self-knowledge, idea of “personal informatics” and “quantified self”) versus predictive models and automated decisions. Finally, the learning analytics process model (Verbert, Duval, Klerkx, Govaerts, & Santos, 2013) is employed to refer to the different dimensions of awareness, self-reflection, sensemaking, and impact.

7.1 KU LEUVEN

7.1.1 ACADEMIC ANALYTICS

KU Leuven has a well-established data warehouse for academic analytics. On the one hand, some parts of the data warehouse are disclosed to selected staff in the faculty. As such, these people can look, through some pre-defined but adaptable reports, to the data of students inside the faculty. The data is accessible up to the individual student level. On the other hand, standard reports are collected in the so-called “Education dashboard”, “Educational indicators”, and “Educational overviews” are available. These reports are at the institutional level, group-level, faculty level, and course level. But don’t contain information on individual students.

7.1.1.1 STAKEHOLDERS

Data subjects: students of particular university programmes (over 55.000 students)

Data clients: faculty staff, both administrative and educational. Mainly used by vice-deans, program-directors, etc. In some cases, as in the faculty of Engineering Science, the data is also used by study counsellors to support data-based advising.

7.1.1.2 OBJECTIVE

Information and reflection: The main goal is to provide information and trigger reflection on the overall programmes and evolutions over time (awareness and self-reflection).

Level: While the data warehouse allows both to get data from individuals (micro) and from group of learners (meso: students with similar characteristics, faculty, university-wide), the main use is at the meso-level.

7.1.1.3 DATA

Self-reported (y/n): no

Open/protected: the data is protected on concerns both information on student prior education, student subscriptions, all course grades, study efficiency, etc.

Relevant indicators: student prior education, student subscriptions, course grades, study efficiency, etc.
Timescale: all data starting from the academic year of 2009-2010.

7.1.1.4 INSTRUMENTS

Pedagogic theory: no underlying pedagogic theory.

Technology: business intelligence technology with a data warehouse

Hardware: desktop

Presentation: the basis reports contain excel-like lists of students with their data, many reports are supplemented with graphical representations (mainly bar-charts or pie-chars) to show for instance the evolution of drop-out over the years.

Algorithms: no algorithms are used, limited to data visualisation.

7.1.1.5 EXTERNAL CONSTRAINTS

Privacy: when subscribing to the university students agree that this academic data is stored and can be used for educational and research purpose.

Ethics: Misuse of the data is possible. When the data is used to for instance identify at-risk students, or to provide foundation for student counselling, careful consideration is necessary.

Norms: Only a selected set of people has access to the data. When using the data the specific guidelines and procedures of KU Leuven have to be respected. (https://admin.kuleuven.be/rd/privacy/en/privacy). The procedure includes main steps such as Notification requirement, Alerting the persons concerned, Drafting a safety plan, Extra protection for processing of special data, and Synching data from different databases.

Time scale: The data is by nature always post-hoc. However, the data could be used for applications such as predicting student success.

7.1.1.6 INTERNAL LIMITATIONS

Required competences for the data clients are interpretation and critical thinking. People having access to the data warehouse are trained to interpret the data.

7.1.1.7 STATUS

Embedded in university practices and systems.

7.1.1.8 EVALUATION

Not to our knowledge.

7.1.2 SUPPORTING LEARNING BY CONSIDERING EMOTIONS

The goal was to explore the possibility of obtaining students’ feedback about the emotions they feel in class in order to discover potential emotion patterns that might indicate learning fails.

7.1.2.1 STAKEHOLDERS
Data subjects: students in particular course (typically 15)
Data clients: students and teacher

7.1.2.2 OBJECTIVE

Information and reflection: The main goal is twofold:

- Students: provide information and trigger reflection on emotions in class
- Teacher: provide feedback on emotions feel in class, trigger reflection

Therefore, the application mainly focuses on awareness and self-reflection.

Level: micro-level, limited to single course.

7.1.2.3 DATA

Self-reported (y/n): self-reported emotions

Relevant indicators: emotions grouped in positive and negative emotions

Timescale: 2 months

7.1.2.4 INSTRUMENTS

Pedagogic theory: based on achievement emotions (Arroyo et al., 2009; Ekman & Friesen, 1982; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011)

Technology: included in PresenceClick dashboard (Ruiz, Urretavizcaya, & Fernández-Castro, 2013)

Hardware: web (desktop)

Presentation: different visualizations of emotions were compared (bubble charts, stacked bars, boxplot charts, emoticons)

Algorithms: no algorithms are used, limited to data visualisation.

7.1.2.5 EXTERNAL CONSTRAINTS

Privacy: not explicitly tackled, student can see his own data and compare to group

Ethics: not explicitly tackled

Norms: not explicitly tackled.

Time scale: The data is by nature always post-hoc. However, the data could be used for applications such as predicting student success.

7.1.2.6 INTERNAL LIMITATIONS

Required competences for the data clients are interpretation and critical thinking.
7.1.2.7 STATUS

Temporary experiment in specific course (optional subject about Multimedia in Computer Science Faculty of University of Leuven). 15 students, one teacher and one observer were involved. No longer active. The process lasted two months. More information in (Ruiz, Charleer, Fernández-castro, & Duval, 2016).

7.1.3 DASHBOARD FOR LIVE FEEDBACK SESSIONS SUPPORT

7.1.3.1 STAKEHOLDERS

**Data subjects**: students in particular course (typically 15-30)

**Data clients**: teacher

7.1.3.2 OBJECTIVE

**Information and reflection**: The main goal is twofold:

- Student: provide information and trigger reflection on feedback in class
- Teacher: provide insight in student traces, provide awareness on feedback so that supportive role is improved

**Level**: micro-level, limited to single courses.

7.1.3.3 DATA

**Self-reported (y/n)**: n

**Relevant indicators**: amount of feedback (measured by a teaching assistant using a wizard-of-oz approach: the teaching assistant manually indicates the activities of the participants).

**Data used**:

- Amount of feedback
- Quality of feedback (through peer-assessment/teacher assessment)

**Timescale**: the activity during a specific live feedback sessions

7.1.3.4 INSTRUMENTS

**Pedagogic theory**: balance of learners’ involvement in collaborative learning settings is important as over- and under-participation can reduce motivation and lower learning outcomes (Salomon & Globerson, 1989).

**Technology**: The dashboard is a web application developed using HTML5, Javascript, processing.js and crossfilter.js. The backend is created with Node.js and MongoDB.

**Hardware**:

- large display (large TV or large projection on the wall)

**Presentation**: different visualizations were compared. The focus is therefore entirely on visualisation.
Algorithms: no algorithms are used, limited to data visualisation.

7.1.3.5 EXTERNAL CONSTRAINTS

Privacy: not explicitly tackled, students and teacher can see the available data.

Ethics: not explicitly tackled

Norms: not explicitly tackled.

Time scale: two classroom sessions

7.1.3.6 INTERNAL LIMITATIONS

Required competences for the data clients are interpretation and critical thinking.

7.1.3.7 EVALUATION

The evaluation was focused on the graphical designs of the data visualizations and on the effect on participation. Therefore, the application mainly focuses on awareness and self-reflection.

7.1.3.8 STATUS

Temporary experiment in specific course. 15 students, one teacher and one observer were involved. No longer active. More information

7.1.4 LEARNING ANALYTICS REFLECTION & AWARENESS ENVIRONMENT

LARAn (Learning Analytics Reflection & Awareness environment) consists of multiple dashboards exploring different ways of presenting learning traces to both teacher and student. These learner traces consist of Twitter and blog posts/comments, as a reporting tool. Using badges as the main progress visualisation technique, both personal and group dashboards have been deployed for students to stay aware of their progress regarding course goals. A teacher-oriented version visualises details of progress over time, provides an overview of the entire class progression, and lets teachers compare (groups of) students. Another approach is an RSS client augmented with learning analytics data: as a student and/or teacher, RSS readers provide an easy way to keep track of activities across multiple blog posts. By adding visual information regarding age of posts, activity on posts and social interactions between student groups, students can easily identify interesting topics and plan their peer review work, while teachers can keep track of both teacher and student activities, and intervene when necessary.

7.1.4.1 STAKEHOLDERS

Data subjects: students in particular course (typically 20-30)

Data clients: student and teacher

7.1.4.2 OBJECTIVE

Information and reflection: The main goal is twofold:
• Student: provide information and trigger reflection on learning traces in a specific course
• Teacher: provide insight in student traces, provide awareness on feedback so that supportive role is improved

**Level:** micro-level, limited to single courses.

### 7.1.4.3 DATA

**Self-reported (y/n):** n

**Relevant indicators:** blog posts, comments on blog posts, twitter posts

**Data used:**

- Blog posts, comments, and twitter

**Timescale:** the activity during a specific course

### 7.1.4.4 INSTRUMENTS

**Pedagogic theory:** community of practice

**Technology:** LAR Ae dashboards are web applications developed using HTML5, JavaScript, D3.js running on a Node.js web service and MongoDB database

**Hardware:** large displays, desktop computers, interactive tabletops, and tablets

**Presentation:** dedicated visualisation allowing overview of the data, while still providing access to detailed context and content.

**Algorithms:** no algorithms are used, limited to data visualisation.

### 7.1.4.5 EXTERNAL CONSTRAINTS

**Privacy:** not explicitly tackled, students and teacher can see the available data.

**Ethics:** not explicitly tackled

**Norms:** not explicitly tackled.

**Time scale:** specific course, one semester

### 7.1.4.6 INTERNAL LIMITATIONS

Required competences for the data clients are **interpretation and critical thinking.**

### 7.1.4.7 EVALUATION

The evaluation was focussed on improving the designs, evaluating the use of badges for motivation, and general usefulness and acceptance of the dashboards by students and teachers. Therefore, the application mainly focuses on awareness and self-reflection.
7.1.4.8 STATUS

Temporary experiment in specific course involving 38 students. No longer active.

More information: (Charleer, Santos, Klerkx, & Duval, 2014) and http://wespot.github.io/wespot_learningdashboard/.

7.2 DELFT UNIVERSITY OF TECHNOLOGY (TU DELFT)\(^{10}\)

7.2.1 MAIS PROJECT AND LEARNING ANALYTICS PILOT

By using the MAIS project, the TU Delfts want to make use of Measuring, Analysing, Informing, and Steering (MAIS), to investigate whether study results can be improved by tackling students’ procrastination by using the Blackboard Retention Center. The Blackboard Retention Center (RC) aids the instructor in monitoring the progress of the students. By setting a number of criteria, the instructor can generate an overview of students who are lagging behind. The instructor can then opt to warn those students in a simple way. With the help of a number of scenarios, TU Delft can investigate with which types of courses and with which boundary conditions the RC can be used to improve communication between instructors and students about progress, and reduce procrastination.

TU Delft’s Learning Analytics Pilot helps instructors find out how active their students are in the instructor’s Blackboard course. This way, instructors are more involved in the progress students make in their course. This does require instructors to a Blackboard course that is suitable for measuring progress. This requires weekly content updates, regular assignments, and/or tests. In this pilot instructors are asked to perform a progress-check a number of times, and send warnings to students who appear to be lagging behind (done by using the RC). A final meeting is then organised to evaluate the project.

7.2.1.1 STAKEHOLDERS

**Data subjects**: students in a Blackboard course

**Data clients**: instructors of a Blackboard course

7.2.1.2 OBJECTIVE

**Information and reflection**: TU Delft’s Learning Analytics Pilot helps instructors find out how active their students are in the instructor’s Blackboard course. The main goal is to provide information and trigger reflection on the progress students make in the course. (awareness and self-reflection).

**Level**: micro-level, the focus is on single courses.

7.2.1.3 DATA

**Self-reported (y/n)**: no

**Open/protected**: on account of student privacy with regards to their activity within a Blackboard course, the data is protected.

**Relevant indicators**: student activity within a Blackboard course.

Timescale: the data collected in a single Blackboard course run (typically one academic year or less).

7.2.1.4 INSTRUMENTS


Technology: business intelligence technology of the Blackboard Learn Learning Management System

Hardware: desktop

Presentation: information and analysis are presented through the Retention Centre, which the course instructor can access through the course’s Blackboard page

Algorithms: no algorithms are used in the Early Warning System; its focus is on data visualisation.

Limitation: not all courses are suited for the EWS; the Early Warning System requires a Blackboard course that is suitable for measuring progress (i.e. contains weekly content, assignments, and/or regular tests).

7.2.1.5 EXTERNAL CONSTRAINTS

Privacy: student privacy is protected under the Personal Data Protection Act (“Wet Bescherming Persoonsgegevens”, WBP). Under the PDPA, student Blackboard activity data can only be used to support their educational processes (i.e. ‘for educational purposes’).

Ethics: students that lag behind are personally approached by the instructor on an individual basis. Instructors receive guidance on how to act in these situations. The Early Warning System is only used to identify students that are lagging behind. The activity data is explicitly not used for any other purposes.

Time scale: the pilot only ran for TU Delft Blackboard courses in the 4th Quarter of the 2012-2013 study year.

7.2.1.6 INTERNAL LIMITATIONS

Required competences for the data clients are interpretation and critical thinking. Instructors are trained to interpret to set the relevant criteria to identify at-risk students, to interpret the data, and to use the early warning system.

7.2.1.7 STATUS

Embedded in university practices and systems.

7.2.1.8 EVALUATION

No explicit evaluation available.

7.3 GRAZ UNIVERSITY OF TECHNOLOGY (TU GRAZ)

Currently there is no existing learning analytics application at the TU Graz.
8 BIBLIOGRAPHY


Drachsler, H., & Greller, W. (2012). The pulse of learning analytics understandings and expectations from the stakeholders, (May), 120. doi:10.1145/2330601.2330634


