



## **International Exchange in Higher Engineering Education - a Representative Survey on International Mobility of Engineering Students**

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## **1 Introduction**

Nowadays, intercultural competences and social skills are inevitable for a successful engineering career because they play a significant role in professional profiles of engineers and will do so even more in the future. Those competences can only be gathered through international exchange. Due to the progressing globalization companies do no longer operate only on local but on global markets. Thus, especially engineering should not be limited by national borders. Therefore students have to be prepared to face the challenges connected with globalized markets.<sup>1</sup>

Nevertheless, the number of students in engineering science who leave Germany to another country for the purpose of study or traineeship (referred to as “outbound mobility”<sup>2-4</sup>) is distinctly below average compared to other disciplines.<sup>5</sup> Statistics show that the goals of the Bologna Reform, whose key aim was the unification of European higher education to boost international mobility by establishing a common credit transfer system, were not obtained satisfactorily.<sup>2</sup> The reform focused on structural changes to increase student mobility throughout Europe as a central goal. On the Ministerial Conference 2009 in Leuven and Louvain-la-Neuve the European Ministers of Education and Research set the aim that until 2020 20% of European students should have lived and worked abroad.<sup>6,7</sup> On the Bologna conferences in Budapest and Vienna in 2010 it became clear that this goal will not be accomplished.<sup>8,9</sup>

Especially engineering students tend to be less mobile as several studies indicate<sup>2,10,11</sup>. In order to take a deeper look at the motivational factors and obstacles engineering students face when planning international exchange periods, a survey was carried out among approx. 33,000 students at Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University in November 2012.

The survey was performed by the institute cluster IMA/ZLW & IfU – Institute of Information Management in Mechanical Engineering (IMA), Center for Learning and Knowledge Management (ZLW), Associated Institute for Management Cybernetics e.V. (IfU) in cooperation with RWTH’s International Office. Its aim was to investigate motivational factors and obstacles students face in different planning and realization stages of a foreign exchange. The anonymous and wide ranging survey covers topics such as financial issues, the recognition of credits, and career advice services among other personal factors influencing a decision on international exchange.

The present paper introduces current studies related to the topic of international mobility of engineering students, and describes the method as well as the results of the RWTH survey and puts them into relation to major studies representing the current state of the art in the research

on international student mobility: the study on international mobility and study-related exchanges of German students carried out by Heublein and Hutzsch<sup>5</sup> of Hochschulinformations GmbH (HIS) in 2009 and 2011, the annual report “Wissenschaft weltoffen” performed by the German Academic Exchange Service (DAAD)<sup>2</sup>, and the 19<sup>th</sup> Social Survey of the Deutsches Studentenwerk (German National Association for Student Affairs) on the economic and social conditions of student life in Germany in 2009.<sup>11</sup>

## 2 Current studies on international mobility of engineering students

Several studies take a deeper look at outbound mobility of German students. According to data from the German Academic Exchange Service (DAAD) and the Higher Education Information System Institute (HIS)<sup>12</sup> as well as the German Federal Statistical Office<sup>13</sup> 64 out of 1,000 students from German higher education institutions pursued a study-related exchange in 2010. These numbers include those students who reside abroad on a temporary basis as well as those who work towards a degree from a foreign higher education institution. Compared to the mobility numbers of the past decade, an increase in outbound mobile students can be observed as is shown in the following figure.

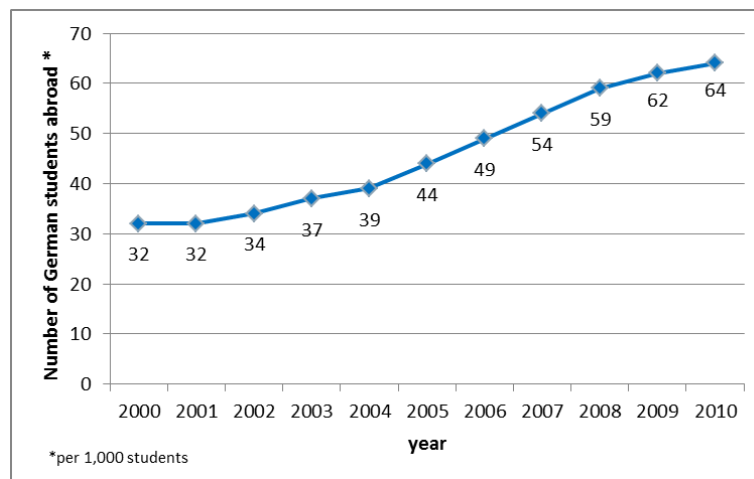


Figure 1: Development of mobility rate of German students from 2000-2010, per 1,000 students<sup>13</sup>

When looking at mobility rates for different subject groups, data are available for example from the European exchange program ERASMUS, as shown in Figure 2.

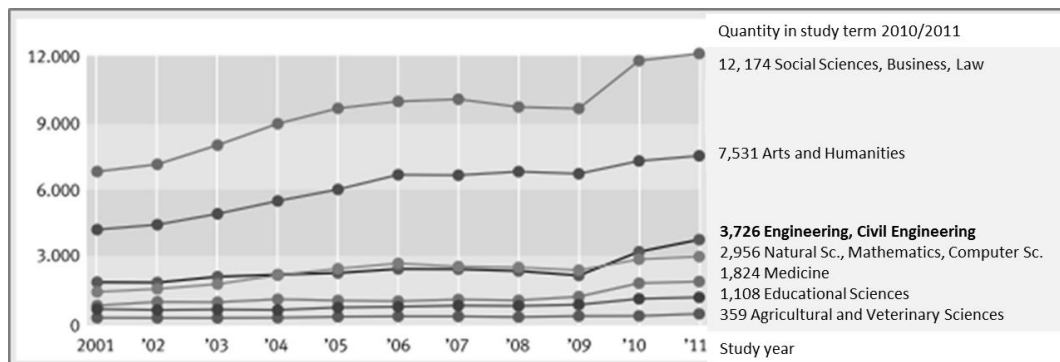


Figure 2: German ERASMUS students by subject group<sup>12</sup>

Out of 30,274 German ERASMUS exchange students, approx. 40% (12,174) came from the social sciences, business and economy, or law, approx. 25% (7, 531) from the humanities and liberal arts, approx. 12% (3,726) from engineering sciences and approx. 9% (2,956) from natural sciences, mathematics and computer science in the study term 2010/2011<sup>12</sup>.

Apparently, students from the subject groups of science, technology, engineering and mathematics (STEM fields) lag behind their counterparts from other subjects in terms of study-related international mobility. Certainly, the data presented here might be biased due to the mere focus only on one single program, the ERASMUS program. It may be the case that the program itself mainly attracts students from other subjects than the STEM fields through its funding scheme or program design. EU official statistics show that approx. 60% of ERASMUS funded students in 2010 and 2011 were women<sup>14</sup>. As in Germany the majority of students in STEM fields are male, they might participate in ERASMUS exchange to a fewer degree and thus do not appear in the official statistics which results in generally lower exchange numbers for students in STEM fields.

Nevertheless, other studies such as the 19<sup>th</sup> Social Survey of the Deutsches Studentenwerk (German National Association for Student Affairs) on the economic and social conditions of student life in Germany in 2009<sup>11</sup> or the study of Heublein and Hutzsch<sup>5</sup> show similar results and tendencies.

Even though the mobility rates among students from STEM fields are comparatively low, their development over the last years is steeper than in other disciplines as Table 1 shows.

*Table 1: Rate of mobile students, by discipline in %<sup>11</sup>*

Disciplines	Year					
	1994	1997	2000	2003	2006	2009
Engineering science	2	3	4	4	3	4
Language and cultural studies	12	12	13	12	12	12
Maths/ natural science	4	5	4	5	5	5
Medicine/ health	4	5	5	7	6	5
Law and business studies	5	8	9	8	9	11
Social/ education science, psychology	2	4	4	5	6	8

Since 1994 mobility rates among students of language and cultural studies stayed constantly at a high level (1994: 12%, 2000: 13%, 2009: 12%) whereas students in engineering science became a lot more mobile over the same timespan where mobility rates nearly doubled between 1994 (2%) and 2009 (4%).<sup>11</sup>

Heublein and Hutzsch<sup>5</sup> also discovered differences in mobility levels according to degree programs as Figure 3 shows.

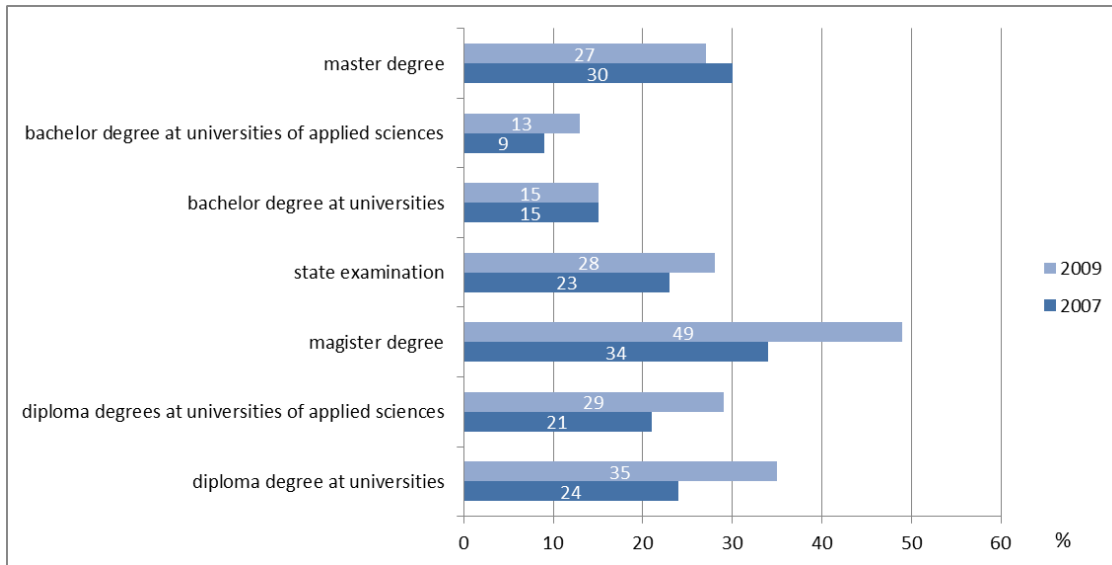


Figure 3: Study-related international exchange periods of German students according to degree program, in %<sup>5</sup>

Students enrolled in the traditional German degree programs that were in place before the Bologna Reform such as the magister and diploma degrees show a higher mobility rate than bachelor students. They argue that this is mostly due to the higher average age and number of study semesters as well as the lacking enrollment of new students in the traditional programs. Those numbers suggest that new degree programs seem to hamper international mobility.

Just a few studies dwell on the motivational factors and obstacles students face when planning and accomplishing international exchange phases. According to numbers from DAAD<sup>2</sup>, HIS<sup>5</sup> and the Ministry of Innovation, Science and Research of the German state of North-Rhine Westphalia<sup>15</sup> the following obstacles are often reported:

- problems in the recognition process of credits accomplished abroad,
- time lost in the overall course of studies,
- problems with harmonizing the international exchange phase with the study requirements of the home institution, and
- financial problems.

As already Heublein et al.<sup>16</sup> argue further studies on student motivation for international exchange hardly exist. Therefore, the present survey focuses the motivational factors and obstacles for international exchange periods at RWTH Aachen University in further detail.

### 3 Method

The survey was carried out as an online questionnaire in order to reach as many students as possible and was distributed among 33,003 students that gained their higher education entrance qualification at a German school in Germany or abroad (so called ‘Bildungsinländer students’). The sample accounts to N=3,218 completely answered questionnaires which results in a return rate of 9.75%. It was distributed over a period of four weeks from

November 5-30, 2012 using email notification and an email reminder once after the first two weeks in order to remind students to participate.

The sample was divided through filter questions into five parts in order to provide students in different planning or realization stages of their exchange periods with tailored questions.

- part 1: students who were abroad and were back in Germany at the time of the survey
- part 2: students who were abroad at the time of the survey
- part 3: students who were still in Germany but planning an exchange period at the time of the survey
- part 4: students who had planned an exchange period before, but finally did not realize it
- part 5: students who were not planning any exchange period at all

Furthermore, the questions were divided into nine thematic blocks:

- block 1: demographic data
- block 2: study related data
- block 3: information on the exchange
- block 4: motivation and evaluation of exchange
- block 5: obstacles
- block 6: experiences and problems
- block 7: financing of exchange
- block 8: recognition of study credits
- block 9: used sources of information

The questions of blocks 1, 2, and 8 were mainly composed of single or multiple choice questions, drop-down lists or entry fields. Question blocks 3, 4, 5, 6, and 7 also used the above mentioned question types added by questions where participants were asked to rate their answer tendency according to a specific statement on a scale ranging from 1 “does not apply at all” through to 6 “applies fully”.

## **4 Description of the sample**

### **4.1 Demographic data**

A majority of 61.5% of students that took part in the survey were male with an average age of 23.44 years. 3, 064 participants were German (approx. 95%), 16 Chinese (approx. 0.5%), 15 Turkish (approx. 0.5%) and 10 Russian (approx. 0.3%). 97.4% of the participants gained their higher education entrance qualification in Germany.

### **4.2 Study related data**

The following figure shows the distribution of survey participants among the different faculties of the university comparing the total number of students at RWTH Aachen University in the winter term 2012/2013<sup>17</sup>.

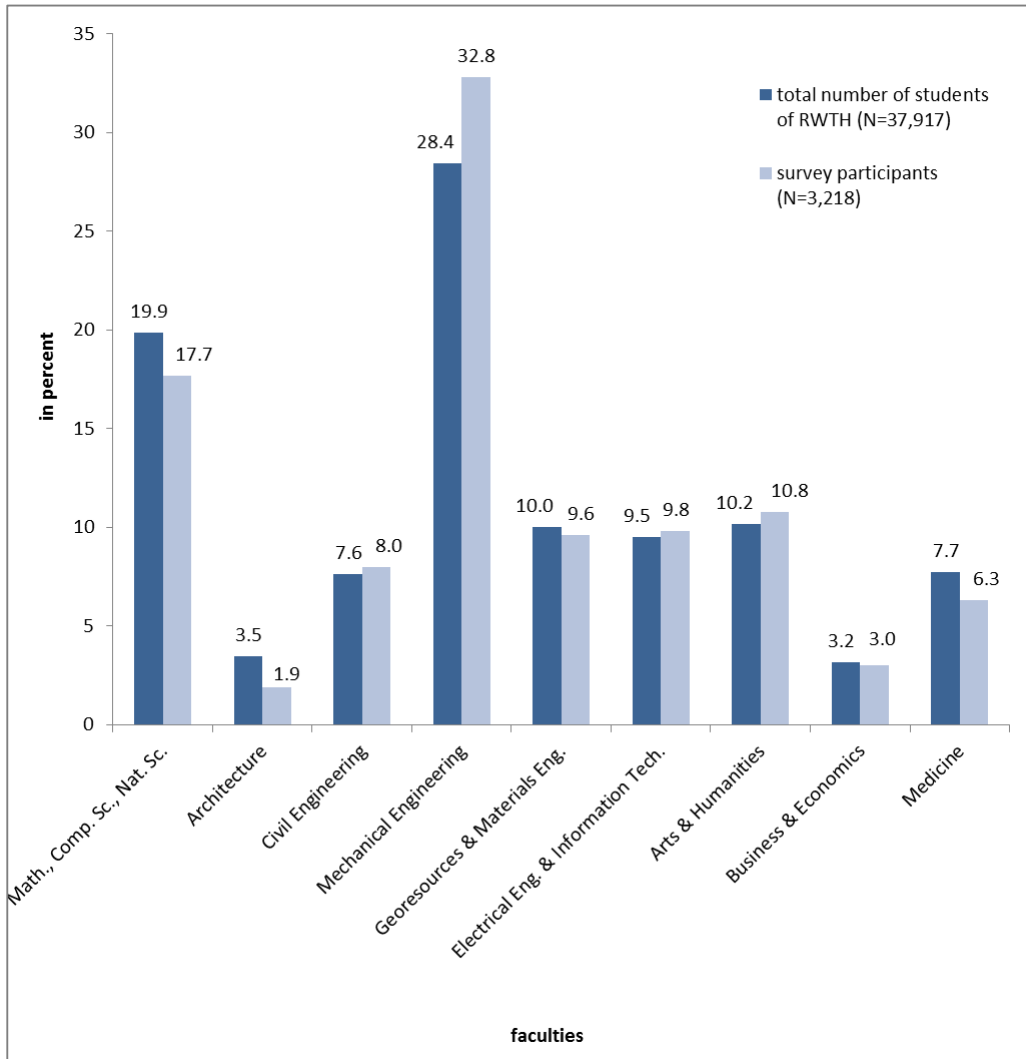


Figure 4: Distribution of participants among university faculties, in %<sup>17</sup>

It shows that the participants of the survey were almost evenly distributed among faculties compared to the general distribution of all RWTH students. Thus, any bias in the distribution of survey participants cannot be observed producing well balanced data resource.

### 4.3 Repartition of degrees

The survey participants worked on different academic degrees as the following figure depicts.

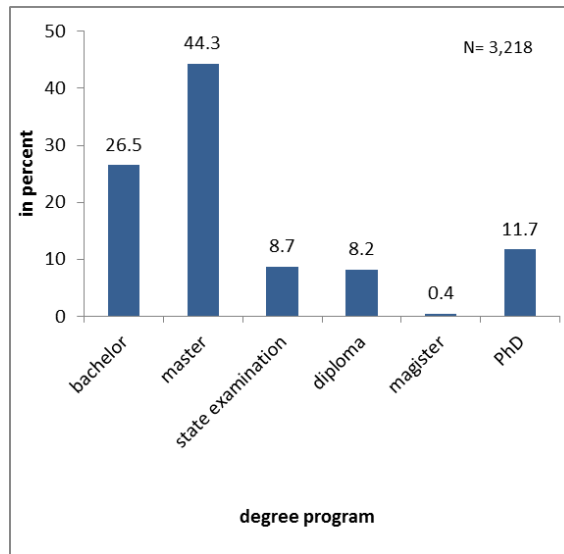


Figure 5: Repartition of degrees among survey participants, in %

The majority of the survey participants were enrolled in the post Bologna degree programs with 44.3% master and 26.5% bachelor students. Together 17.3% pursued a traditional degree program such as diploma, magister, or state examination and 11.7% were enrolled as PhD students.

#### 4.4 International experiences

A clear majority of 50.7% of all survey participants had never gathered any experiences abroad before starting their higher education programs. While 27.8% gathered international experiences through one exchange, 20.4% pursued two or more exchanges before entering university as is demonstrated in the following figure.

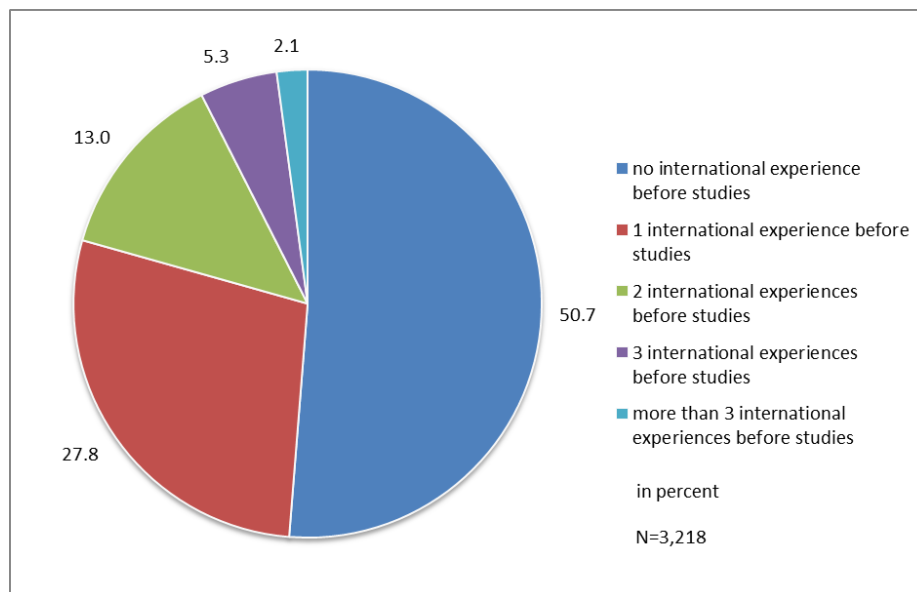


Figure 6: International experiences before studies, in %



With 66.3% two thirds of the survey participants gathered international experiences before studying, mostly through student exchanges at high school with 31.8% or language courses with 12.4% as is shown in the following figure.

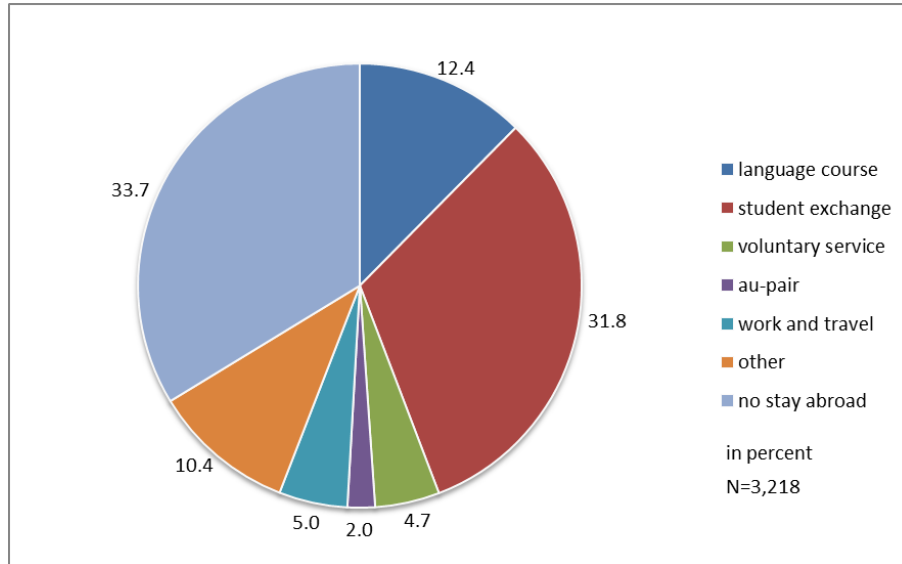


Figure 7: Types of international experiences of survey participants before studies, in %

The survey participants were in different planning and realization stages of their exchange or were not planning to go abroad at all as Figure 8 shows.

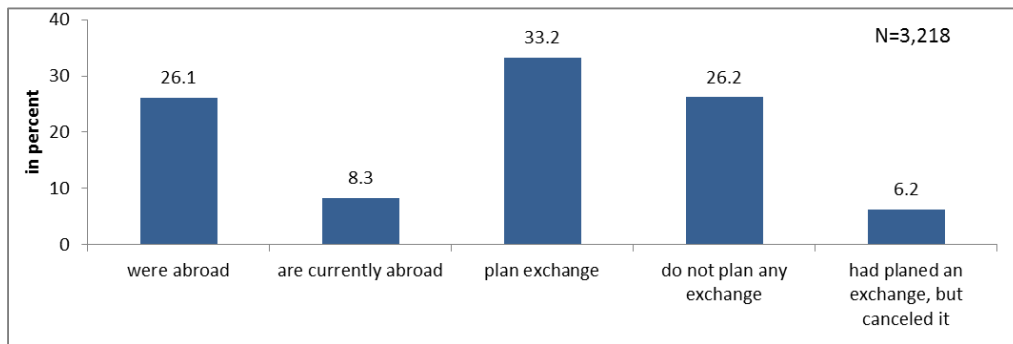


Figure 8: Planning and realization stages of survey participants, in %

The sample can be divided into three groups in terms of international experiences gathered:

- group A: students with international experiences (those who were abroad and are currently abroad)
- group B: students currently planning an exchange
- group C: students without any international experiences (those who had planned an exchange, but cancelled it and those who do not plan any exchange)

With 34.4% more than one third of the sample can be attributed to group A. 33.2% of students belong to group B and thus actually plan to go abroad during their studies. All together 32.4% of the survey participants belong to group C and have not gathered any international experiences whereas 6.2% had originally planned to undertake an exchange and 26.2% did not plan to go abroad at all. Thus, the sample is well balanced in terms of international experiences of the survey participants.

Those characteristics of the sample can also be found in similar studies. According to Heublein and Hutzsch<sup>5</sup>, approx. one third of all students plan an international exchange during their studies, 20% are not decided yet, and 35% do not envisage going abroad at all. A third of those who went abroad even plan another exchange period.

## 5 Results of the survey

### 5.1 Mobility according to disciplines

When comparing mobility of engineers with students of other disciplines, the survey did not discover any specific differences. The participants from the engineering faculties of Mathematics, Computer Science and Natural Sciences, Civil and Mechanical Engineering, Georesources and Material Engineering as well as Electrical Engineering and Information Technology ('engineer') were compared to those of the faculties of Architecture, Arts and Humanities, Business and Economics and Medicine ('no engineer').

Those participants who had already been abroad or were abroad at the time of the survey were attributed to the variable 'was/is abroad', all others to the variable 'has not been abroad'. The following contingency table shows the frequency distribution among the tested variables.

Table 2: Contingency table for mobility & engineering students, in frequency of answers

	was/is abroad	has not been abroad	total
engineer	873	1634	2507
no engineer	234	477	711
total	1107	2111	3218

A Pearson's chi-squared test was performed on the two nominal variables 'engineer' or 'no engineer' and 'has not been abroad' or 'was/is abroad'. The null hypothesis ( $H_0$ ) on the relationship between the two variables was tested and the following results calculated ( $\chi^2$ : chi-squared value, p: probability value):

$$\chi^2 (1, N = 3,218) = .90; p = .05$$

The results fail to reject the null hypothesis, which means that there is no significant difference in mobility affinity between the disciplines. Thus, engineering students are not less mobile than other students that took part in the RWTH survey.

These results are contrary to the numbers introduced above showing that engineering students are mostly less mobile than students from other disciplines such as the social sciences,

business and economics, or arts and humanities.<sup>12</sup> While those numbers rely on studies with a much broader data background, the present survey only shows the picture of RWTH Aachen University. The reasons for these deviant results can only be speculated. Most certainly, the bigger engineering faculties in terms of student numbers dispose of better structures than the smaller faculties such as the arts and humanities faculty by providing i.e. explicit coordinators for international relations that encourage their students to undertake international exchanges<sup>18</sup>. Furthermore, RWTH has installed double degree programs<sup>19</sup> with partner universities in China, Japan and France explicitly for engineers and students from STEM fields which is also reflected in the higher exchange numbers among those students. Moreover, RWTH has built a unique reputation also on international level due to the fact that it succeeded for the second time within the Excellence Initiative of the German federal and state governments, and thus consolidated its leading position among German universities<sup>20</sup>. This led to more university partnerships especially in the highly requested target regions such as the US, Spain or Sweden (c.f. 5.3 *Countries of destination*). Together with the English-taught master's degree courses in computer science, mechanical and electrical engineering as well as geophysics not only the incoming numbers of international students might have been increased but also national students that are more aware of the positive effects of international experiences for their later careers might have been encouraged to go abroad. Last but not least, exchange numbers among the RWTH engineering students might have increased due to close links of the respective faculties to industry partners resulting in a wide range of industry internships abroad.

Apart from those measures a certain selection effect within the survey due to imperfect randomization of the sample cannot be ruled out. It may be the case that rather mobility-prone students took part in the survey and thus influenced the results accordingly.

## **5.2 Types and duration of exchange**

Different types of foreign exchange seem to be commonly chosen by students from the different disciplines. As the following figures show the mobility preferences of engineering students differ significantly from other students. When asked to rate the three most important types of exchange, they answered as follows.

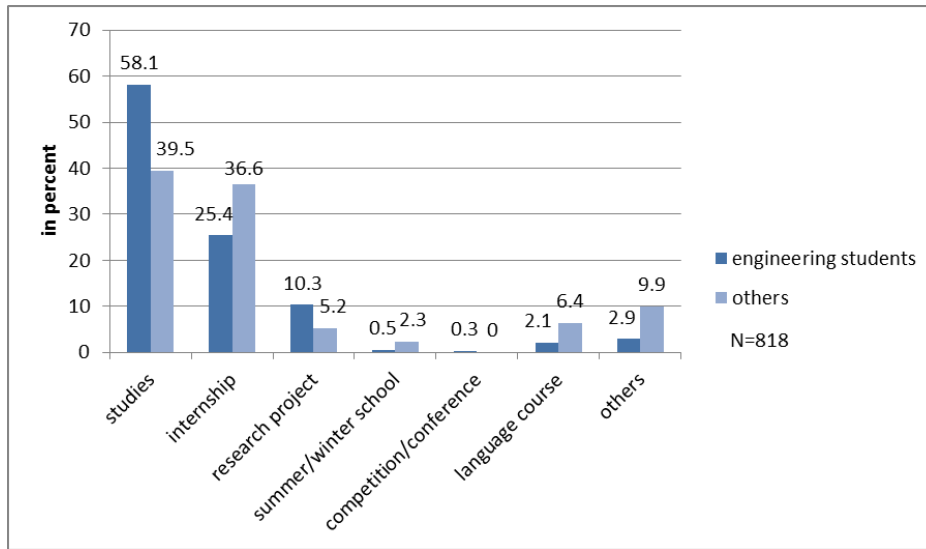


Figure 9: Prioritized types of exchange by engineering students and others, in %

Hence, studies and internships are highly and almost evenly prioritized among all students whereas engineering students prefer to pursue their studies more than an internship abroad.

This is contrary to the numbers of the Deutsches Studentenwerk. According to them, students of language and cultural studies often chose to pursue their studies abroad whereas engineering students prefer to take up internships in the respective country of destination as is shown in Table 3.<sup>11</sup>

Table 3: Rate of mobile students with study-related activities, by discipline in %<sup>11</sup>

Disciplines	Studies		Internship		Language course		Other	
	06	09	06	09	06	09	06	09
Engineering science	3	4	6	7	2	1	1	1
Language and cultural studies	12	12	9	8	7	6	4	4
Maths/ natural sciences	5	5	5	5	2	1	2	2
Medicine/health	6	5	18	16	3	2	3	2
Law and business studies	9	11	9	7	5	3	1	1
Social/education science, psychology	6	8	7	7	3	3	2	2

The difference in results compared to the RWTH survey may be attributed to a wide ranging network of partnering universities rather than contacts to industry partners. Presumably, students tend to take advantage of already existing networks rather than organizing an industry internship themselves.

Regarding the duration of the exchange most of the students that were abroad before and that were abroad at the time of the survey chose a period of 4-6 months (43.5%) which perfectly

fits into one study term. 19.9% of all participants pursued a 3-month exchange or shorter. 19.3% preferred to stay abroad for 10-12 months. On average students went abroad in their 7th semester ( $M=7.04$ ,  $SD=3.02$ ).

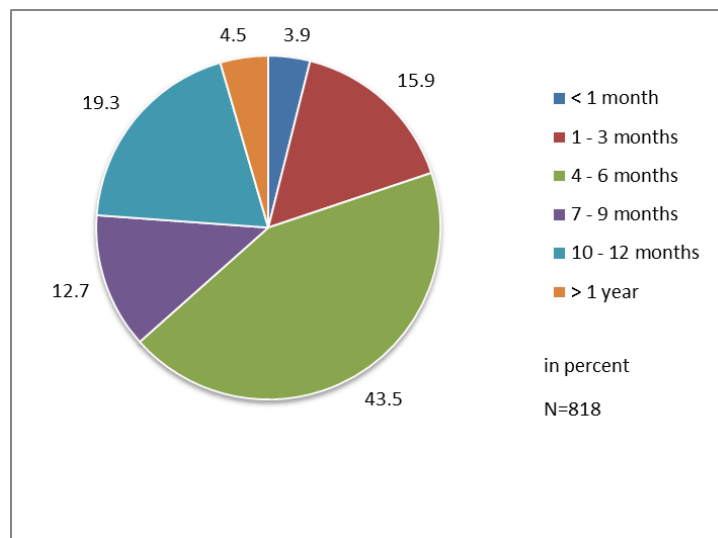


Figure 10: Duration of international exchanges, in %

This also corresponds with the numbers of Heublein and Hutzsch<sup>5</sup>. While engineering students tend to pursue short-term stays abroad such as internships, students in the humanities often organize long-term studies. The average international exchange lasted for approximately 6 months. Only 8% of students stayed longer than 12 months abroad. While studies lasted 6 months, internships lasted 3 months on average.

Just very few curricula integrate mandatory exchange periods. The majority of 96.2% of all RWTH survey participants answered that exchange periods were not mandatory. When asked whether those periods shall be made mandatory the majority of 58.3% declined it. Thus, the students seem to appreciate that international exchange periods have to be self-organized and can be integrated at a time of their choice into their studies. 44.2% of participants took semesters off in order to go abroad and accepted a related extension of the overall study time (60.6%).

### 5.3 Countries of destination

The following table shows the five most popular countries of destination for international exchange among the survey participants separately for engineers and other fellow students.

Table 4: Most popular countries of destination among survey participants

rank	engineers	others
1	US	Spain
2	Spain	France
3	Sweden	US
4	UK	UK
5	France	Italy

Hence, the most popular countries are almost evenly distributed among disciplines. While engineers tend to prefer the US more than the European countries, students of other disciplines prefer European countries slightly more than the US.

Also the language plays a major role in choosing a country of destination. 61.6% of the participants used the respective language of the country during their studies. Thus, the languages learned at school such as the European languages English, French, or Spanish or the ones being close to German such as Swedish are preferred.

The tendency of a clear preference of European countries is also mirrored by the numbers of DAAD<sup>2</sup>, while different countries of destination were most popular in different disciplines: 40% of German bachelor students went to the Netherlands, 37% of German PhD students abroad enrolled in Switzerland and 61% of students with other degrees (such as diploma or master) took up studies in Austria. As is shown in Table 5 the neighboring countries seem to be most attractive to German students with Austria and the Netherlands being the most visited countries as well as the UK and the US as Anglophone countries.

Table 5: German students abroad in 2008, by country of destination, in %<sup>2</sup>

Destinations	Quantity	Amount
Austria	20.019	19,6
The Netherlands	18.972	18,6
Great Britain	12.895	12,6
Switzerland	11.005	10,8
USA	9.679	9,5
France	6.071	5,9
Australia	3.418	3,3
Sweden	3.400	3,3

Also Heublein and Hutzsch<sup>5</sup> show that the most popular countries of destination of German students such as the UK, France, and Spain were situated in Western Europe. Only 12% went to the US or Canada, 11% to Eastern Europe, 11% to Asia, and 7% to Latin America or Africa.

#### 5.4 Experiences of exchange

When asking those who are currently abroad or who have already finished their international exchange on the experiences their gathered the following picture emerges. Across disciplines positive experiences were gathered in developing language skills, getting to know a new culture and friends and an increased autonomy.

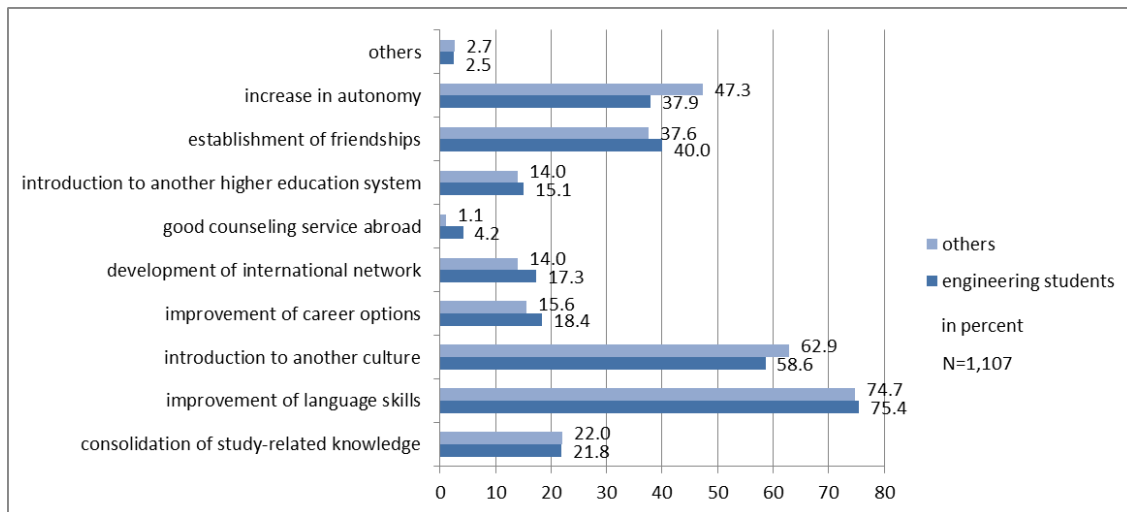


Figure 11: Experiences during exchange, by discipline in % (multiple answers possible)

While non-engineers seem to rate the introduction to another culture and an increase in autonomy as more relevant than engineers, they seem to have gathered better experiences with good counseling services abroad or the improvement of career options.

Heublein and Hutzsch<sup>5</sup> also confirm that students report to gather rather positive experiences abroad regardless of the country of destination. 81% of students were able to deal with the new culture without any problems and report of having had the feeling of being integrated into society. This highly corresponds with good language skills and can also be attributed to a good preparation leaving students with appropriate expectations for international exchange.

### 5.5 Problems of exchange

Most problems were reported concerning financing and the search for accommodation. While engineering students seem to have fewer problems with financing their studies abroad, they report more problems with communicating in the respective foreign language, in contacting locals or in dealing with the requirements of studies. 20-25% of students reported to having had no problems at all.

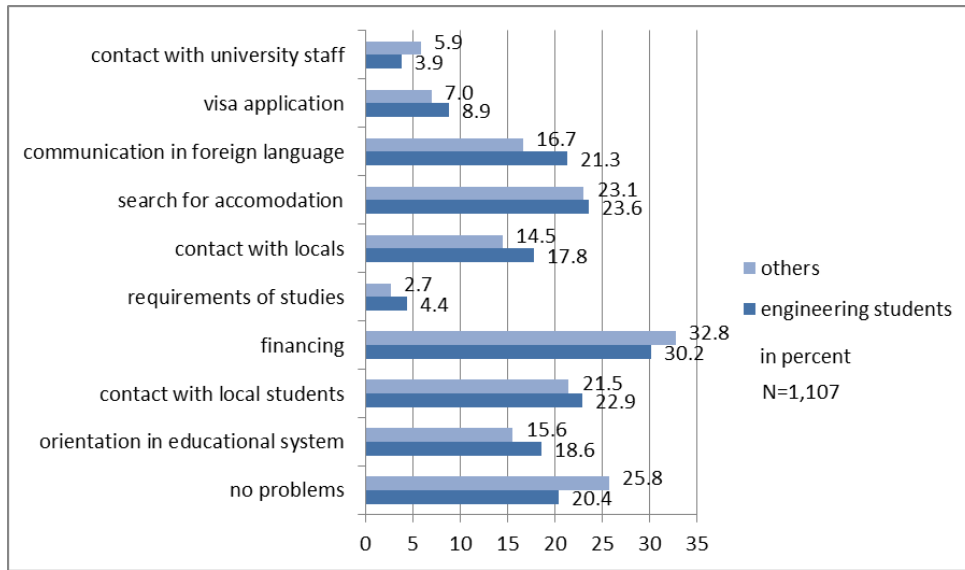


Figure 12: Problems during exchange, by discipline in %

Heublein and Hutzsch<sup>5</sup> report that approximately one quarter of the students had difficulties in financing their studies as well as criticized a lack of support by their sending university. Fewer problems are reported concerning the requirements of studies abroad and the recognition process. Only 16% referred to problems in the search for an accommodation.

### 5.6 Motivation for exchange

The participants were also asked to rate a pre-defined set of motivational factors on a range between 1 (no motivational factor) to 6 (high motivational factor). The following tendencies can be observed.

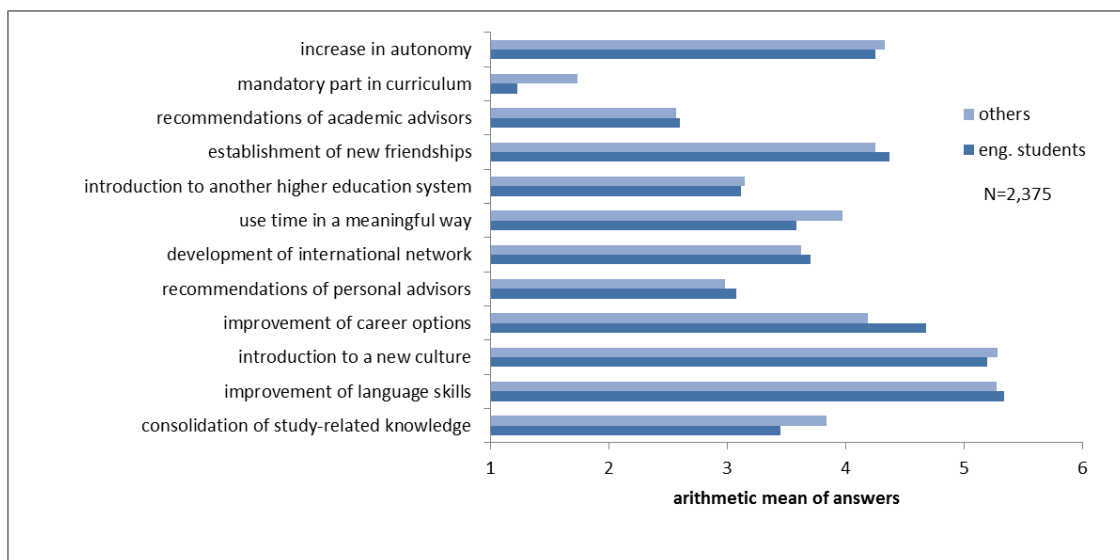


Figure 13: Motivational factors for planning an international exchange, by discipline

As the figure shows there seems to be a good match between motivational factors influencing the decision in the planning phase and the actually gathered experiences during the stay



abroad (c.f. Figure 11). There is a slight difference between the estimation of improved career options before and during the exchange period. While in the planning phase students tend to estimate a high influence of international experiences on their professional career, they rate it rather low during their stay abroad. The most important motivational factors across disciplines seem to be the improvement of language skills and the introduction to a new culture along with the establishment of new friendships and an increase in autonomy. This corresponds with the positive experiences students gather when being abroad (c.f. 5.4 *Experiences of exchange*).

Differences between engineers and students of other subjects can be observed at the factors ‘mandatory part in curriculum’, ‘use time in a meaningful way’, ‘improvement of career options’ and ‘consolidation of study-related knowledge’. While exchange periods are often mandatory in curricula of non-engineers, it is not common in engineering sciences. Engineers tend to be more motivated by improved career options and less motivated through using time in meaningful way, or by consolidating their study-related knowledge than other disciplines.

When asked to evaluate their exchange participants scaled its effects on their personal development and the improvement of their foreign language skills higher than on their studies as is shown in Figure 14.

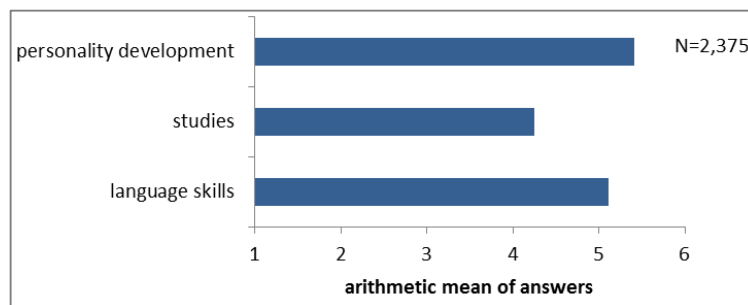


Figure 14: Evaluation of positive effects of exchange

Heublein and Hutzsch<sup>5</sup> also point to motivational factors for international exchange. Most of the students focus on improving social as well as language skills and on gathering experiences in another culture. 71% perceive an international exchange as being career-enhancing. Only half of the students aim to improve their discipline-specific knowledge. 45% plan to work abroad in their profession and thus try to gather international experiences already during their studies. The following figure summarizes the motivational factors of students to go abroad.

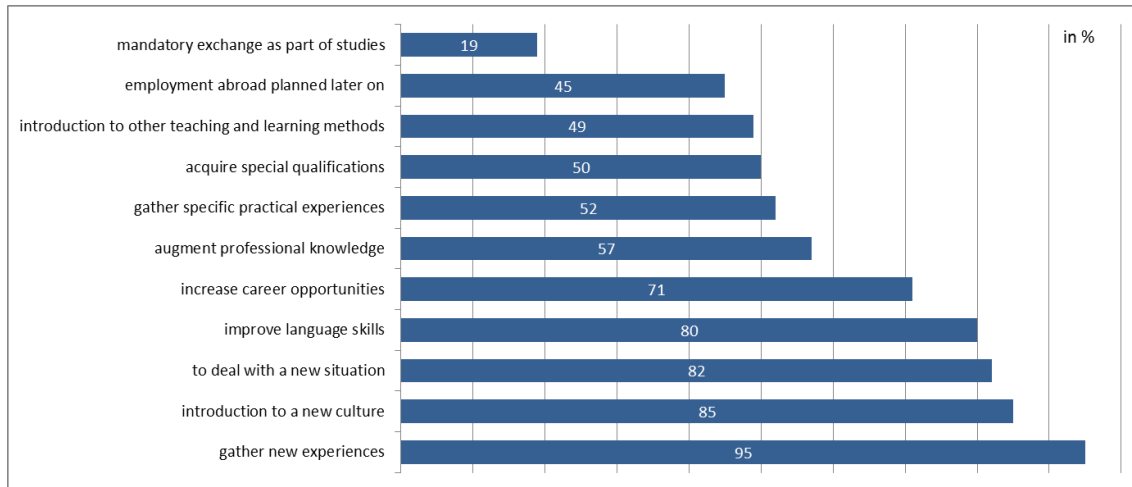


Figure 15: Reasons for study-related exchange, answers on a scale from ,1 = not important at all' to ,5=very important', in %<sup>21</sup>

### 5.7 Obstacles for exchange

The most important obstacles across disciplines are time pressure, financial problems, and too few exchange opportunities. Financial problems seem to be more severe for other students while engineering students rated those problems less relevant. Participants did not see any special problems imposed by the fear of the unknown or the challenge of going abroad. They also rated the fact of an international exchange being a problem for their career as rather low, as is summarized subsequently.

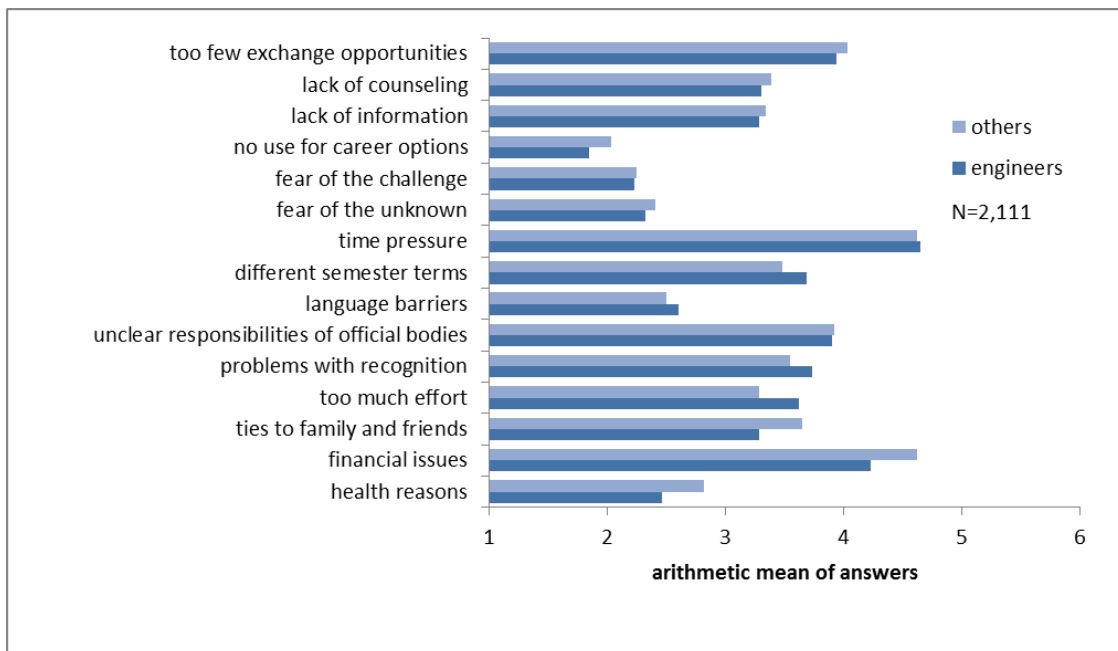


Figure 16: Obstacles for international exchange, by discipline

According to Heublein and Hutzsch<sup>5</sup> approx. 10% of all students fail to realize an international exchange period regardless of their specific course of studies. The most evident reasons were problems with financing the exchange (49%), a lack of support by their home

university (45%), low compatibility with the requirements of their studies (43%), or a loss of time (39%). Only 33% refer to problems in the recognition process.

Apparently, the participants of the RWTH survey seem to feel an extraordinarily high time pressure. This may be due to strict curricula leaving not enough time to integrate an international exchange.

### 5.8 Financing of exchange

Most of the students take advantage of their own savings, their parents' financial support, or scholarships to go abroad. Engineering students tend to use scholarships to finance their exchange more than other students while the others rely more on private savings and family support. Only 10.3% receive state-funded grants that support their studies in Germany (international BAföG) also abroad. Generally students are very well informed about possible ways of financing their international exchange, but use only few of their opportunities as the following figure demonstrates.

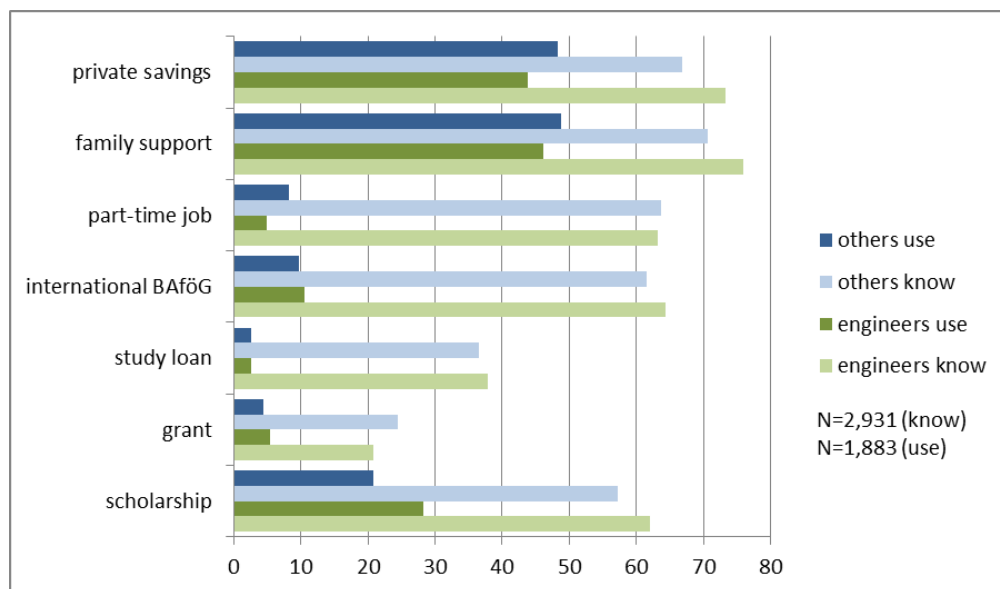


Figure 17: Level of information and use of financing for exchange, by discipline in %

### 5.9 Recognition of study credits

Most of the students report not to have had any problems in the recognition process at all. Of those problems that occurred, most frequently the duration of the recognition process was criticized along with different syllabi and problems with the conversion of acquired credits. Obviously, engineering students face bigger problems in all of the stages of the recognition process as demonstrated below. Thus, special measures to tackle those problems for engineers are necessary.

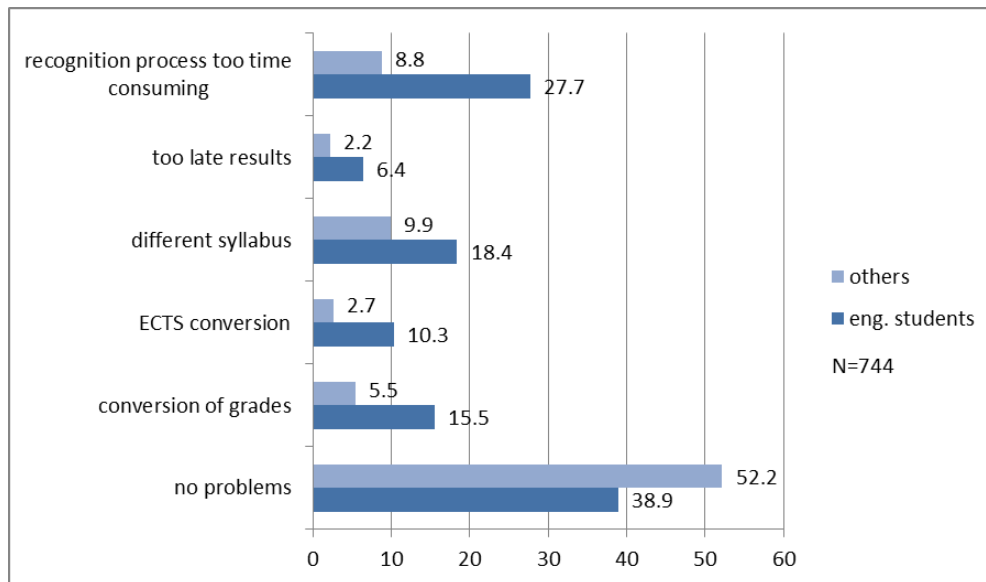


Figure 18: Problems in recognition process, by discipline in %

Heublein and Hutzsch as well as the Deutsches Studentenwerk confirm these tendencies. According to Heublein and Hutzsch<sup>5</sup> only a fifth of all students face problems within the recognition process. Whereas the Deutsches Studentenwerk<sup>11</sup> points out that students in the planning phase of an international exchange tend to be hampered by the prospect of having problems in the recognition process more than the problem really occurs later on.

## 6 Summary and conclusion

The survey among approx. 33,000 RWTH students has led to the following key findings.

- The survey could not confirm the tendency of low mobility among engineering students compared to fellow students from other subject groups at RWTH Aachen University.
- Regarding the types of exchange engineering students of RWTH tend to prefer studies rather than internships abroad which may be attributed to an extended network of partnering higher education institutions rather than industry partnerships abroad. Most students go abroad for 4-6 months which corresponds to one study term and obviously fits best into study curricula.
- There are only a few slight differences in the preferred countries of destination. While engineering students tend to prefer the US more than the European countries, their fellow students from other disciplines rather prefer to stay within European borders to gather international experiences. The foreign language nevertheless plays an important role in the decision for the country of destination in so far as the majority of students communicate in the respective language of the country.
- Most of the students who are currently abroad or who have already finished an international exchange report having gathered rather positive experiences. They rated the improvement of their language skills and the introduction to another culture as most relevant.

- Most problems among those with international experiences occurred with financing the exchange and with finding an appropriate accommodation abroad. Especially engineering students face problems with communicating in the foreign language and with contacting local students.
- Regardless of the different planning and realization stages of an international exchange, students are mostly motivated by the prospect of improving their language skills, by getting to know a new culture, by enhancing their career options, by building new friendships, and by increasing their autonomy. The development of discipline-specific knowledge or other factors such as recommendations by counselors or getting to know another higher education systems seem to be less central.
- The major obstacles students face in any planning or realization phase are financial problems, time pressure during their studies, and too few exchange possibilities especially.
- For financing their stay abroad most students rely on private savings, their family's support, or scholarships – while the latter is especially important for engineering students. The minority of students finances international exchange through state-funded grants.
- The majority of survey participants report no problems in the recognition process of study credits. Nevertheless, those problems reported such as the long duration of the recognition process and problems with differing syllabi were most severely encountered among engineering students.

Those key findings suggest the following conclusions and requirements for further research.

There are several deviations in the results of the survey compared to prior studies such as the fact that engineering students at RWTH are not less mobile than other students or face fewer problems in the recognition process of study credits. This might be partly due to the specific situation at RWTH and its specialized programs for engineering students that already tackle those challenges successfully. Nevertheless, further investigations on the specific reasons and comparisons to other universities will become necessary. An in depth-analysis will have to measure what components of those programs and to what extent they successfully encourage outbound mobility among engineering students in order to facilitate their transfer to other higher education institutions.

It is striking that students can only integrate an international exchange when it is financed by their families due to lacking financial support by official bodies. This bears the danger of privileging one specific group of students and discriminating mainly students from lower social classes. As Finger<sup>22</sup> argues the social background of students is especially important when it comes to the decision to go abroad. Once students decided to go abroad the influence of the social background on the choice of country of destination and the duration of mobile periods decreases. Thus, in order to support wide ranging exchange programs more opportunities and financing options shall be offered. Further investigation on the social background especially of engineering students shall be undertaken in order to analyze the special needs of this group of students.

The survey has also shown that students seem to be mainly motivated to go abroad by improving their social competences and language skills. Thus, information and counseling should focus on those issues but should also point out the positive effects on an international exchange on the development of discipline-specific skills and the professional career.

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