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1. Introduction

Throughout the second half of the 20th century Europe became more and more united and its member states grew closer together than they had ever been before and this trend continues in the 21st century. These developments brought with them a need not only for a common political system, the European Union, but also for a unified tertiary education system. The Bologna reform introduced a degree system that is the same in all member countries of the EU, thus fostering student and staff mobility. This mobility brought about the need for a common language to be used in European tertiary education. The language which was assigned this role was English.

As a consequence, in recent years the importance of English not only as a language of everyday life but also of higher education has grown and is still growing. Hence, “[f]oreign-language-mediated learning, usually in English, is becoming an increasingly common phenomenon in European higher education” (Hellekjær 2004: 147). Higher education institutions do not only offer separate language courses that students can take if they want to, but they have started integrating language into their curricula, for instance, by introducing English-taught programmes outside the English-speaking areas of Europe. This increasing number of English-taught programmes helps to familiarise students in these programmes with using English as *the* language in which they can communicate in with every scholar around the globe.

This thesis considers all study programmes offered at the Faculty of Chemistry at the University of Vienna. In order to get a thorough picture of the current status, not only students were included in this research but also members of the teaching staff. The research for this thesis follows similar research conducted in 2012 that focused only the bachelor level of chemistry studies and did not include any teachers’ opinions. This thesis is a status-quo analysis of the role that English plays at the Faculty of Chemistry at Vienna University and about teachers’ and students’ perceptions thereof.

The research questions which therefore are of interest are:

What developments led to the fact that English nowadays is the dominant language of science and what are the consequences of its use for higher education?

How is English used at the Faculty of Chemistry at the University of Vienna? How much of it is used and what is it used for? How do teachers deal with the fact that

English is the language in their field of research and teaching? Is there any support for them when they (have to) teach in English?

What do students think about the role that English plays in their studies and will play later on in their working lives, are there any problems or advantages arising from its use? Do students want to have more English in their study programmes or do they even want to have courses that focus on the improvement of their English-language skills?

In order to answer these questions, the first part of this thesis seeks to establish a theoretical frame for the research findings. Chapter 2 outlines recent developments in European higher education and the consequences that these changes had on teaching in tertiary education. One of these changes is the increasing introduction of English-taught courses and programmes. The development of English as *the* language of science is outlined in chapter 3. Moreover, that chapter presents reasons why English-medium teaching has become so popular nowadays and what forms it can take in tertiary education.

The second part of the thesis is dedicated to a presentation of the study and a discussion of its findings. Chapter 4 briefly sketches the research design used to gather data from both teachers and students and describes the methodology used to evaluate these data. Chapters 5 and 6 then present actual research results from teaching staff and students, respectively. Chapter 7 is dedicated to a discussion of findings in context with other studies and the theory outlined in the first part of this thesis. The last chapter points out conclusions that could be drawn from the research findings.

2. European higher education and Bologna

European countries have become interconnected and interdependent over the last decades more than ever before. The European Union establishes a shared political space for most of the European countries. This shared space, however, is not limited to politics and economy but also highly affects European education, including the tertiary level. Universities form a major part of higher education institutions (HEIs) and are thus influenced by these developments. Räisänen and Fortanet-Gómez (2008: 14) agree with this increase in connectedness when they state that we live in “a time when Europe is becoming more and more consolidated as a continent and as new common educational policies are being approved in its countries”. Often this new common European education area is referred to as “European Higher Education Space” (Booklet on Bologna) and even seen as a “global higher education market” by some scholars (e.g. Wächter 2004: 268). This section will give an overview of the underlying ideas behind this process and the impetus it had on higher education. The subsequent sections will then highlight its influence on the language of instruction in higher education institutions throughout European countries.

It was in 1999 that what is commonly known today as the Bologna declaration was signed (see e.g. Wächter 2004). This declaration did not only intend to bring uniformity and comparability to a higher education space as diverse as the European one, i.e. every country having its own education system and awarding its own degrees, but also promoted student as well as staff mobility across the European countries (Holdsworth 2004: 21). For Wächter (2004: 268) the declaration even established a change of paradigm from “the blessing of diversity [towards] [...] great comparability and compatibility of structures”. Furthermore, it promoted the learning of foreign languages, foremost but not necessarily intended as such, that of the English language. All this was endorsed by ministers of four member countries of the EU, i.e. France, Germany, Italy, and the United Kingdom, in the Sorbonne Declaration, which was signed on May 25, 1998 and fostered the “harmonisation of the architecture of the European higher education system” (Sorbonne Declaration). This declaration can be seen as the predecessor of the Bologna declaration as it “already contained the main aims of the Bologna Declaration” (Wächter 2004: 265).

As with most changes imposed by politics, there have always been critical voices arguing against the Bologna process and also voices opposing the introduction of

English at European higher education institutions (see e.g. Ammon & McConnell 2002: 7, 23f.; Coleman 2006: 1, 8). Although the European Union does not limit the range of possible languages of instruction to this one language, it is interestingly often assumed that English should be chosen. It seems that English is considered as the most important (foreign) language that graduates from European universities should have sufficient skills in. It has been noted, hence, that “European authorities insist that new graduates have a good command of English, which should be complemented with other European languages” (Räsänen & Fortanet-Gómez 2008: 47). When choosing a foreign language as the medium of instruction authorities intend to improve their students’ language skills in these languages.

When it comes to the implementation of foreign-language learning in higher education, northern European countries are often referred to as a model. In Finland, for example, “[a]ll universities offer studies in languages and cultures as part of their degree programme” (Räsänen & Fortanet-Gómez 2008: 36, referring to Ministry of Education 2003). Hence, it can be said that in Finland the ideas formulated in the Sorbonne Declaration are really being integrated in the educational system including the tertiary level. As has been previously mentioned, very often it is not a range of languages that is used but dominantly one, i.e. English. For example, Räsänen and Fortanet-Gómez (2008: 23) claim that in Sweden “most, if not all, master programmes are to be taught through the medium of English”. As another example, at the University of Oslo, Norway, Hellekjær (2007: 68) noticed an increase from 30-40 programmes offered in English in 2003 to circa 800 in 2007. It seems that the Scandinavian countries take something like a leading role in implementing English in their tertiary institutions. Hence, it is not surprising that a comparably large number of studies concerning English in European tertiary education has been conducted in these countries.

Denmark is one of these countries under recent investigation. There, three major reasons for a “change of the linguistic situation in recent years” were observed (Cancino 2011: 138). The reasons named are

[t]he spread of English as a result of globalisation and internationalisation[,] [t]he existence of a growing number of languages as Denmark is no longer a homogenous linguistic society and, finally, a general need to increase foreign language learning because of the needs and requirements of the information society. (ibid.)

Two of these reasons can be easily transferred to the Austrian context. Firstly, globalisation affects all European countries, including Austria. Secondly, the information society and its requirements are international and therefore also present in Austria. Furthermore, it can be argued in line with Cancino that Austria, thanks to the Bologna process, is now part of a larger educational system, i.e. the European one, and this educational system probably has to face more foreign students coming to its universities than before, who speak a multitude of languages other than German. An OECD study showed, however, that it is students from Germany, who have the highest share (38%) of foreign students in Austria. Most of the German students in Austria persuadably speak German, most of them even as their mother tongue. These students then do not have to face the problem of foreign-language education if taking part in a German-taught programme in Austria. Students from Germany are followed by students coming from non-EU countries (20%), 10% are from Italy, 8% from countries in Asia, and 20% from other EU-countries (Die Presse, 25 Sept. 2013: XI). The change of linguistic situation that Cancino realises in her research for Denmark and which is to some extent also present in Austria, is also reflected in European higher education in general.

The increasingly diverse linguistic situation in European higher education institutions has been fostered by the establishment of European mobility programmes, for example Erasmus. These programmes have fostered student and staff exchange among the European countries. Erasmus was launched by the European Union (then: European Community) in 1987 (Caudery, Petersen & Shaw 2007: 233) well before the Bologna declaration. Hence, it must be assumed that after more than 26 years of Erasmus more international students are present at European (and thus also Austrian) universities than ever before, enriching the linguistic landscape of many traditionally monolingual countries in Europe. For a more detailed investigation of the exchange students' situation, especially in Austria, see section 3.3.2.

In the European Union neither a language policy nor the Bologna declaration officially foster only a single language. A parallel use of two (or more) languages is suggested by some scholars (see e.g. Kuteeva & Airey 2013 on the parallel use of Swedish and English in Sweden). Despite these multilingual possibilities, English has quickly become dominant in the EU (Ammon & McConnell 2002: 6; for a discussion of the use of English vs. other languages in CLIL see section 3.4.3.). The following section tries to offer an insight into this 'dominant' use of the English language in Europe and

especially in its tertiary education sector. It will try to answer the question why English has become a leading language in sciences, investigate reasons why higher education institutions have introduced English-medium teaching, and give an overview of the possibilities of incorporating the English language into field-specific curricula and teaching at the tertiary level.

3. The use of English in higher education

Räsänen and Fortanet-Gómez (2008: 11) tie in with Ammon and McConnell when stating that “English has over the last two centuries gained a privileged position in that it has become the established language of science and technology”. Additionally, they refer to English as “the most usual foreign language learnt in European schools and universities” (ibid.). They are part of the ESP research community and it has been noted that

[i]nsofar as the ESP research community seeks to understand present-day academic speaking in English, it is vital to take on board English as a lingua franca. To capture its contextualised use in real life, ELF is a better representative than native English. (Mauranen 2010: 21)

The term English as a lingua franca (ELF) is used to refer to “any use of English among speakers of different first languages for whom English is the communicative medium of choice, and often the only option” (Seidlhofer 2011: 7) where no native speakers of English might be involved. The use of ELF does, therefore, not depend on any native speaker norms as opposed to that of English as foreign language. Students in Hungary who took part in a survey on how the use of ELF, ESP, and English as a native language (ENL) affects their aims and beliefs seem to be aware that they will be using English as a lingua franca and native-like competences are not mandatory to be achieved as a consequence (Csizér & Kontra 2012).

Considering both ESP and ELF approaches can be helpful to deal with the issues of English-medium teaching and it has been observed that “[m]any learners take up ESP in order to have a working knowledge of English in their speciali[s]ed field to communicate not only with native speakers but with fellow professionals around the world” (Csizér & Kontra 2012: 2), hence really using English as a medium of communication between speakers of different first languages, i.e. as a lingua franca. Opposed to ESP, “ELF is not dependent on a certain specification in communicative purpose” (Smit 2010: 56). While both these approaches acknowledge the importance of the English language in academia and although English is seen as a “[hypercentral] language” (Coleman 2006: 2), the amount of English implemented in university programmes strongly differs from country to country.

Three very comprehensive studies in the field of English in European tertiary education have been conducted so far (Ammon & McConnell 2002; Wächter & Maiworm

2002, 2008). They offer good insights into the current situation in European higher education. It has to be kept in mind, however, that these studies focus on whole *programmes* being offered and taught in English, whereas this thesis focuses on only one programme and the *courses* offered in English within it. Nonetheless, the studies will be used to allow some understanding of the current situation of English in tertiary education in Europe.

The increasing popularity of English-medium teaching in tertiary education is mirrored in the numbers of English-taught programmes at European universities, where these “programmes are becoming more numerous almost by the day” (Wächter & Maiworm 2008: 7). It was found that “current trends suggest a wish to communicate easily with anyone, anywhere; hence, it may imply learning through a widely-spoken language” (Wilkinson & Zegers 2008: 2). This might be one reason why universities all over the world establish programmes in English (*ibid.*). The argument is supported by Graddol (2000: 45), who found that more than 60% of European students at school studied English as a foreign language, which can therefore be considered to be widely-spoken in Europe. Obviously, this is one of the reasons why English has become such a popular language for teaching also outside English-speaking areas. Other reasons will be outlined in the following sections.

Finally, it has to be remarked that universities have the advantage that they usually have specialists teaching linguistics and foreign languages and that they often offer language-learning centres (Holdsworth 2004: 21), i.e. the experts needed for introducing English-taught courses and programmes should be easily available if needed. In the next section it is discussed why it is precisely English that is so predominantly used as the language of instruction and why it has become the *lingua franca* in natural sciences.

3.1. The use of English in natural sciences

English is often referred to as an international language. Phillipson, however, reminds us that “[t]he concept *international language* was first used to refer to planned languages” such as Esperanto (2003: 111, original emphasis). Furthermore, he recognises a tendency to label a language like English as international just because it is “big” which, however, “ignores the fact that every single EU official language has been

used outside its national heartland” (ibid.). In line with this, it will be argued later in this thesis that also German was once an international language in the natural sciences such as chemistry, a ‘big’ language as it was. This means that German was used world-wide for research, publications, and communication even by chemists whose first language was not German. Before discussing the importance that the German language once had in chemistry, the role of Latin as a lingua franca in Europe will be outlined.

3.1.1. *The decline of Latin as a ‘world’ language*

In the German-speaking areas of Europe, Latin had been used as a language of scientific communication until the late Middle Ages (e.g. Ammon 2008: 25). Later in history, an “Abwendung vom Lateinischen” (ibid.) could be observed. A similar development was observed in Denmark where the status of Latin is described as being *the* language used at universities from the 15th to the 19th century (Mortenson and Haberland 2012). Latin retained its role as medium of scientific communication in Denmark throughout the 15th and 16th centuries and was there considered to be a “*sine qua non*” (Mortensen & Haberland 2012: 177, original emphasis). To illustrate the beginning of the decline of Latin as a ‘world’ language, Mortensen and Haberland reveal that Latin slowly retreated from the 17th century onwards in Denmark.

Additionally, it is known that already back in the 15th and 16th centuries teaching staff was often brought to Denmark from other parts of Europe and thus had no knowledge of the local language, i.e. Danish (Mortenson & Haberland 2012: 178). This implies that already as soon as the 15th century a system bringing ‘visiting professors’ to Danish universities had been established. Hence, “Latin served a role as a vehicular language quite similar to the role that English is playing today in international study [programmes]” (ibid.). The major difference, however, was that Latin was not introduced for the reason to attract foreign teachers and students like it is done with English today but simply for reasons of mere practicality and the lack of any other ‘common language’.

In Danish tertiary education Latin survived until the 19th century when it was ultimately replaced by modern languages, including German, French, and English. “Thus, German, French and English which had emerged as the new lingua francas of academia in Europe were commonly used for the dissemination of research results in addition to

Danish” (Mortensen & Haberland 2012: 185). In some modern study programmes, such as, for example, medicine, law, theology, science, and philosophy, we still find traces of the important role that Latin once played in tertiary level education (Mehisto, Marsh & Frigols 2008: 9). In medicine, for example, the names of the bones are still studied in Latin rather than in a modern language. Another indicator of the importance that Latin once had is that at the University of Vienna Latin is seen as a prerequisite for studying, for instance, medicine, law, philosophy or history (information retrieved from Student Point, Fakultätsvertretung Jus, and MedUni Wien websites). When Latin declined as the language of science, it left a need for another common language, thus allowing German to take over as the most commonly used language in the natural sciences, at least for some decades.

3.1.2. German as a lingua franca in natural sciences

As the example of Denmark shows, at some point in history the German language obviously played an important role in international scientific communication and also in European higher education teaching. While it was more or less obvious to choose German as the successor of Latin in Germany and Austria, it is not so clear with non-German-speaking countries. Still, German became also important in those areas for reasons outlined in this section. The change from Latin to German did not happen overnight but it took as long as the second half of the 19th century to finally arrive at the point where German can be said to have been the language of scientific communication in Europe’s German-speaking areas *and* beyond (Ammon 2008: 25). The questions which then arise are why German once played an important role in the natural sciences and why it is no longer the lingua franca of science? These historical developments are of special interest for the Austrian context. It might be that in Austria, which is referred to as “a traditionally German-speaking country” (Smit & Dafouz 2012: 6), German is still the prevalent language of scientific education at the tertiary level. In order to be prepared for such findings in the research, this section will give an overview on the history of German as a language of science.

While in the first decade of this century it was observed that “English has been the foreign language most commonly taught and learned in the EU” (Räsänen & Fortanet-Gómez 2008: 21), also German, together with French and Spanish, was among

the languages learned by a significant number of people in the European Union (Räsänen & Fortanet-Gómez 2008: 21, referring to European Commission 2005). This was slightly different at the turn of the 20th century. For 1900, English, French, and German are named as the three most prominent languages in sciences (Ammon & McConnell 2002: 11) with German dominating especially in the natural sciences and not so much in diplomacy and economy where French and English had always been more important (Ammon 2008: 26). The question, why German lost its importance as a scientific *lingua franca* becomes especially interesting when keeping in mind that German is the most widely spoken language in the EU, with 16% of Europeans considering it as their first language whereas for English this applies to only 13% of people in the EU (European Commission 2012a: 10).

There are many factors that indicate the importance of the German language in the early 20th century as the international language of communication throughout the world (see e.g. Ammon 2008; Ammon & McConnell 2002). The reasons for this importance include the leading role that German scientists took in that time in scientific fields like chemistry and the influence of the German research area on its neighbouring countries without their own potentially international languages (e.g. Scandinavian countries). Ammon (2008: 27) claims that German was the language to be learned by students of chemistry throughout the world and that at least sufficient reading skills were expected from them. Even if research was published in a language other than German, it often included a German abstract. This changed during the First World War, which, for obvious reasons, indicates the beginning of the decline of German as a scientific *lingua franca*. During the war German was even boycotted by the international scientific community and German scientists, on their part, stopped contributing to international projects. The situation got even worse during the advent of the Third Reich and the assassination of German scientists or their expulsion from Germany. Many German-speaking scholars were forced to leave their native countries and in many cases had to leave all their possessions behind. Very often after that, they consciously rejected the use of the German language and conducted research in English rather than in their native language. The same holds true for their publications. Furthermore, the devastating conditions in post-war Germany and Austria did not allow really competitive research to be conducted and numbers of publications in German dropped

further¹. English took this chance to replace German in the natural sciences and hence, German lost its predominant role as the lingua franca in chemistry and other sciences. (Ammon 2008; Ammon & McConnell 2002)

Overall, it was mainly political reasons that led to a decrease in the use of German as a lingua franca in the natural sciences. On the one hand, this allowed “English [to] spectacularly [take] off as a language of science in the course of the 20th century” (Ammon & McConnell 2002: 13). On the other hand, research also shows that German still plays a minor role as an international language of science. For example, German had stabilised on a low level in 2006 with 1.4% of the language used in *Chemical Abstracts* being German compared to English (81%) and Chinese (10.1%) (Ammon 2008: 39). Furthermore, it needs to be highlighted that the role of German as a *national* language of science is far from out-dated (ibid.). Anyhow, as internationalisation has become an issue in European higher education also Germany started replacing German in the sciences and thus also in science education at the tertiary level (see section 3.3.1.).

When Germany introduced its first study programmes in the English language in 1997/98, critics voiced their concerns of Germany giving up its national language for English. On the one hand, it was feared that Germany had lost so much of its identity because of its recent history that it would give up on its native language as the language of teaching (Ammon & McConnell 2002: 5). By allowing a foreign language to be the medium of instruction in higher education this loss of identity might then be even further enhanced. On the other hand “[i]t may also be assumed [...] that language communities and countries with a tradition of having their own language as an international language of science, have still not shifted to English to the same extent as countries without such traditions” (Ammon & McConnell 2002: 21). This implies that the extent to which English-taught courses have been introduced in German-speaking areas of Europe might be lower than in other areas. For these implications, not only the field of study is of interest and importance (e.g. Humanities vs. Theoretical Natural Sciences) but also the country that research is conducted in and its history play a significant role in the adaptation of English-taught courses and programmes.

The reasons presented above should also be considered when thinking about why it took Germany longer than northern European countries to introduce English-

¹ For a detailed discussion of the post-war conditions that allowed English to become the dominant language of science see, for example, Kaplan (2001).

taught programmes (Ammon & McConnell 2002: 23). While it was suggested more than 25 years ago that “English has no chance of playing [...] a role in countries like France or Germany, at least not the important one of academic teaching” (ibid., referring to Gauger (1988)), from recent studies it becomes clear that these arguments are outdated and that English has in fact made it into science teaching also in countries like Germany and Austria (see e.g. Wächter & Maiworm 2008; Ammon & McConnell 2002).

From the last third of the 20th century onwards, an increasing use of a foreign language, i.e. English, for scientific communication also in the German language community was observed (e.g. Ammon 2008: 25) and, as an ongoing process can still be seen. In line with this, it was observed that it is mainly Germany, the Netherlands, and Scandinavian countries that take the lead in offering English-taught programmes at the tertiary level (Smit & Dafouz 2012: 2; Wächter & Maiworm 2008). A reason for this development could be that “[z]weifellos [...] die englischsprachigen Länder für den längerfristigen sowohl wissenschaftlichen als auch sprachlichen Wettstreit besser aufgestellt [waren] als die deutschsprachigen” (Ammon 2008: 31). This is also exemplified by Wächter and Maiworm (2008: 48) who state that “Germany has Europe’s strongest share [of English-taught programmes] in the natural sciences”. As Germany was characterised as a rather resistant country in terms of English-medium education, this high share of English-taught programmes can be seen as a strong indicator for English being used both in tertiary natural science teaching and in scientific communication in general all over Europe.

3.1.3. English as the language of science

Using only English in the natural sciences would obviously be in opposition with the European language policy of learning several foreign languages and not only English, i.e. the EU’s idea of mother tongue plus two other languages (see e.g. Coleman 2006: 5). It was thus suggested that the use of mainly English for “CLIL in European exchange situations sends a very powerful message about the language hierarchy” (Caudery, Petersen & Shaw 2007: 234). This was further reinforced by the results of their study which show that the most prominent reason for exchange students to study at the three Scandinavian universities under investigation was improvement of their English language proficiency (Caudery, Petersen & Shaw 2007: 239f.). Overall, it can be said that

“[h]eute ist Englisch die dominante internationale Wissenschaftssprache” (Ammon 2008: 36).

This dominant use of English as a common language in science “allows unprecedented possibilities for international co-operation, especially in the solution of scientific [...] problems” (Kaplan 2001: 19). The degree to which English is used depends on the discipline under investigation and on how knowledge is constructed within them (e.g. Kuteeva & Airey 2013). The reason found for the dominance of English in the natural sciences is the hierarchical knowledge structure within these disciplines, i.e. “new knowledge is built on the foundations of previous knowledge” (Kuteeva & Airey 2013: 14). From this it is concluded that “disciplinary differences will affect the use of English as an academic language with the natural sciences having the most use of English” (Kuteeva & Airey 2013: 6f.).

Further reasons for this uneven distribution of English language use in the different disciplines are best summarized as following.

For the Theoretical Natural Sciences communication with the immediate language community is less urgent than for the Applied Natural Sciences, which – for application purposes – use their own language (especially their national official language) to a greater extent and, therefore, English (if a foreign language) to a lesser extent, than do the Theoretical Sciences. [...] In addition, the language specifically used by the Social Sciences is less formalised than that of Theoretical Natural Sciences. (Ammon & McConnell 2002: 21)

Ammon (2008: 36f.) adds to these reasons that natural sciences are more specialised and thus English is needed to communicate with a larger number of experts of the same field and to establish a global network. He concludes, nevertheless, that “heute Englischkenntnisse für *alle* Wissenschaftler, die international kommunizieren und zur Kenntnis genommen werden wollen, [sind] so gut wie unerlä[ss]lich” (Ammon 2008: 39, emphasis added).

Overall, this section has shown the importance that the English language has gained in European and indeed world-wide scientific communication within the last century. It was also outlined that long ago Latin was the ‘scientific’ lingua franca as it was used for ‘world’-wide scientific communication. Furthermore, it was demonstrated that German was for some time considered as the most important language in science and why it lost this role in the first half of the 20th century. Today, English needs to be mastered by all scientists regardless of their native language. Thus, they should be confronted with that language not only in schools but also at the tertiary level of their

education. Despite the fact that “[t]eaching was pointed out as one of the strongholds, perhaps even the most resilient one, for the continuing role of languages other than English in science communication” (Ammon & McConnell 2002: 23), it appears that English-taught programmes have nevertheless been realised by responsible stakeholders and have been introduced in many European higher education institutions in recent years and are still growing in popularity.

3.2. English as the language of teaching in European higher education

While it is known that French and German play a role in teaching in higher education institutions as well, the dominant foreign language used for teaching in such institutions is English (Ammon & McConnell 2002: 7). Therefore, this section will only focus on the use of English in tertiary level teaching. Several studies revealed that the frequent use of English as a language of instruction in European universities and other higher education institutions is a rather recent development (e.g. Ammon & McConnell 2002; Dafouz & Núñez 2009; Coleman 2006; Wächter & Maiworm 2008). This still held true in 2008 and it can be assumed that the introduction of English-taught programmes is still an ongoing trend in higher education (Wächter & Maiworm 2008: 12).

As becomes clear from above, Wächter and Maiworm in their two studies (2002 and 2008) focused only on whole programmes being taught in English. Although the focus of this thesis is on one programme only, valuable conclusions can be drawn from a discussion of their findings. Moreover, it is considered essential to know about the situation of English-medium teaching in European higher education in order to fully understand the results, findings, and conclusions of the research conducted for this thesis and presented in later chapters. Only the more recent of the two studies will be considered here, i.e. the one published in 2008, as this is the latest comprehensive set of data available for all European countries.

The study found that English-medium teaching programmes were still rather an exception than the norm in European higher education in 2007 with only about two per cent of European students studying in such a programme. Wächter and Maiworm could conclude from their comprehensive survey that, in relative numbers, the Netherlands had the most programmes taught in English, followed by Germany, Finland, and Sweden. Furthermore, they found that English-taught programmes were more likely to be found

in larger institutions offering a wider range of subject areas and study programmes also at the PhD level. They thus characterized 'the typical' higher education institution offering English-taught programmes. (Wächter & Maiworm 2008: 7ff.)

The subject areas in which most English-taught programmes were found were engineering (27%), business and management studies (24%), social sciences (21%), and natural sciences (15%). Four fifths of the programmes offered in English were found at the Master level and were introduced for reasons like attracting foreign students, preparing students for the labour market or giving the institution a more sharpened profile. Some of these reasons will be further elaborated in the next section. Moreover, some problems with English-taught programmes were revealed by the study. These problems included mainly the lack of foreign students' knowledge of the country's native language, a small number of both domestic and foreign students interested in the English-taught programmes offered, and foreign and domestic students' weak command of English. In general, however, responses to the survey revealed that these problems with English-taught programmes were only rarely present in the respective institutions. (Wächter & Maiworm 2008: 12ff., 45)

Considering the number of higher education institutions that offer study programmes in English, Finland took the leading role, followed by the Netherlands and Cyprus. Austria took place 19 of 27 overall, but place 11 of 27 when it comes to numbers of programmes offered in English (Wächter & Maiworm 2008: 30). For Austria, precise information on the overall direction of change could not be given but "it seems clear enough that the teaching of English at Austrian institutes of higher education learning has expanded in recent times and probably will even more in the future" (Ammon & McConnell 2002: 34). Wächter and Maiworm's study reinforces this argument as the number of reported English-taught programmes had increased from 6 in 2001/02 to 23 in 2006/07, i.e. 0.8% and 1.8% of all offered programmes, respectively (Wächter & Maiworm 2008: 32). This number, however, is fairly low when compared to other countries, e.g. in Finland 13.9% of study programmes were offered in English in 2006/07, 11.5% in the Netherlands, and 3.7% in Switzerland. It needs to be mentioned that there were also countries with a lower share of English-taught programmes than the Austrian one. For example, in Germany only 1.6% of programmes were offered in

English (2006/07), 0.4% in Italy as well as in Portugal (ibid.)². More recent research focused on Austrian business faculties and found that more than 65% of English-taught programmes had only been introduced after the academic year 2009/10 (Unterberger 2012: 86), thus implying that the numbers from 2008 presented above are outdated and are more than likely to have risen since then.

The purpose of this section was to give a picture of the situation of English-medium teaching in Europe. It was demonstrated that English-medium teaching still is not a mainstream phenomenon in European higher education but is increasingly gaining ground in higher education institutions in European countries. In the next section, the major reasons for the introduction of such programmes will be outlined and discussed.

3.3. Reasons for introducing English-medium teaching

It seems to be obvious to everyone involved in education at the tertiary level that “[i]nternationali[s]ation is changing the world of higher education” (Knight 2008: 1). The impact of this internationalisation will be discussed in this section, focussing on the reasons why English is, was, or might be introduced at a university in the German-speaking part of Europe. Moreover, a general impression, i.e. the situation in other parts of Europe, should be established for the reader here. It goes without saying that not all of the following reasons are applicable to all higher education institutions in Europe. These reasons are, nevertheless, considered to be the most prominent ones and are even referred to as the “[d]rivers of Englishi[s]ation of European higher education” (Coleman 2006: 4). One of the reasons that Coleman gives, i.e. CLIL, will be omitted here and thoroughly discussed in section 3.4.3. The remaining reasons were chosen for further investigation at this point of the thesis.

3.3.1. *Globalisation and internationalisation*

There are two major reasons for the internationalisation of universities across Europe. Firstly, globalisation as a driving force affects politics and economy as well as it affects

² Note that all these numbers were obtained by following the ‘pessimistic scenario’, i.e. “a calculation of the percentage of English-programme-providing institutions [compared to] all institutions addressed in the survey” (Wächter & Maiworm 2008: 24) and are thus minimum numbers. Furthermore, in the last six to seven years numbers are more than likely to have further increased. This means that the actual numbers can be expected to be somewhat higher than those presented here.

people's everyday lives (Nastansky 2004: 49) and thus also higher education. This concept is expanded in the definition of globalisation as "the flow of people, culture, ideas, values, knowledge, technology, and economy across borders resulting in a more interconnected and interdependent world" (Knight 2008: 4). In contrast to this, internationalisation is, for the purpose of this thesis, understood as "the process of integrating an international dimension into the teaching and research function of a higher education institution" (Wächter 1999: 12). While the influence of globalisation on higher education must not be neglected, this thesis will only focus on the process of internationalisation as it is concerned more with the teaching in higher education than globalisation is. The second reason for the internationalisation of universities in Europe is the development of a "new European community", often referred to as the Bologna process when talking about academic life (Nastansky 2004: 49). Other scholars go even further and claim that internationalisation is "*the* central feature" in recent higher education developments (Knight 2008: 3, original emphasis).

This does, however, not immediately necessitate a shared language. Within the European Union for example, interpreters for every single European language exist and official documents published by the authorities of the European Union are translated into all these languages³. There is the possibility to argue that for the internationalisation of tertiary education, a common language can help to make the sharing of ideas, knowledge, and technology easier for people involved, provided all participants have sufficient language proficiency in that language. Such a language then constitutes a language shared by all participants, i.e. a lingua franca. If we assume English to be this shared language, we can speak of English as a lingua franca (ELF). It was also observed that "[a]cademia is one arena where speakers of different languages regularly communicate with one another, be it as lecturers, researchers, students or university bureaucrats" (Ljosland 2011: 992) and hence a common language is urgently needed there.

Another such arena is economy where an "increasingly borderless economic global dependency means that communication and the ability to use a lingua franca is becoming a prerequisite for individual success" (Coyle, Hood & Marsh 2010: 8f.). Hence, using such a lingua franca already at university, i.e. making education there more

³ See e.g. Phillipson (2003) for a detailed discussion of language policies in the EU.

international, might give students a benefit and probably even an advantage in their struggle for being personally and professionally successful. Furthermore,

[t]he increasing need for higher-education institutions to strengthen international profiles so as to achieve competitive advantage entails increasing pressure to ensure a suitably high quality of performance. Global competition often means teaching certain degree courses through the medium of English. (Coyle, Hood & Marsh 2010: 26)

Being an internationally competitive university or a part thereof, e.g. a faculty or department, seems to be a major reason for introducing courses and programmes in English. However, this is definitely not the only reason. For example, also international students and teachers coming to a university from abroad foster the introduction of English-medium taught courses and programmes.

3.3.2. *Student and staff mobility*

The mobility of university students and staff is, of course, possible in both directions, i.e. incoming and outgoing. Thus, universities across Europe have had to introduce programmes which are attractive not only to students from their own country, but to students from other countries as well. Concerning student and staff mobility, it was correctly remarked that

[t]he extent or degree of [the use of English] for teaching in institutions of higher education is an indicator of the possible degree of international mobility of students and teaching personnel within the European Union (EU), just as the lack of its use indicates the degree of maintenance of the national or other languages in this function. (Ammon and McConnell 2002: 26)

“[A]cademic mobility for students and teachers” is even included in some conceptions of internationalisation (Knight 2008: 1) and mobility is summarised as the “[m]ovement of people” (ibid.). Furthermore, it is claimed that

[s]uch movement includes students in award-based [programmes] changing location through semester/year abroad, internship or research [programmes], a full [programme] abroad; and the movement of professors/scholars and experts for purposes of teaching and research, technical assistance and consulting, sabbaticals and professional development. (Knight 2008: 24)

It is often argued that an increased mobility leads to an “[i]ncreased brain drain/gain including physical and virtual forms” (Knight 2008: 12, 15f.). On the one hand, a certain amount of competition between higher education institutions is favourable and

necessary to foster research. On the other hand, if this brain drain/gain ends in universities competing for students, scholars, and teachers at the expense of each other, this can be considered to be the a drawback of mobility. While some institutions might gain scholars others might lose them which would certainly reduce the reputation of these institutions. This highlights very much the interconnectedness of and also interdependence between European higher education institutions on a higher education market, where scholars and students are more or less free to work or study at a university of their choice.

One of the best known programmes that encourages student and staff mobility across Europe is Erasmus. The statistics for the academic year 2010/2011 give the following numbers of students studying abroad⁴. In the respective academic year, 190,495 students from all over Europe took part in the Erasmus programme in order to study abroad. Numbers for Austrian students going abroad (outgoing) and foreign students coming to Austria (incoming) are presented in Table 1 for selected countries. Spain, France, Germany, Slovakia and the Czech Republic were chosen as they were the most popular countries for outgoing Austrian students and staff and incoming students and staff as well. The United Kingdom and Ireland were considered because English is the main official language and the numbers for these two countries are hence of interest for this paper.

country of destination / origin	outgoing		incoming	
<i>total</i>	4,241	<i>per cent</i>	4,472	<i>per cent</i>
Spain	739	17.4	547	12.2
Germany	296	7	489	10.9
France	470	11.1	422	9.4
Slovakia	6	0.15	107	2.4
Czech Republic	78	1.8	279	6.2
United Kingdom	423	10	162	3.6
Ireland	147	3.5	52	1.2

Table 1: Incoming and outgoing Erasmus students: numbers for Austria in 2010/11.
<http://ec.europa.eu/education/erasmus/doc/stat/1011/studies.pdf>, 11 Nov. 2013)

⁴ Overall numbers of students studying abroad, i.e. not split up in terms of students' origin and destination, are also available for 2011/2012. Numbers have risen to 4,549 out-going students and 4,827 in-coming students. These numbers only consider student mobility for studying and not for placement. Detailed information on the countries of origin and destination for that academic year were not available by the time of the research (November 2013).
http://ec.europa.eu/education/erasmus/doc/stat/1011/countries/austria_en.pdf, 11 Nov. 2013)

Not only students make use of the chance to spend time abroad but also teaching staff that is willing to teach across Europe. All the numbers given below include staff going abroad both for teaching assignment and training. The numbers for selected countries of destination and origin are presented in Table 2⁵.

country of destination / origin	outgoing		incoming	
<i>total</i>	<i>1,022</i>	<i>per cent</i>	<i>1,212</i>	<i>per cent</i>
Spain	74	7.2	118	9.7
Germany	164	16	186	15.3
France	42	4.1	48	4
Slovakia	90	8.8	11	0.9
Czech Republic	33	3.2	91	7.5
United Kingdom	74	7.2	44	3.6
Ireland	16	1.6	9	0.7

Table 2: Incoming and outgoing Erasmus staff: numbers for Austria in 2010/11.
<http://ec.europa.eu/education/erasmus/doc/stat/1011/staff.pdf>, 11 Nov. 2013)

From Table 1 and Table 2 it can be seen that Austrian students favour other destinations for their exchange than the teaching staff. While the highest share of students chose Spain, this country was not as popular with teachers. They favoured Germany, which only ranks at the third place with students. Also teachers more often went to Slovakia and the Czech Republic. These two countries were, however, not attractive to students when looking at the number of those going there. The numbers also show that Germany and Spain were the two countries, where most exchange students *and* teachers in Austria came from.

It becomes clear from these numbers that many non-German speaking students and members of staff are present in the Austrian tertiary education sector. Although their numbers seem fairly small compared to the total student population, their presence must not be ignored. There are basically three possibilities of dealing with such students and staff members. The first one is to expect them to be proficient enough in using and understanding German in an educational setting, the second one is to run courses only for Erasmus students either in English or in any other language spoken by

⁵ Again, overall but no detailed numbers are available for the academic year 2011/12. Like with student mobility also numbers for staff mobility have risen. A total of 1,177 Austrian staff members went abroad and 1,291 of their European colleagues came to Austria.
http://ec.europa.eu/education/erasmus/doc/stat/1011/countries/austria_en.pdf, 11 Nov. 2013)

them, and the third possibility is to introduce English-taught courses and programmes. This would allow foreign students to follow a lecture or participate in a course without knowledge of a country's native language. The latter possibility, obviously, requires participants of Erasmus to have a good command of English.

The following section takes a step further as it intends to answer the question how matters of graduate employability influence the introduction of English-taught programmes at higher education institutions in Europe. Student mobility and graduate employability are interrelated as “[a]n opportunity to study abroad is at the same time seen as better preparing domestic students for international careers” (Coleman 2006: 5).

3.3.3. Employability

When graduating from a university these days, students will have to deal with an “increased international labo[u]r mobility” (Knight 2008: 1). Thus, it is one of the responsibilities of universities to prepare their students for this kind of market and to provide them with skills that will help graduates to survive under the current labour market conditions. One such skill definitely is to have a sufficient English-language proficiency. Ammon and McConnell (2002: 34f.) claim that, for example in Austria, “[t]here is a widespread feeling that the international competence of indigenous university personnel and students should be improved. Comprehensive skills in English are generally considered a crucial component of international competence”.

A very insightful study on the relation between graduate engineering students' English language competence and their employment rate was conducted not in a European context but in Malaysia (Kassim & Ali 2010). It focused on petrochemical engineering students and chemical companies. This focus on chemistry makes the survey even more interesting for this thesis. The study found that despite high academic qualifications of applicants, companies, especially multinational ones, often hesitated to employ them due to a lack of English language proficiency. Hence, the importance of a good command of English for employment in Malaysian multinational companies, especially for recruitment and promotion, is highlighted.

As English is used as a lingua franca in business communication not only in Malaysia but around the world, these findings can easily be transferred to a European

multinational company context as well (e.g. Nickerson 2005; Rogerson-Revell 2007). When preparing students for the working conditions that such companies offer and the language prerequisites they demand of their employees, a survey conducted in Italy found that 45% of teachers considered it important for their students to learn a foreign language in order to increase their international work prospects (Argondizzo, de Bartolo & Ting 2007: 52). Furthermore, 96% of the respondents named English as the most important language to know (ibid.). Hence, English-medium teaching in tertiary education offers one way of preparing students for the needs of these companies, especially if it includes explicit preparation for working in a multinational company. It was suggested that

students need to be exposed to a learning environment where workplace scenarios could be reenacted [in English] throughout the lessons. [This][...] will determine the engineering terminology, jargon, social conventions and even vocabulary that will be essential to the students. (Kassim & Ali 2010: 180)

English-medium teaching can increase a university's graduate employability rate. This is immensely important "for students whose access to a good employment track on graduation also depends heavily on their proficiency in English. Employability of graduates is, in turn, a common criterion of university rankings" (Coleman 2006: 5).

These rankings can be used by potential foreign students to compare universities and to choose the best one. For this reason, universities should be interested in constantly improving their position in these rankings. One way of doing so, as outlined in this section, is to prepare students well for their future working lives, i.e. to make them compatible with the international labour market's requirements and by doing so increase graduate employability. On the one hand, universities will not benefit financially from a good ranking directly but on the other hand, in many European countries tuition fees apply. Thus, attracting more foreign students often goes hand in hand with more income for the universities.

3.3.4. Attract foreign students

One of the reasons for introducing English-taught programmes in Austria is that its higher education institutions "[want] to have a greater share in the international academic market, so it is trying to attract more foreign students" (Ammon & McConnell 2002: 34). The same holds true for many other European countries (Ammon &

McConnell 2002). In Austria, in the Wintersemester 2012/13 (winter term 2012/13) 284,455 students were enrolled at universities or other higher education institutions. Of these students, 220,960 were enrolled at public universities with a share of 25% being foreign or exchange students, i.e. not being Austrian citizens. Altogether, the number of foreign students was 88,440 (Statistik Austria). Interestingly, this means that Austria is number five of the OECD countries when it comes to internationality in terms of foreign students (Die Presse, 25 Sept. 2013: XI).

Higher education has changed from “[being] seen as a ‘public good’ and a ‘social responsibility’ [towards] a tradable commodity or, more precisely [...], an internationally tradable service” (Knight 2008: 13). Thus, it is not surprising that there is a competition among institutions to attract as many international *and* tuition fee-paying students as possible (Knight 2008: 28). In order to be able to make a profit of fee-paying international students, a country has to introduce these fees first and they need to be high enough to contribute effectively to the income of the universities of that country.

In European countries often no tuition fees apply or, if they do apply, they are at a very moderate level as far as EU citizens are concerned. In Austria, Austrian and EU-citizens do not have to pay any tuition fees if they are degree seeking and as long as they do not exceed the time of study defined in the curriculum by more than two semesters. Non-EU citizens have to pay €726.72 per semester and non-degree seeking students or students exceeding their time of study will be charged an extra fee of €363.36 for each term. Students from the least developed countries do not have to pay any tuition fees to study at Austrian Universities. The situation in many European countries is similar to the situation in Austria, i.e. no tuition fees for EU students. (Study in Europe)

In some other European countries the situation is slightly different. In the context of this thesis, the Czech Republic is a very interesting case. There, students do not have to pay tuition fees if the medium of instruction is Czech. If, however, another language than Czech is used as a language of instruction, tuition fees will apply, starting at €1,000 a semester. The same system is applied in Finland, where EU citizens might be charged tuition fees if the language of instruction is not Finnish or Swedish. To have some idea of how considerable tuition fees for non-EU students can get, Sweden and Denmark are considered. The two countries charge these students tuition fees of about €10,000 per

year⁶ (Study in Europe). These examples clearly demonstrate that there is an economic factor involved when both changing the language of instruction and trying to attract foreign students, i.e. in the European Union basically non-EU students, to a country's universities.

As made explicit above, the idea of changing the language of instruction from a country's native language to English in order to attract foreign students is, of course, neither limited to the Austrian context nor the German-speaking areas in Europe in general. For example, a study conducted in 2004 in Hungary found that recruiting international students was the main reason for starting foreign-language medium programmes (Kurtán 2004: 130). It seems that also the recruitment of Hungarian students was an important factor for the introduction of such programmes (ibid.). When reading this study in the Hungarian context, it seems that stakeholders at higher educational institutions in Hungary could decide on their own whether to introduce English as a medium of instruction at their institution. As a lot has happened in Hungary since 2004, this might have changed in the meantime. Up-to-date research on the present requirements in Hungary is unfortunately not available.

In France, the issue of introducing English-medium instruction is dealt with differently. In May 2013, the French Parliament voted for an increase of courses and programmes taught in English at French Universities. This was done mainly in order to increase the number of international students. Another argument for more English brought up in the debate preceding this resolution was that French students' level of English should be increased to meet the challenges and expectations of an international labour market. However, critics raised their voices and demanded a withdrawal of the draft law because for them it resembled a danger for the cultural richness in France. (news.orf.at 23 May 2013)

As can be seen from the cases Hungary and France, higher education institutions as well as entire countries have realised the need for more English-medium instruction in education at the tertiary level. In Austria also some institutions seem to have realised this need. For instance, the head of the Technische Universität (TU) Graz claimed in an interview, published in *Die Presse*, that he intends to foster the internationalisation of

⁶ The actual fees that non-EU students have to pay in Sweden depend on the field of study. While students of Social Sciences, Humanities, and Law have to pay about €9,700, students taking courses in other Sciences, e.g. Natural Sciences, have to pay about €15,000 (Study in Europe).

his University by introducing more and more master programmes which are taught in English (Schwarz 2013). It is striking how clearly he pronounces his wish to attract foreign students when asked about his goals. He stated that they, i.e. the responsible stakeholders at TU Graz, “wollen jene [Studierende] ins Land holen, die durch besondere Qualifikationen glänzen und unserem Land auch etwas zurückgeben” (ibid.).

While it was shown in this section that the low tuition fees do not contribute a lot to the financial situation of universities in Austria, foreign students need to be attracted by Austrian universities in order to gain expertise and to bring highly qualified and motivated students to Austria⁷. One way of attracting such students is offering programmes in a language that they are able to communicate in. English as a global lingua franca offers itself to be that language. Another advantage of using English is the possibility of using authentic research and teaching materials.

3.3.5. *Research publications and teaching materials*

When it comes to researching and publishing research findings, English has been used more and more often from the 1950s onwards for reasons outlined in section 3.1. While for the period of 1980-90 Ammon and McConnell (2002: 18) argue that almost two thirds of the publications in natural sciences were in English, Lobachev (2008: 4) found that less than half of all scholarly journals were produced in English in 2007. What is striking about these numbers is that the use of English seems to have declined within this time period. This can be explained by the different foci that the scholars have, i.e. natural sciences only versus all fields, and by the gain in importance of other languages as, for instance, more than six per cent of scholarly journals were produced in Chinese in 2007 (ibid.). In the journals which do not focus on natural sciences German still plays a role with more than ten per cent of these journals using that language (ibid.). Research on publishing in a local language even suggests that “there are still plenty of disciplines within which researchers continue to publish in their native language as well” (van Weijen 2012). This means that in Germany and Austria German is still used to publish research results.

⁷ A very interesting instance of such an institution is the IST (Institute of Science and Technology) Austria. It establishes an international campus where English is the language of communication. In their mission statement it becomes clear that one of their goals is to bring experts from foreign countries to Austria and educate them further here. (<http://ist.ac.at/about-ist-austria/mission-statement/> 17 Nov. 2013)

Concerning the use of English teaching materials in Germany “English seems to be used *least of all* in publications for teaching, i.e. teaching materials” (Ammon & McConnell 2002: 23, referring to Skudlik 1990: 272, emphasis added). There seems to be a difference between German-speaking and other European countries in terms of using English teaching-materials at tertiary level. For example, a survey in Italy found that sciences are the field that contained *most* original English material throughout students’ academic lives with the actual amount used basically increasing hand in hand with the progress of their studies (Argondizzo, de Bartolo & Ting 2007: 53f.). A tendency similar to the one in Italy was observed in Norway. There, “the use of English texts [...] is widespread [...] even when teaching in Norwegian” (Hellekjær 2007: 73). However, the comparison between these observations for Germany and Italy and Norway remains questionable because of the more than ten years between the respective observations. Moreover, German is the language spoken by most people as a first language in the European Union (see section 3.1.2.) and Germany plays an important role in the European economy as well. This can explain two things. Firstly, it tells us why German might still be used in publishing more often than other European languages, excluding English. Secondly, it can explain why in Austria it took longer to introduce English as a language of publication than it took in Sweden, which has about as many inhabitants as Austria but not as many speakers of its language (see e.g. Gunnarsson 2001).

Despite this argumentation, Coleman assumes that English research publications are present in university teaching. He claims that “in the sciences, for example, up-to-date text books and research articles are obtained much more easily in one of the world languages and most readily of all in English” (Coleman 2006: 4, quoting Graddol 1997: 45). Additionally, he argues that more and more of the publications used for teaching are in English nowadays (Coleman 2006: 5f.). Thus, it will be interesting to find out whether some of the teaching materials used at the Faculty of Chemistry in Vienna are in English as well and if so, for what reasons they are used. Similarly, practical reasons might be considered by teachers using such ‘authentic’ research material as, for example, they do not need to translate such texts. One consequence of the use of teaching materials in English could be that the whole course is taught in English. Another option is the use of English teaching materials, e.g. articles or PowerPoint slides, while the actual presentation is conducted in another language than English, e.g. German. These are ways of how the availability of teaching material and research publications in

English can foster the introduction of English-medium teaching or a bilingual approach where English is only used for certain parts of teaching.

It becomes clear from the discussions of the motivation of higher education institutions to introduce English-taught courses and programmes that “[f]oreign language learning is NOT the reason why institutions adopt English-medium teaching” (Coleman 2006: 4, original emphasis). There are, however, approaches that focus on the teaching of language in tertiary education. The following section of this thesis will outline English for Specific Purposes, Content and Language Integrated Learning, and English-medium instruction as examples of such approaches.

3.4. Forms of English-medium teaching

Generally speaking, “[f]oreign-language-medium instruction is a form of education in which students receive academic instruction through the medium of a foreign language” (Kurtán 2004: 126). If this foreign language is English, we speak of English-medium instruction or English-medium teaching. The latter is used in this thesis as an umbrella term and refers to all approaches outlined here. English-medium teaching focuses on the teaching of subjects *other* than language via the medium of English (see e.g. Hellekjær 2010: 233). As the description of English-medium teaching in higher education is very general, the following sections deal with the different forms of realisation that English-medium teaching can take and will elaborate on them in more detail.

These forms of English-medium teaching can, for example, be summarised as plurilingual education, adjunct CLIL, and language-embedded content courses (Coyle, Hood & Marsh 2010: 24f.). While the first model is only suitable for specific types of higher education institutions because it expects students to master content provided in more than one foreign language, the latter two models are more commonly used. In Adjunct CLIL “[l]anguage teaching runs parallel to content teaching with specific focus on developing the knowledge and skills to use the language so as to achieve higher-order thinking” (ibid.). Although language is integrated in the study programme, it is still done so in a separate course, e.g. an ESP course as discussed in section 3.4.2. This is overcome with language-embedded content courses. Here, “[c]ontent programmes are designed from the outset with language development objectives” (ibid.), as discussed in sections

3.4.3. and 3.4.4., labelled CLIL and ICLHE in this thesis. Before discussing these two models of language teaching at tertiary level, another way of introducing English in higher education, i.e. English-medium instruction is discussed.

3.4.1. *English-medium instruction (EMI)*

The term 'English-medium instruction' or 'EMI' is often used as an umbrella term, referring to the use of English as a medium of instruction in general. For this thesis, as indicated above, English-medium instruction will not be used in this way but to refer to one specific kind of using English as a medium of teaching, i.e. changing the language of instruction to English without any considerations concerning language learning as it can be found for example in large-scale lectures that are taught through the medium of English (see e.g. Unterberger & Wilhelmer 2011 who also follow this distinction).

When talking about English as the medium of instruction, the general underlying development of interest is the medium of instruction (MOI), which does not include a specific language. As opposed to CLIL (see below), "MOI almost exclusively focuses on the content" (Hamid, Jahan & Islam 2013: 147) and does not include language-learning aims. It will become clear in this section and section 3.4.3. that "major differences" (Wannagat 2007: 663) exist between the two approaches. When teaching an EMI course it is assumed that students will improve their English language proficiency without training in the language itself but simply by being exposed to it (Hamid, Jahan & Islam 2013: 146, referring to Ali 2013a, Doiz et al 2012). Thus, the language learning effect in such courses can be considered to be rather incidental (Unterberger & Wilhelmer 2011: 96). As the focus of EMI is on the learning of disciplinary content, language in an English-medium instruction context is only used as a tool (ibid.). The absence of language learning goals for this type of courses is seen critically by scholars (e.g. Hellekjær 2007: 79). Hellekjær (ibid.) even speaks of "lost opportunities" for students' foreign language improvement.

English-medium instruction courses often take the form of a large-scale, expert-centred lecture, where the content is presented to a large number of students by one content expert only. Because of this large number of students it is rather difficult to focus on students' English language development and it can also be assumed that teaching a language goes beyond the lecturers' teaching competences in many cases. EMI lectures

target all kinds of students, i.e. native and non-native as well as exchange students (Unterberger & Wilhelmer 2011: 96). Another type of English-medium teaching, in which the focus is on language learning and not on content mastery, is English for Specific Purposes (ESP).

3.4.2. *English for Specific Purposes (ESP)*

When considering this approach to teaching English at tertiary level, it was observed that “most of the English taught at universities in Europe [in 2008 was] English for Specific Purposes (ESP)” (Räsänen & Fortanet-Gómez 2008: 12). While they tell us that the main difference between ESP courses and courses on general English is “that ESP students are already assumed to possess some general knowledge of English” (ibid.), other scholars argue that an “ESP competence” should be achieved by students which includes “functional, professional language and communication competence in the disciplinary field *and* in general” (Unterberger & Wilhelmer 2011: 97, emphasis added). Taking into consideration both these arguments, it can be said that on the one hand, ESP courses can rely on a certain language level of students when they start taking them, e.g. students have already studied general English at school. On the other hand, courses can also focus on improving students’ knowledge of general English. Nonetheless, it has to be kept in mind that students in such settings do not study English because of an interest in the language itself but rather because they need a specific language either for their studies or for their working lives (Robinson 1991: 2).

According to this need, Robinson (1991: 2f.) further subdivides ESP into EOP, i.e. English for Occupational Purposes, and EAP, i.e. English for Academic Purposes. There are, however, also scholars who sub-divide ESP in three major areas, which are then English for Academic Purposes (EAP), Business English (BE), and English for Science and Technology (EST) (e.g. Räsänen & Fortanet-Gómez 2008: 42). The latter gives a clear hint for the presence of courses focussing on the English language in a scientific field of study such as chemistry. Again another categorisation rather sees EST as “the main area” of English for Academic Purposes than as a direct subcategory of English for Specific Purposes (Dudley-Evans & St John 1998: 6f.).

Regardless of which of these definitions one follows, when it comes to English for Science and Technology courses, it was remarked that

EST covers the areas of English for written and for academic and professional purposes and of English written for occupational (and vocational) purposes, including the often informally written discourse found in [...] scientific and technical materials written for the layman. (Trimble 1985: 6)

Trimble, thus, does not only underline the distinction between EAP and EOP but also supports the distinction between EST and EAP, leaving out BE. EST courses are designed for students of scientific and technological subjects and should prepare the attending students not only for writing in an academic or university context but also for publishing results of their research in their later occupations. Furthermore, it was claimed that also writing for non-experts of that field should be part of students' university education (ibid.).

Having discussed the different terms that might be used to refer to English for Specific Purposes or parts thereof, the paper will now focus on the methodology used in this approach to language teaching at tertiary level. There are two different possibilities of teaching English for Specific Purposes. First, an Adjunct-CLIL approach is used if "the ESP courses are linked to the content courses in that ESP teachers use the materials and tasks that students are assigned in the content course" (Räisänen & Fortanet-Gómez 2008: 42). As CLIL is the subject of discussion in the next section, this part of the thesis will only focus on the second possibility, i.e. implementing ESP into the curriculum as a separate subject (Räisänen & Fortanet-Gómez 2008: 43) sometimes even without any connection to a content course.

It is also interesting that it was found in Germany that such ESP courses are not taught by universities themselves but rather by languages centres connected to the universities (Räisänen & Fortanet-Gómez 2008: 26). Thus, language courses are not only thematically distanced from content courses but also organisationally in these cases. Unfortunately, no Austrian University was included in that survey. Still, as Germany is related closely to Austria, the conclusion can be drawn that the situation in Austria might be the same. Tatzl (2011: 253), however, talks about the advantage that having internal language teachers has. At the FH Joanneum University of Applied Sciences Graz he observed that giving language teachers faculty status "allows the tailoring of language courses to the immediate needs of students and the requirements imposed by the [...] curriculum" (ibid.) as opposed to language courses offered by external centres.

Regardless of where ESP courses are taught, teachers of these courses have to take many different roles at the same time, e.g. researcher, course designer, materials

writer, tester, evaluator, and classroom teacher (Robinson 1991: 1) and therefore do not only need to be excellent teachers but also language experts. If the course is not related to any content course, teachers have to come up with relevant course materials themselves. There is, as mentioned before, also the possibility that an ESP course is loosely related to a content course. Then, the English teacher and the respective content teacher have to work together closely. For example, for ESP courses explicit language learning aims need to be formulated. These aims are, of course, highly dependent on the discipline that such courses are intended for and also need to take the respective content into consideration. ESP courses usually address non-native learners who are then being taught by a language specialist (Unterberger & Wilhelmer 2011: 96). This certainly is the best way to improve students' English language proficiency professionally, quickly, and effectively.

So far, this paper has presented two different kinds of approaches to using English in tertiary education. The first one was English-medium instruction (EMI), which focuses only on the content and not on the language. The second one was English for Specific Purposes (ESP), where it is basically vice versa, i.e. the main focus is on language mastery. The third approach to teaching English at the tertiary level presented in this paper, seeks to combine the two foci of EMI and ESP and, as mentioned before, is called Content and Language Integrated Learning (CLIL).

3.4.3. Content and Language Integrated Learning (CLIL)

It is very interesting in the context of this thesis that Coyle, Hood, and Marsh use a metaphor taken from chemistry to describe the idea behind CLIL when remarking that it "is an approach which is neither language learning nor subject learning, but an *amalgam* of both" (2010: 4, emphasis added). In chemistry, the term 'amalgam' refers to a mercury compound or alloy. Hence, CLIL in education can be seen as a compound of language and content teaching just like an amalgam in chemistry is a compound of mercury and another metal element. In other words, the integration of content and language is

an educational approach where subjects such as geography or biology are taught through the medium of a foreign language, typically to students participating in some form of mainstream education at primary, secondary but also tertiary level. (Dalton-Puffer, Nikula & Smit 2010: 1)

While this approach is successful at primary and secondary levels, at tertiary level there appear to be objections to its implementation (Räsänen & Fortanet-Gómez 2008: 22). In this section a theoretical background for Integrated Content and Language Learning in Higher Education (ICLHE) will be established. For doing so, CLIL methodology will be discussed because of an only small number of publications on ICLHE methodology and because of an overlap of major parts of the theory behind the approaches. Features specific to the tertiary sector will be presented in the subsequent section next to experiences gained from its implementation in higher education.

The history of English-medium teaching is thoroughly outlined by Mehisto, Marsh, and Frigols (2008: 9f.). According to them, the term CLIL itself came up in Europe in 1994. Nonetheless, also before the 1990s, similar approaches had been used throughout the world and throughout history. For example, a foreign language, i.e. the Sumerian one, was used by Akkadians for studying botany and other subjects more than 5,000 years ago. Later, Latin was widely used in Europe for communication among speakers of different languages (as discussed in section 3.1.1.). Whereas the use of Latin rather promoted a one-language-only policy, CLIL today seeks to foster foreign-language development in more than one foreign language if possible without threatening the native language. The movement of teaching in another language than the established language of education started in Canada in 1965 when English-speaking people living in the French-speaking part of the country had started to worry about their children's competence in the French language. They considered standard second-language teaching as rather insufficient. Therefore, a programme using language-immersion was established by the school authorities. In this programme, English-native speaking children could study their subjects completely in French. As this immersion programme was highly successful, similar approaches became popular in the rest of the world.

As a consequence, CLIL was introduced in more and more educational institutions and is already very popular today at primary and secondary levels of education. Ten years after the introduction of the term CLIL, the European Commission also referred to the secondary level when noting the benefits that the CLIL approach has.

Content and Language Integrated Learning (CLIL) [...] has a major contribution to make to the Union's language learning goals. It can provide effective opportunities for pupils to use their new language skills now, rather than learn them now for use later. It opens doors on languages for a broader range of

learners, nurturing self-confidence in young learners and those who have not responded well to formal language instruction in general education. It provides exposure to the language without requiring extra time in the curriculum, which can be of particular interest in vocational settings. The introduction of CLIL approaches into an institution can be facilitated by the presence of trained teachers who are native speakers of the vehicular language. (European Commission 2004: 8)

The attitude of learning now for immediate use is something that is usually attributed to the 'Generation Y', i.e. people born between 1982 and 2001 (e.g. Mehisto, Marsh & Frigols 2008: 11). This is also the generation which by the academic year 2013/14 constitutes the major part of the student population in tertiary education.

The European Commission above, like most scholars, uses the term 'language' when talking about CLIL rather than using 'English'. This clearly demonstrates that CLIL does not need to be confined to one language only, this language being in most of the cases English, but the approach can also be applied with any other language (Holdsworth 2004: 26). The awareness of the multitude of languages at disposal for use in CLIL is further illustrated when scholars talk about an "additional language [being] used for the learning and teaching of both content and language" (Coyle, Hood & Marsh 2010: 1, emphasis omitted) and thus avoid a reference to the English language. They, as examples of other languages used in CLIL settings, refer to the use of German, French, and Spanish in CLIL contexts in English-speaking countries (Coyle, Hood & Marsh 2010: 9). These languages might also be used in non-English speaking countries, of course. For example,

CLIL has involved Malaysian children learning maths and science in English. CLIL has been used for Norwegian students to do drama in German, Italian students to learn science in French, Japanese students to learn geography in English and Australians to learn maths in Chinese. The combinations of languages and subjects are almost limitless. (Mehisto, Marsh & Frigols 2008: 9)

Nonetheless, the importance of the English language is acknowledged as a "huge global demand for learning English [as] [...] a popular vehicular language in non-Anglophone areas" is seen (Coyle, Hood & Marsh 2010: 9). Moreover, despite all the arguments for *any language* being a potential language of instruction in CLIL, the integration of content and *the English* language is the main focus of this thesis. Regardless of the language used, it was observed that "a considerable body of educational research attests to student success in CLIL initiatives" (Mehisto, Marsh & Frigols 2008: 20). For example, it was found that being taught through the medium of English did not hinder content learning

in a secondary chemistry class in Poland (Gregorczyk 2012) and can therefore be said to be at least as successful in terms of content learning as native-language taught courses. Of course, it using CLIL adds the benefit of improvement of students' language skills. Moreover, the use of a CLIL methodology is considered to have benefits for both students' motivation and their language competence (Lasagabaster 2010).

No matter what foreign language is used as the language of instruction or vehicular language in a CLIL setting, the amount of this language can vary according to the approach that was chosen and the degree to which language should be integrated in a content lesson. This scale of amount of integrated language ranges from an almost exclusive use of the foreign language to only partial integration of the language (Coyle, Hood & Marsh 2010: 15f.). By this, also bilingual approaches are implied in which, for example, the language of instruction can be German but English is used for the teaching materials like PowerPoint slides. Another advantage of the integration of content and language learning is that "TL[, i.e. target language,] exposure is increased without a correspondingly higher demand on precious curriculum time" (Coleman 2006: 4), i.e. students are more or less automatically in contact with a foreign language. The amount of target language exposure is, of course, dependent on the amount of this language being used. Although exposure to the target language is also increased in English-medium instruction, the difference is that CLIL explicitly foregrounds the language and that language learning aims are usually included.

Having discussed CLIL, it has to be mentioned again that "findings [on CLIL at primary and secondary level] cannot and should not simply be transferred to the tertiary level" (Unterberger & Wilhelmer 2011: 95). One of the major differences is that while "language learning objectives are considered particularly important in secondary settings, in tertiary education they are rarely formulated explicitly" (ibid.). Because of this lack of language learning aims, scholars demand a formulation of such learning objectives when they state that successful integration of content and language learning needs more than a simple switch in the language as found in English-medium instruction. For instance, stakeholders' motivation and pedagogical issues are an important factor that needs to be taken into consideration (Argondizzo, de Bartolo & Ting 2007: 50). Furthermore, it was argued

that a successful [ICLHE] programme must: a) provide 'language support' for the subject teachers, b) be an official initiative of the Faculty which also recognizes

the extra preparation time needed, and c) be an extra for students who can, rather than impede those who cannot. (Argondizzo, de Bartolo & Ting 2007: 56)

Because of these differences, some findings of research on ICLHE will be discussed in the next section.

3.4.4. *Integrated Content and Language Learning in Higher Education*

On the one hand, reasons why CLIL pedagogy cannot simply be transferred from primary and secondary levels to the tertiary level include the difference in student population, different interaction formats between teachers and students, and a more challenging and more specific content. On the other hand, what is similar to CLIL at secondary level is the dual focus, i.e. there are learning aims for both content and language (Unterberger & Wilhelmer 2011: 96). ICLHE courses are usually taught by subject experts either on their own or in some form of team-teaching with a specialist of the language that is used. The target group normally consists of non-native language learners. In ICLHE courses language plays the role of both a mediator, a tool, and a subject (ibid.). Unless the content teacher is an expert on the language as well, the idea of having a dual focus is difficult to realise. Its introduction can be very challenging for higher education institutions in terms of having enough *and* qualified staff and paying for these additional teachers. As it was found that often no need is seen for the integration of content and language learning when teaching in English (Coyle, Hood & Marsh 2010: 24), these problems are sometimes not faced in English-taught programmes because an unintegrated approach is used.

Although these findings might suggest that CLIL is not of relevance in higher education, other findings clearly show the success that ICLHE can have. The introduction of this approach is often linked to the idea of improving language proficiency or meeting the needs of foreign students or students with a low English proficiency level. What is furthermore special about the Integration of Content and Language in Higher Education is the debate whether proficiency in an additional language should be seen as “part of the core of academic life, or [as] a secondary auxiliary science”. (ibid.)

As the idea behind ICLHE courses is to “[provide] students with the necessary ‘know-how’ of coping with situations like international conferences and meetings within the academic environment” (Argondizzo & Laugier 2004: 275), these courses should really be seen as being part of students’ everyday academic lives rather than

being only an auxiliary tool for their studies. ICLHE allows teachers to confront their students with subject-specific terminology in an additional language, for example English (Coyle, Hood & Marsh 2010: 10). This can prove especially useful when educating future chemists as it is very probable that they will have to use the English terminology alongside with the chemical terminology in their native language in their studies and also later when conducting their own research or in their future working lives. Although chemistry has many standardised formulas and symbols that are the same all over the world, other textual needs, for example, results of experiments and their discussion still need to be provided in an actual language. If students are expected to produce written documents and give presentations in English, training in this language should be part of their study programmes to offer them the best preparation possible.

The introduction of such courses or programmes needs to consider all participants. Studies came to the conclusion that “involving management and subject lecturers in the development [of an integrated approach] has proven to be realistic and useful” (Panday, Hajer & Beijer 2007: 104). If the responsible stakeholders decide on developing an ICLHE approach and thus to introduce more English in certain study programmes, experience has shown that “language tutors can effectively integrate appropriate and relevant content in a language skills programme, and that language staff can be effective in integrating language skills within a content course” (Wilkinson 2004: 454). This demonstrates the two major possibilities that exist, i.e. integrating language in a content course or vice versa. Overall, this approach to teaching language at tertiary level can be seen as an “innovative fusion” of subject and language learning (Coyle, Hood & Marsh 2010: 1) no matter if language is included in a content course or if disciplinary content is dealt with in a language class.

Any form of integration of language and content learning is seen as a necessity of successful language programmes in higher education by some scholars (e.g. Panday, Hajer & Beijer 2007: 100f.). Although courses focusing on language teaching and courses focusing on content teaching existed next to each other in the Netherlands, these courses were not as effective as expected. Panday, Hajer, and Beijer (ibid.) argue for an *integrated* approach and specific language learning aims in order to make language learning at the tertiary level more effective. Another experimental study that underscores the argumentation for an integrated approach was conducted at a Turkish

university which uses English as a medium of teaching (Erçetin & Alptekin 2007). It found that students following a language-focused curriculum, showed poorer performance in a content test than their colleagues taking part in a content-focused curriculum. Thus, it was concluded that a content- *and* language-focused approach, e.g. CLIL, seems to be favourable under these conditions. These two studies seem to demonstrate that an integrated approach like ICLHE is a good way of teaching language in higher education.

Research was conducted that focused on the differences that students perceive between English as a foreign language and ICLHE lessons (Pinyana & Khan 2007: 185f.). It found that students saw several advantages in the use of an ICLHE approach, i.e. they perceived certain features of ICLHE as being easier. Especially when it comes to tackling speaking skills students said that ICLHE was more similar to real life situations. While motivation seems to increase in such courses, a major objection found was that students felt that the content was not as dense in ICLHE lessons. Additionally, it was claimed that students needed to have sufficient English language proficiency in order for ICLHE to be successful. This implies that students who attend a higher education institution are expected to have good enough language skills, for example to follow an English-taught lecture, already at the beginning of their studies.

This seems to also be expected by some teachers at the Faculty of Chemistry (e.g. T1). As will be shown below, they expect their students to be able to follow a lecture or course in English without major difficulties. More of the results will be presented and discussed in the subsequent chapters of this paper following an outline of the research design.

4. English at the Faculty of Chemistry in Vienna

There is no full study programme offered at the Faculty of Chemistry at Vienna University in which the instruction is exclusively in English. While German thus is expected to be the most dominant language, occasionally also some English-taught courses, for example lectures or seminars, exist. It is mainly these courses that the research for this thesis focuses on. This interest includes both the amount of such courses being offered, the intention behind their introduction, teachers' attitudes towards them, and students' ideas and thoughts concerning English-taught courses. The research for this thesis was conducted between early November and December 2013. The remaining parts of the paper will present the research design in more detail, discuss the outcomes of the research at the Faculty of Chemistry in Vienna and relate them to studies conducted in other countries and in different study programmes.

4.1. Research Design

Although most studies on the field of English in higher education are “surveys of the extent to which a second language is used in educational settings” (Airey & Linder 2007: 163), research conducted for this thesis will focus rather on *why* English is or is not used at the Faculty of Chemistry in Vienna and what the consequences of its use. There will be a quantitative part as well when it comes to *how many* courses are taught in English at this faculty to establish a context for the reader. To gather information on both the *why* and the *how much* English is used in chemistry education at the University of Vienna, teachers and students at the respective faculty were used as a source of information.

4.1.1. Data – teacher interviews

Teachers were interviewed following a previously compiled interview guide (see appendix). The questions for the semi-structured, qualitative interviews were based on research conducted by other scholars in different settings and the interviews followed the guidelines outlined for example in Flick (2010: 194ff.) or Cohen, Manion, and Morrison (2007: 349ff.). The method of having guidelines for the interview requires the interviewer to come up with a set of guiding questions previous to the interview. These

questions need to be relevant to the theory, i.e. relevant topics are known in advance, and they need to be intelligible and unambiguous. Furthermore, the guidelines need to be coherent and the position of the individual questions within the bigger framework needs to be considered. The actual order in which the questions are then asked in the interview situation is dependent on the answers given by the interview partner and is open to be changed by the interviewer (Flick 2010: 222f.; Cohen, Manion & Morrison 2007: 349ff.). The interviews were conducted in the most convenient language for the interview partners. While three of the interviews for this reason were conducted in German, one was conducted in English. All the interviews were recorded and relevant parts of these recordings were then transcribed to allow an in-depth analysis of teachers' utterances as "without a transcript [...] talk is impossible to analyse systematically" (Cameron 2001: 31, emphasis omitted). A broad transcription of the interviews was considered to be sufficient for the purpose of this research. Thus, only the spoken words were transformed into written language and a standard orthography without indicating any form of intonation, volume, pause lengths or any other suprasegmental features (Ellis & Barkhuizen 2005: 28; Dörnyei 2007: 247). If, however, a word was emphasised by an interview partner and was relevant for the meaning of their utterances, this was indicated in the transcripts using capital letters (as suggested by Dörnyei (2007: 247)). In order to ensure teachers' anonymity, they were assigned synonyms consisting of a capital 'T' for teacher and a number from 1 to 4.

Core statements of the interviews were then fitted into categorical schemes and paraphrased to allow an easier comparison between them. These categories "are not predetermined but are derived inductively from the data analysed" (Dörnyei 2007: 245). The paraphrases were also translated from German to English to fit in with the language of this thesis. The categorical schemes were then each ascribed a label, i.e. coded. The category labels (codes) were thus derived from the interview data and were not decided in advance (Cohen, Manion & Morrison 2007: 369). As this includes both a simplification of the content and highlights the most important content and links it to broader concepts, it was a necessary step in the analysis of the interviews (Dörnyei 2007: 250). A list of codes derived from the interviews is included in the appendix. Teachers' utterances in the respective schemes were then compared and are discussed in the following chapter.

4.1.2. *Data – student questionnaires*

A different method was chosen to collect data on students' experiences, opinions, and ideas on English-medium teaching at the Faculty of Chemistry at Vienna University. As their number exceeds the number of teachers by far, questionnaires were considered to be the best way of collecting a significant amount of data. As with teacher interviews, the questions for the survey among students were deduced partly from the theoretical framework presented in the previous chapters of this paper and partly from other scholars' research in the field of English-medium teaching in European higher education (e.g. Airey & Linder 2007; Hellekjær 2004, 2007, 2010; Wilkinson 2004; Wilkinson & Zegers 2008).

In order to deal with the large amount of information, closed ended questions were included in the questionnaire where possible and whenever considered sufficient to get the information needed (Cohen, Manion & Morrison 2007: 320; Dörnyei 2010). It was, however, necessary to include open ended questions as well for two reasons. Firstly, because this study is more interested in students' opinions rather than a statistical evaluation of numbers of English-taught courses offered. The use of open ended questions allowed students to really give their opinions on the topic. The second reason for using open ended questions was to prevent the loss of unexpected answers by providing a certain set of possible answers as is the case with closed questions (Cohen, Manion & Morrison 2007: 321).

For reasons of convenience and practicability, the questionnaires were distributed online. To reach as many students as possible, first an e-mail was sent to all of them included in the distribution list of the Studienvertretung Chemie (student representatives). A second e-mail was sent two weeks later to remind students of the survey. Additionally, the link to the online questionnaire was posted in two facebook groups ("Chemiker und Chemikerinnen der Universität Wien", "LA Chemie Uni Wien") to make students who are not in the distribution list aware of the survey as well and to ensure a large sample rate. A copy of the online questionnaire is included in the appendix.

5. Teaching staff

Before discussing findings from the interviews with teachers at the Faculty of Chemistry, a limitation of these findings needs to be pointed out. Although many more teachers were contacted, only four of them were willing to take part in the research. This means that a general conclusion neither can nor should be drawn from these findings. Nonetheless, they still give some insight in what teachers might think about English-medium teaching at the Faculty of Chemistry at the University of Vienna and what practices there are when teaching in English. Table 3 lists teachers that were interviewed and gives basic information on them and on the interviews conducted.

synonym	home country	position	duration of interview	lines in transcript
T1	Austria	'regular' teacher	19min	256
T2	Germany	teacher of chemical didactics	21min	257
T3	Germany	teacher of 'Chemistry Journal Club' and 'Scientific Writing'	33min	311
T4	Spain	deputy director of studies	47min	439

Table 3: Summary of basic information on interview partners and interviews.

When these teachers conduct their courses in English, they take a

crucial role [...] in the promotion of language learning and linguistic diversity, not only because they have linguistic skills that they can pass on to their learners, but also because we see language teachers as role models, exemplifying the ideals of openness to other cultures, willingness to listen, tolerance, and so on: the values that [the European Commission] [hopes] language learning will imbue. (Holdsworth 2004: 25)

Although Holdsworth here refers only to language teachers, also subject teachers are role models. If they decide to use English for their teaching they also exemplify the ideal mentioned above. Therefore, the implications of English-medium teaching should not be underestimated. Moreover, it was noted that introducing courses in a second or even a foreign language, for example in English, takes much effort on the lecturers' side. This effort will not be taken by the lecturers if they are not convinced of the extra value that changing the language of instruction to English will bring (Sercu 2004: 547). As the possible effort depends partly teachers' English-language proficiency, in the next section, the interview partners' language backgrounds are discussed.

5.1. Teachers' language backgrounds

Fields and Markoc (2004: 520f.) remarked about teachers' language backgrounds that there are advantages of having English native speaking teachers conducting courses on the English language. These include their fluent conduct of the English language, student exposure to authentic English, and the potential benefit of non-native speakers from the presence of English native speakers. But there are also advantages of having non-English-native speaking teachers of English which Fields and Markoc (2004: 521) summarise as "common language, common cultural background, and common values" of students and teachers. Furthermore, non-English-native teachers are considered successful language learners that can provide new learners of that language with helpful advice and possibly also learning strategies.

None of the teachers that took part in the interviews was a native speaker of English. It could therefore be suggested that, although none of them teaches a course focussing on the English language as was the case for Field and Markoc's remarks above, they can be considered as role model for learning content. Moreover, as will become clear from teachers' self-report on their English-language skills discussed below, most of the interview partners can also be considered to be role-models for how to gain English language proficiency. One of the interview partners named Spanish as his mother tongue but English as his "favourite language" (T3, line 3⁸) all the others named German as their mother tongue. Two of them are from Germany (T2, T4), one is from Austria (T1). Interestingly, the only one who teaches courses which could be assumed to focus on students' language skills, is the Spanish native speaker (T3). Having no native speaker of English as an interview partner, the questions arises where teachers take the language proficiency from to achieve the "interactional skills [...] [that] have become increasingly relevant in moderni[s]ing the workforces found in certain types of higher education" (Coyle, Hood & Marsh 2010: 24), including, for instance, conducting lectures in English.

In tertiary education "many subject instructors are competent users of a foreign language" (Argondizzo, de Bartolo & Ting 2007: 48) and in Sweden, Bolton and Kuteeva (2012: 438) found that about 90% of teaching staff that the Science Faculty reported not

⁸ All quotations from interviews given in this paper refer to the lines in the transcript. This was considered to be the most effective way of quoting teachers' statements. For reasons of space, the transcripts are not included in this paper.

to have difficulties with writing and speaking in English. However, Argondizzo, de Bartolo, and Ting (2007: 50, 55f.) found that many of these instructors hesitate when it comes to teaching in a foreign language as they *feel* not competent enough in that language and thus utter objections towards teaching subject classes in English. All the teachers that took part in the current research felt secure enough to teach in English. A possible source of these teachers' English language proficiency might be that they spent a certain time studying or working abroad or even in an English-speaking country.

While T3 studied in the United States, T2 and T4 only spent short periods in English-speaking countries. When asked if she had spent time abroad, T1 remarks "leider nicht" (line 12) and she also rates her English skills as "ziemlich schlecht" (lines 4f.), whereas T2, who only spent four weeks in the United States, rates her English as "sehr gut" (line 5). T4 just generally comments on the fact that he has problems learning languages (lines 5f.). T3 achieved very good English skills in the United States and also the interview with him was conducted in English. The question is, if teachers, who perceive their English language skills as rather weak, also conduct lectures or courses in English and if they do so from where they take the language proficiency for doing so. Hellekjær (2007: 78), for instance, found that teachers who had spent a longer period in a foreign country felt more confident teaching in English than their colleagues who had not. The next section will explore if a similar tendency can be found at the Faculty of Chemistry at the University of Vienna and point out teachers' other ideas on teaching in English.

5.2. Teaching in English

The only one of the four teachers who teaches in English exclusively is T3 (lines 67f.). This may simply be due to the fact that he finds it "difficult to speak sort of scientific language" (lines 4f.) when using German. Opposed to this, T2 neither teaches any courses in English nor does she know of any didactic courses that are offered in English. T1 and T4 have different experiences and both of them have already conducted courses in English. None of these courses, however, was planned to be held in English but the circumstances then demanded it. For instance, the presence of an (exchange) student whose level of German is not sufficient to follow a lecture in that language can lead to

English-medium teaching. Both T1 and T4 switched to English when such a student was present in their courses.

When asked if she uses English for teaching, T1 agrees that she does so “vor allem wenn Leute dabei sind, also Studierende, die nicht Deutsch können. Da ist das notwendig” (lines 15f.). Usually, she checks at the beginning of a course if such students are present and then decides on which language to use, i.e. German or English. This procedure is not at all surprising when considering that, in Austria, “teaching in English seems to be aimed mainly at foreign students, [i.e. non German-speaking,] though Austrian students are also able to participate” (Ammon & McConnell 2002: 34). The more or less same technique is used by T4. He does not announce any of his lectures to be in English but in reality he often uses this medium of instruction. The reason he gives for this is that there are

Lehrveranstaltungen [...], die sowohl für Masterstudierende als auch für Studierende des Doktorats angeboten werden und Studierende des Doktorats haben halt die Voraussetzung, dass sie English sprechen müssen um dafür zugelassen zu werden [...] und da kommen die[se Studierenden] [...] in die Lehrveranstaltung und sagen ‚Ich möchte mitmachen‘. (lines 29ff.)

Then, of course, the lectures have to be conducted in English. “[T]he presence of a single exchange student [in] a course” was found as a reason for changing the language of instruction to English in Sweden (Airey & Linder 2007: 161, referring to Airey 2004). This obviously holds true for the Faculty of Chemistry in Vienna as well.

Having outlined that there are lectures conducted in English by teachers who are native speakers of German or Spanish and not of English, the paper will now discuss problems that these teachers encounter with English-medium teaching. Although she assesses her English language skills as rather weak and has not spent time abroad, T1 claims that she manages to teach in English without problems (line 20). Also T4 has not faced any problems so far when teaching in English but he states that it is easier for him to transmit content in German because it is his mother tongue (lines 81f.). Interestingly, none of the teachers claims to have encountered any problems concerning the use of English for teaching content, which implies that they perceive their language skills to be sufficient for the purpose of English-medium teaching.

If there are no problems that teachers see, are there any other differences that they notice when using English as a medium of instruction? The interview partners’ opinions on this topic are somewhat divided. T1 states that she “eigentlich keine

Unterschiede feststellen [kann]" (line 46), especially in the "Fachsprache" (lines 46f.). While concerning the presentation of content, T4 agrees with T1 that there are no differences, he notices a reduction in the speed with which this content is presented compared to German-taught lectures (line 57). Despite the use of different methods, i.e. self-report vs. external observation, this ties in with Airey and Thøgersen's (2011: 209) findings. When observing EMI lectures they found that "the lecturer takes 22% longer to present the same content in L2 compared to L1". Furthermore, they found that lectures slow down when using a second language instead of their first one, an increased use of repetitions, and also a reduction of syllables produced per second was noticed. All these observations were made by external researchers and are difficult to make self-reportedly. The experiences and changes mentioned by the interview partners for my study were all self-reported. Therefore, more in-depth research on the changes of lecturers' speaking styles could be conducted, was, however, not part of the research presented here.

Not only presenting content takes longer, but it was also found that teachers need more time preparing for courses or lectures taught in a foreign language (Jochems 1991: 315). As the only one of the interview partners, T4 observes that preparation for English-taught lectures takes him up to 20% longer. This argument, however, might not be applicable if he intends to teach in German but then has to use English spontaneously. In fact, he then cannot really prepare for using English. When he knows that he needs to use English in a lecture then preparations are more laborious, "[w]eil man sich die ein oder andere Formulierung noch überlegt und dann halt doch noch einmal in einem Wörterbuch oder wo nachschaut, um keine Zweideutigkeiten wo mit rein zu bekommen" (lines 65ff.).

So far, it has only been assumed that English is used as the medium of instruction in courses or lectures. English can, however, be integrated into a course in many different ways and to different degrees. For instance, in Sweden it is usual "to have lectures in Swedish with course texts in English" (Airey & Lindner 2007: 161). T2, for example, does not teach any courses in English but sometimes uses articles in English that students have to read. When doing so, she notices that some students have problems understanding these articles (lines 27ff.). As a solution for students' problems she suggests offering a choice of texts and to include at least one in German or having group discussion phases in which students can exchange the information they

understood from a text in English (T2, lines 38ff.). The limitation of this method is that it can only be applied easily in seminars and not in lectures. T1 appears to vary the degree to which she uses English a lot. She mentions using English on her slides and also her talking accompanying these slides is in English if necessary (lines 22ff.). Furthermore, she sometimes uses English for her lecture notes (“Skript”) and also recommends reading literature in English. T3 notices a bilingual approach that some of his colleagues use. He states that “even when [the professors] speak in German, the presentations, or part of the PowerPoints would be in English mostly” because teachers simply “recycle some of their materials [from conferences] in courses” (lines 95f.). Additionally, most of the manuals for the laboratory equipment are written in English only (T3, line 217). A slightly different viewpoint is taken by T4, who says that, after all, it is “eigentlich ein Vortragen auf Englisch” (line 39) and that he mostly uses his slides for visualisation, for instance of spectra, so that “der Schriftanteil in den Unterlagen ist [...] eher sehr gering und durchaus gemischt” (line 43). Thus, he also implies that, if text is part of the slides at all, this text can be either in German or in English.

Also student-teacher interaction is part of a lecture, e.g. when students ask questions. All interview partners that conduct courses in English allow students to ask questions in German. Even the Spanish-native speaker (T3) has no problems with students asking questions in German. T1 and T4 report on a strategy to deal with questions asked in German in an English-taught course. T1 usually gives the answer in German but “fallweise” (lines 63) translates it to English for people unable to understand her German answer. A very similar strategy is used by T4. He answers in German as well and then gives a brief summary in English (lines 96ff.). This is additional time that he needs in English-taught courses and it might therefore contribute to the fact that transmitting content in these courses takes longer (ibid.).

Another part of teaching at university involves reading and grading students’ papers and theses. These can also be written in English. It is, however, no requirement to do so in any study programme offered by the Faculty. Generally, students are free to choose the language and several choose English (T1, lines 82f., “eine Reihe von Masterarbeiten, Diplomarbeiten, die auf Englisch verfasst wurden”). On the bachelor level T4 notices a distribution of theses written of about half English and half German with the latter exceeding slightly. When writing their dissertation, T4 urges students to use English. The reason that T4 gives for preferring English for the PhD thesis is that

students “dann, wenn sie sich irgendwo bewerben, was Internationales in der Hand haben und nicht nur auf den deutschen Raum begrenzt sind” (lines 116ff.). Also, students can improve their language proficiency when writing papers in English. Hence, writing in English is considered good language practice for students and the papers are accessible to a wider audience if they are written in English (T3, lines 118f.). T1 notices that especially students who want to specialise as scientists use English more often in their thesis than other students (lines 90f., “Studierende, die eben sich in der Wissenschaft spezialisieren wollen”). If one of the students strictly refuses to write in English, they can write in German as well, also PhD students (T4). There are multiple reasons which influence students’ preference of language and therefore also how they perceive English-taught courses.

But which of these reasons are also noticed by the teachers? The general answer to this questions seems to be ‘none’ when considering what the interview partners reply to the question whether they see any problems that students (might) have when courses are conducted in English. T1 affirms this by saying that teaching in English “ist überhaupt kein Problem. Heute können eigentlich alle Studierenden gut Englisch” (line 42). When T4 changes the language of instruction to English, students at the master level have the right to insist on German because it is the official language there and his lectures are announced to be held in this language. This, however, does not seem to be the case very often because the use of English as a medium of instruction “wird eigentlich sogar ganz gut angenommen” (T4, line 89). All these answers imply that teachers do not see the need for any English-language support for students because their language level is perceived as being sufficient anyway.

This ties in with the idea that there is “[a]n unwritten assumption in many [...] countries, e.g. the Netherlands and Sweden, [...] that students already possess good knowledge of English and therefore do not need special training” (Räsänen & Fortanet-Gómez 2008: 43). Some teachers at the Faculty of Chemistry share this assumption. For instance, T1 claims that “die Studierenden müssten eigentlich schon mit ausreichend Englischkenntnissen kommen, weil das wird schon erwartet” (lines 148ff.). T4 thinks that “Schulenglisch” (lines 429) is the language level that is expected of students and that it is the students’ own responsibility to find out whether they need to improve their English or not (lines 434ff.). A study on students’ language proficiency was conducted with students in English-medium taught courses in Norway. From the results of this

study it was concluded that it should *not* be “[taken] for granted that beginner students have the [...] levels of English proficiency required for [English-medium] instruction” (Hellekjær 2004: 159). It can be assumed that for the Austrian context this definitely holds true and problems might be even bigger here because of the high level of English that is usually ascribed to Norwegians (cf. Hellekjær 2004: 159).

The two other teachers, i.e. T2 and T3, take a more distinctive view on the issue of what language level to expect from students. One of them notices that some students’ English is “insufficient for pursuing real science” (T3, line 146) when they enter university and the other one claims that it is important to language-wise pick up students from where they are and help them to improve their language skills from there on (T2, lines 203ff.). She remains, however, unclear on who should foster this improvement and how this should be done. Furthermore, she claims that “Schulenglisch” is definitely not enough because a more scientific English is needed at university level which is not taught in schools (lines 231ff.).

Moreover, teachers were asked what they would recommend to students to further improve their English language proficiency. The answers range from reading many scientific articles in English for improving vocabulary and style (T1, lines 111ff.) or speaking a lot to gain proficiency (T2, lines 195ff.) to attending courses in English (T3, lines 137f.) or taking language courses offered by the university (T4, lines 147ff.). All four teachers have some idea on how students could improve their English language proficiency. Therefore, it can be said that they see a need for their students to increase their English language proficiency in order to become (more) successful students and, later on, scientists. Apparently, teachers give some value to having English-language skills.

5.3. The value of English

“[I]n an English-medium programme [or course] where the aim is the development of knowledge and skills about specific content areas, the upshot [of Wilkinson’s findings] implies a relatively low value placed on language per se” (Wilkinson 2004: 456). As basically all English-taught courses at the Faculty of Chemistry at Vienna University follow EMI principles, it can be assumed that no language learning aims are part of this teaching. T1, without knowing, agrees with this by saying that “in der Chemie [steht] die

Sprache überhaupt nicht im Fokus” and that students’ language errors are neither corrected in German nor in English (lines 53ff.). As a reason for not including any language learning aims in his teaching, T4 names the fact that he is no language expert and does therefore not presume to teach the English language (lines 105ff.). Research on that area found that at Maastricht University “faculty staff do not see it as part of their role to develop students’ language abilities” (Wilkinson 2004: 456) and in Sweden teachers replied that they were content and not language experts (Airey 2012: 74f.) and, obviously, teachers of chemistry in Vienna think so as well.

It was outlined in a previous chapter that English is the main international language used in communication in science. Although the focus of this paper is on *teaching* in English, this section intends to find out what role teachers and researchers of chemistry assign to English as a language of research and publications. All four teachers see the value and the importance of the English language in chemistry. This is affirmed by remarks like

[s]ie ist das Medium oder die Sprache die eigentlich von jedem in jedem Land beherrscht wird und ist somit DAS Kommunikationsmedium und ja, ist vielleicht auch kein schlechtes Kommunikationsmedium weil so schwierig ist die englische Sprache jetzt nicht im Vergleich zum Deutschen. (T4, lines 308ff.)

or “Ich glaube, es ist das Englisch tatsächlich besonders geeignet. Es gibt sehr, sehr viele Worte, sehr viele Möglichkeiten sich auszudrücken” (T1, lines 197f.). Its role in chemistry is described as “tragend” because everybody can communicate with everybody else (T1, line 195). According to T2, in chemical didactics English is the language most commonly used in international communication and publications. T2 does not only state that publications need to be in English in order to publish and distribute them internationally (lines 119f.) but also that it is getting more and more normal to use English (lines 135f.).

This increasing use of English does not only hold true for spoken interaction but English has also become the most important language for publishing research results and by doing so making them available for a much wider audience. Like T3 remarks,

I think there is still some things published in German but probably nobody will really consider publishing important work in German because very few people would be able to read it. So things that are published in a local language are generally not accessible to many people. So it would almost be a waste to publish it in a language other than English. (lines 155ff.).

Although T1 (lines 186ff.) thinks that content is more important than the language when publishing in chemistry, she also admits that an article might be rejected if the English used is unintelligible for the reviewers and that therefore a good English is also important in international research publications.

But what happens if only German-native speakers communicate with each other or if research is published only for a very restricted readership, e.g. only German-native speakers? Then, it seems, German still plays a role in the Austrian context. This is exemplified by T1 who states that “wenn sich etwas in [ihrer] Forschung nur auf Österreich bezieht, nicht international publiziert wird, dann wird das natürlich auf Deutsch gemacht” (lines 34ff.). T2 even uses a different language depending on her audience. She uses “Englisch hauptsächlich, wenn [sie] an die Fachdidaktik [spricht], also auf Forschungsebene [und] Deutsch hauptsächlich, wenn es darum geht, das auch an Lehrerinnen und Lehrer publik zu machen” (lines 115ff.).

Publishing research in English for an international audience is definitely an important and necessary skill for “academic staff, whose international careers depend on a demonstrated ability to teach and publish in English” (Coleman 2006: 5). After a brief excursus on the use of English for research and research publications, this quote leads back to the main focus of this thesis, i.e. English-medium *teaching*. The following section presents teachers’ ideas on the ways in which English should be part of the chemistry study programmes at the Faculty of Chemistry at Vienna University.

5.4. Teachers’ ideas on English in chemistry studies

The first questions that needs to be answered here is if teachers think that more teaching in English should be part of the chemistry study programmes. When asked about this T1 answers “[e]igentlich schon” after hesitating briefly (line 120) and then reinforces her answer by saying that the current trend is towards using English and if one wants to work as a scientist, one needs to have good English skills (lines 122f.). From her own experience T2 knows that introducing more English-taught courses can be useful for students.

Ich würde das schon sinnvoll finden, weil ich zum Beispiel gemerkt habe, als ich das erste Mal auf so internationale Konferenzen gefahren bin, dass mir vor allen Dingen die Fachvokabel gefehlt haben. Ich konnte zwar, also ich habe mich eigentlich auf mein Englisch verlassen und habe so das meiste verstanden, aber

die ganzen fachsprachlichen Begriffe, sei es jetzt für die Chemie, aber auch die Chemiedidaktik, oder science education, haben mir am Anfang total gefehlt. (T2, lines 96ff.)

T4 also is in favour of having more English-taught courses at the Faculty of Chemistry. Next to the fact that there are non-German speaking students, especially at the doctorate level, he also claims that it “auch den eigenen Studierenden [...] sehr, sehr gut tun [würde]” (T4, line 155). One problem that he sees is that, at the University of Vienna, the introduction of English-taught courses needs to be “kostenneutral” (line 159) and therefore it can work out if the lectures are *only* conducted in English. For financial reasons, it is not possible to have a German and an English lecture on the same topic running parallel. Additional teachers would be needed for that. Therefore, the use of English as a medium of teaching can only be realised by teachers using English-medium instruction in lectures and courses that are offered anyway. While T4 is definitely in favour of using more English at master and doctorate levels, at the bachelor level he seems to be more hesitant. Firstly, because the Technische Universität (TU) Wien offers the same study programme in German and he fears that students will then rather attend TU than the University of Vienna and secondly, because he thinks that students should also know field-specific vocabulary in German and not only in English in case they wanted to work in Austria (T4, lines 180ff.).

T1 agrees that teaching in English might threaten German as a language of science. Therefore, “würde [sie] nicht gerne nur auf Englisch lehren” (line 50). Another point of view is taken by T3. He claims that “people do not really lose [the German terms], this is something they do in high school so they know the terminology, at least a lot of it” (lines 272f.). T2 (lines 238ff.) on the one hand, claims that it is important to be a confident user of one’s mother tongue in order to be able to learn another language and to have this language as a medium of instruction in tertiary education. She emphasises that the knowledge of field-specific vocabulary in German is important for German-native speakers. On the other hand, she remarks that it would sometimes be easier not to have to look for a German equivalent of an English term because some of them are difficult to translate and do not keep their original meaning when translated (ibid.). This opinion is also supported by T3 (lines 237f.) who states that “a lot of terminology does not even exist in German or is just no longer in use in German even by German-speakers”.

Despite these concerns, all interview partners, as outlined above, are in favour of introducing more English in the Chemistry study programme. They differ, however, slightly concerning in what forms English should be introduced, for instance only in EMI lectures or should there be something like ESP or EST courses. T3, for example, disregards language learning at all when saying that even in the ‘Scientific Journal Club’⁹ course language matters are not addressed explicitly. For other courses taught in English, he claims that “these are chemistry courses with the content of chemistry and it is not really the[ir] purpose to teach English” (T3, lines 122f.). When asked if he would welcome courses whose purpose it would be to teach English as a language, he answers, “Probably there are people who would benefit from it [...]. [S]ome people have relatively poor English skills in which case they would probably benefit [from] such courses [whose purpose would be] to get people up to a decent level as quickly as possible” (lines 285ff.). He does not think, however, that such courses need to be conducted by the Faculty of Chemistry but suggests university-wide language courses. In general, he does not see the need for such courses for all students because “people who start the university are young enough to learn the language quickly when exposed to it” (lines 291f.).

This argumentation is countered by T2 (lines 220f.). She definitely thinks that there need to be language courses (“Aufbaukurse”) for students who feel insecure in that language. She is the only one definitely in favour of such courses. Research in Turkey found that it seems to be more common to have such courses there as “English-medium instruction usually follows a year-long intensive English [programme]” there (Fields & Markoc 2004: 508). T1 (line 125) only mentions lectures that should be conducted in English and T4 (lines 207ff.) remarks that having courses focussing on the English language would be problematic time-wise because there is so much chemical content that needs to be transmitted in an already very limited amount of time. Furthermore, additional teachers would be needed as there are currently no language experts teaching at the Faculty of Chemistry, which would not be manageable without additional costs.

⁹ The ‘Scientific Journal Club’ according to the Vorlesungsverzeichnis “is intended for students who wish to improve their ability to read, analy[s]e and understand scientific literature” (Vorlesungsverzeichnis, accessed 20 Mar. 2014).

The last question that this section deals with is the moment when English should be introduced according to the interview partners' opinions. Apart from T4 all teachers seem to take a 'the earlier the better' attitude. While T4 (lines 164f.) suggests to really start with English-medium teaching at the master level to prepare students well for the doctorate level, T1 confirms that she would already confront students with English in their first term¹⁰. Waiting too long is a disadvantage that T3 (lines 255ff.) sees and as studying chemistry at a university in his eyes is a commitment to being a scientist, it can only be an advantage for students to use English from the very beginning of their studies onwards. While T2 (lines 203ff.) agrees that English should already be used at the bachelor level and then more extensively in the master programme, she even takes a step further. In her opinion, if an integrated approach was used, this should really start at a pre-school, i.e. kindergarten, level already.

Obviously, there are different opinions on when and how to introduce English at the Faculty of Chemistry. These opinions range from introducing English as soon as possible to only really starting with English-taught courses at master or even PhD level. Special courses focussing on the English language seem to be only welcomed by one interview partner. The question arises if there are any prescriptions by the University of Vienna on these issues, which would clarify the whole situation and would make it less 'wishy-washy'. The next section deals with exactly this question.

5.5. Language prescriptions and language support

In 2004, 60% of the teachers conducting courses in the Hungarian foreign-language medium programmes were not at all prepared for the challenge of teaching in a foreign language (Kurtán 2004: 131), in Italy 77% of universities did not offer language support for their teachers in English-medium programmes (Costa & Coleman 2012: 14). These numbers imply that there is neither language preparation nor language support for the majority of foreign-language medium teachers in these countries.

At Delft University of Technology (the Netherlands), where all master programmes are offered in English, non-English-native speaker teachers were screened for their language proficiency in the academic year 2006/07 (Klaasen & Bos 2010). It

¹⁰ In a way she also contradicts herself as later in the interview she claims that it would not be useful to teach 'Allgemeine Chemie', i.e. the very first lecture that students have to take when starting to study chemistry, in English (T1, lines 141f.).

was found there that most scientific staff had a C1 language level according to the Common European Framework of References for Languages (CEFR). Nonetheless, students complained about teachers' English language. Therefore, Klaasen and Bos (2010: 75) claim that the University of Delft has "to offer [students] the opportunity to listen to lecturers with a C2 level of English and provide the opportunity to acquire the languages at an acceptable level themselves". Hence, they clearly utter the need for language support for teachers. The University of Copenhagen has even gone a step further as it "introduced a certification of teachers who lecture in English" (Cancino 2011: 150). These two examples show that teachers' English language proficiency should be an issue and that support should be offered for those teachers in need of improving their English language skills. This section intends to present the situation within the context of English-medium courses at the Faculty of Chemistry at Vienna University and by doing so to find out if there is any language support offered for the teachers and if the language of instruction is somehow prescribed by the University management

General prescriptions given by the University that concern language are not known to any of the interview partners. It appears that the only thing required by the University to be in English is a short course description for the course catalogue and that there the language of instruction needs to be made explicit (T3, line 177; T1, lines 134ff.). The possibility to choose the language of instruction in the course catalogue is an indicator for T1 (lines 140f.) that it is "schon von der Uni her vorgesehen, dass man [...] jede Lehrveranstaltung auch auf Englisch abhalten darf". Although at the doctorate level it is "nicht vorgegeben[, dass da Englisch verwendet werden muss]" (T4, lines 231ff.), English still has to be used in T4's opinion at that level because of the "Zwang der Wissenschaftssprache Englisch" (line 230). Also for the other study programmes, i.e. bachelor and master, "gibt [es] keine Vorgabe, dass es eine Fremdsprache sein muss. [T4] weiß nicht, inwieweit es reguliert ist, welche Fremdsprache es sein *kann*" (T4, lines 239f., emphasis added). As there are no clear language prescriptions, "hängt [es] dann quasi vom Lehrenden ab [welche Sprache verwendet wird], der kann selbst entscheiden" (T1, line 143). T4 (lines 246f.) claims that, if there were any language prescriptions, at least the possibility to choose between German and English should be obtained.

When English is used as a medium of instruction, and obviously it is regularly used for teaching at the Faculty of Chemistry, there should be some sort of language support for the teachers in order to make their English-medium teaching more effective (cf. Argondizzo, de Bartolo & Ting 2007: 56). The interviews conducted for this study revealed that T1 did not seek any support and thinks that it is expected of teachers that they can teach in English (lines 159ff.). T3 agrees that

university professors – at least in the sciences – have a good knowledge of English, especially the younger ones who have had more exposure [...] and so their English is better and they are probably more willing to, or more interested in teaching in English. (lines 188ff.)

This exposure to the English language, for instance in e-mails or at international conferences, is assumed to be enough language training for teaching in English (T3, lines 210ff.). T4, when asked if there is any support offered for teachers using English as the medium of instruction replies, “Also möchte ich jetzt nicht mit ‘Nein’ beantworten, möchte ich aber auch nicht explizit mit ‘Ja’ beantworten” (lines 255f.) and thus remains very vague. The only interview partner who explicitly knows about support offered by the university is T2. She mentions “etwas, was in Richtung geht ‘auf Englisch präsentieren’” (line 176f.) that is offered for teachers.

T3 (line 229) does not think that there is any official support by the University for researchers *publishing* in English and while he suggests that “the only option would be to hire someone to read it”, T2 took a course on scientific writing in English. Some of the coaches that conducted this course also offered further support afterwards. Generally, teachers need to look for support themselves and sometimes find it in the journals that also offer language support (T2, lines 161ff.). It depends on how important a paper or an article is whether she seeks support or not (T2, lines 170ff.). T4 knows courses that focus on scientific writing but he also remarks that these courses are usually conducted for students but teachers could also attend them (lines 267ff.). Despite T1 claims that it is “üblich” to ask for support, she does not do so when publishing in English (lines 177f.).

To sum up, there is some language support when publishing in English known to three of the interview partners. When it comes to English-medium teaching, less support is known to the four teachers and it was even suggested that no support is needed as teachers’ language proficiency is good enough. It seems that the University of Vienna, on the one hand, welcomes English as the language of instruction but on the other hand, no

prescriptions are made on what language to use. In 2001, de Cillia and Schweiger noted that the Austrian legislation in general hardly considered the dominance of the English language in science and in particular no adequate language policies existed at Austrian universities that use English-medium teaching¹¹. According to more recent information found on website of the University of Vienna, there are now plans for a “([f]urther) development of study programmes (master’s/PhD) conducted in a language other than German” (Uni Report 2010: 8). This, however, does not seem to have already been realised yet and is not mirrored in teaching at the Faculty of Chemistry. As a consequence, it is up to the teachers to choose a language of instructions. If teachers decide to use English, also students are affected by this decision. Their opinions will be subject of discussion in the next chapter.

5.6. Summary

This section has presented four teachers’ ideas on English-medium teaching at the Faculty of Chemistry at Vienna University. Despite the fact that three of four of these teachers did not receive any instructed English-language training going beyond their secondary education, using English as a working language (e.g. for reading scientific articles in English) does not pose any problem for them. Although support would be offered by the University, three of the four teachers do not know of this possibility. Three of the four interview partners have experience with using English for teaching content courses. While one (T3) teaches in English exclusively as German is not his mother tongue and therefore using English is easier for him, T1 and T4 use English only if the circumstances of their lectures demand it. For example, if an exchange student is present who does not have sufficient German-language skills to follow the lecture in German, they switch to English. Teachers claim that Austrian students usually do not face problems with English-taught courses and that such courses are accepted well by them. For T1 teaching in English simply means a change of language and she does not notice any other differences. T4 notices that both preparation of a lecture and its presentation take him longer. None of the interview partners thinks they need language support when teaching in English and they do not include any language-learning aims in their

¹¹ For a more detailed discussion of the legal framework and language policies in Austria and Austrian universities in 2001 see de Cillia & Schweiger (2001).

English-taught courses. This is mainly because the chemical content of the classes is already very dense and teachers do not have language teaching competences. Therefore, English-medium teaching at the Faculty of Chemistry at Vienna University is limited to EMI (see section 3.4.1.).

All four teachers are aware of the fact that today English is the most important language for pursuing science. They value the role of the English language in chemistry accordingly. While the four teachers acknowledge the role of English as scientific *lingua franca*, there are no prescriptions by the university concerning language use known to any of them. All interview partners would be in favour of using more English-medium teaching to meet the needs of students' later working lives. However, T4 names the costs and the lack of qualified language teachers at the Faculty of Chemistry as limitations for increasing the use of English-medium teaching. Furthermore, he is worried that eventually students would not know scientific terms in German if English would be increasingly used as language of instruction. While T1 agrees with him, T3 thinks that the German terms are already learned in school and that teaching in English at university is therefore no threat to the German scientific language.

Overall, teachers' opinion on English-medium teaching is divided. The language of instruction is not considered much by them and they think that courses taught in English do not pose any problems to the students attending them.

6. Students' experiences and ideas

Before analysing the results of the survey in detail, some general information on the participants needs to be provided here. A total of 107 students took part in the survey. This number represents 6.7% of all students as in the winter term 2013/14 1,587 students were registered at the Faculty of Chemistry (http://studienservice-lehrwesen.univie.ac.at/fileadmin/user_upload/studienundlehrwesen2013/statistiken/studstat_72_2013W.pdf 28 Jan. 2014). Figure 1 shows the distribution of answers by duration of study. It reveals that almost 50% of participants were only in the second or third semester of their chemistry studies. First-semester students were not included in the survey as their experience with chemistry studies was expected to be very limited. Figure 2 below provides the distribution of answers between bachelor, master, doctorate, and Diplom students, as well as students in the teacher education programme (Unterrichtsfach Chemie/Lehramt). Most students were still studying in the bachelor programme and thus findings on the master and doctorate level remain rather limited.

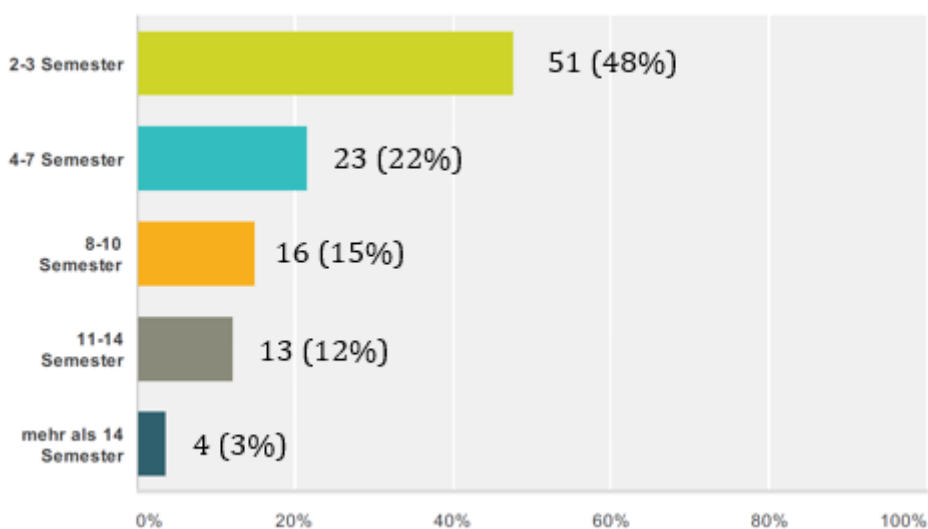


Figure 1: Numbers of semesters studied at Faculty of Chemistry (total answers: 107)

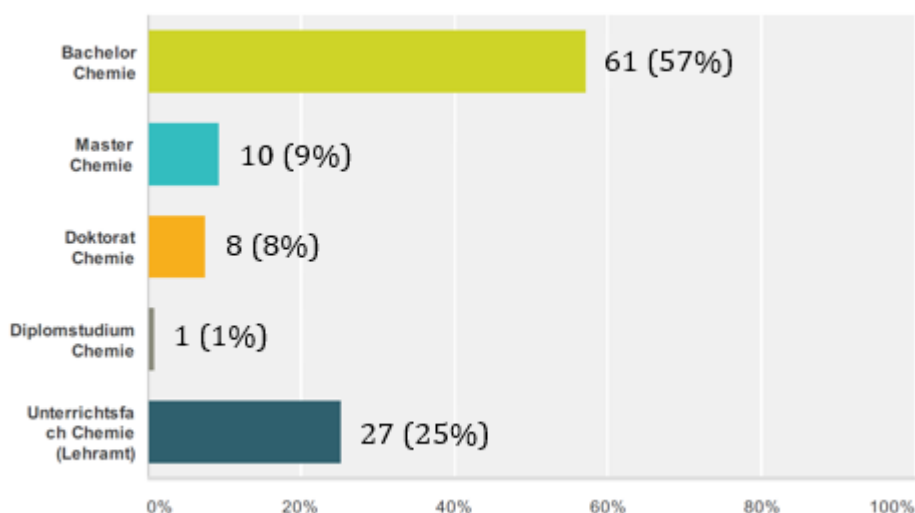


Figure 2: Numbers of students in different study programmes (total answers: 107)

As it might influence students' perception of English-taught courses, they were also asked about their mother tongue. A huge majority (88 of 107) considered German as their only mother tongue, three named English (two of these considered both English and German as their mother tongues) and 16 had other mother tongues than German and English. Two of these 16 students also considered German as one of their mother tongues. Altogether only 15 of the participants were not German-native speakers. Because of the vast majority of German native speakers it remains questionable whether any differences observed between these and native speakers of other languages can be found. The question whether German-native speakers perceive English-medium teaching differently than native speakers of other languages can therefore not be answered in this thesis.

Holdsworth (2004: 24) points out that, as only 12% of students in Europe are not able to speak another language than their mother tongue, in higher education there will be fewer problems when teaching in another language than when educating people who did not undergo a profound language education. More recent research on European¹² student's language proficiency revealed that 32% of them reached, according to the Common Framework of Reference for Languages (CEFR), B2 level listening skills¹³ in the first target language (European Commission 2012b: 35). 16% were at a B1 level in

¹² Although not all EU-countries were part of this survey, results are considered to mirror the situation in the European Union as a whole.

¹³ Only listening skills are considered for this paper (see also section 6.2. on chemistry students' listening skills). This was the skill in which most students in the survey reached a B2 level.

the first target language, an A2 level was reached by 13%, 23% of students were at level A1, and 16% did not even reach A1 English level (ibid.). For English it was found that listening skills vary strongly depending on students' country of origin (European Commission 2012b: 42). In most countries that took part in the survey, the majority of students was found to be at an A1 level only. In Belgium, the Netherlands, and Malta, however, more than half of the students had listening skills at a level above A2 (ibid.). These numbers suggest that listening to a course taught in English and understanding its content should not be a problem for students from these countries. For the other countries, it remains questionable, whether students' listening skills will be sufficient for this or not.

Some of the questions that students were asked to answer in the questionnaire aimed at gathering information about what problems students encounter when their courses are taught in a foreign language, i.e. English. Other questions concerned students' perception of the level of English that is used in English-taught courses, whether course materials in English are used as well and what role they think English will play in their later professional careers. Additionally, students were asked why they think English should or should not be used and if they want to have courses that focus on the English language and therefore could help them to develop their English language skills. To begin with, the question of how many English-taught courses students have actually attended so far in their studies will be dealt with.

6.1. Number of English-taught courses

As mentioned before, natural sciences took the forth place among the fields in which English-taught programmes were offered in 2007 (Wächter & Maiworm 2008: 45). For Austria, the same study revealed that the share of English-taught programmes in the field of natural sciences lay at 10 per cent in that year (Wächter & Maiworm 2008: 47). Although no whole programme is offered in English, the probability of finding at least single courses being taught in English at the Faculty of Chemistry in Vienna was therefore given. To gather information on how many courses are *officially* taught in English at this Faculty, the Vorlesungsverzeichnis (accessed 30 Dec. 2013) for the summer term 2013 and winter term 2013/14 was considered. For these two semesters, 23 and 21 courses, respectively, intended to use English as the language of teaching

either as a sole language or together with German. From these numbers it does not become clear whether these courses were then really taught in English or German or a mixture of the two languages. It can also not be deduced from the language of instruction mentioned in the Vorlesungsverzeichnis if a course that was intended to be held in German was really conducted in that language or whether the teacher switched to English for whatever reasons (see section 5.2.).

In order to get more detailed information on how many English-taught courses students really attend in the course of their studies, they were asked to give the number of how many they have already attended. From Figure 3 it can be seen that some students (28 of 96) have not attended a single course that was taught in English so far in their studies. More than half of them have only attended one to two courses in English.

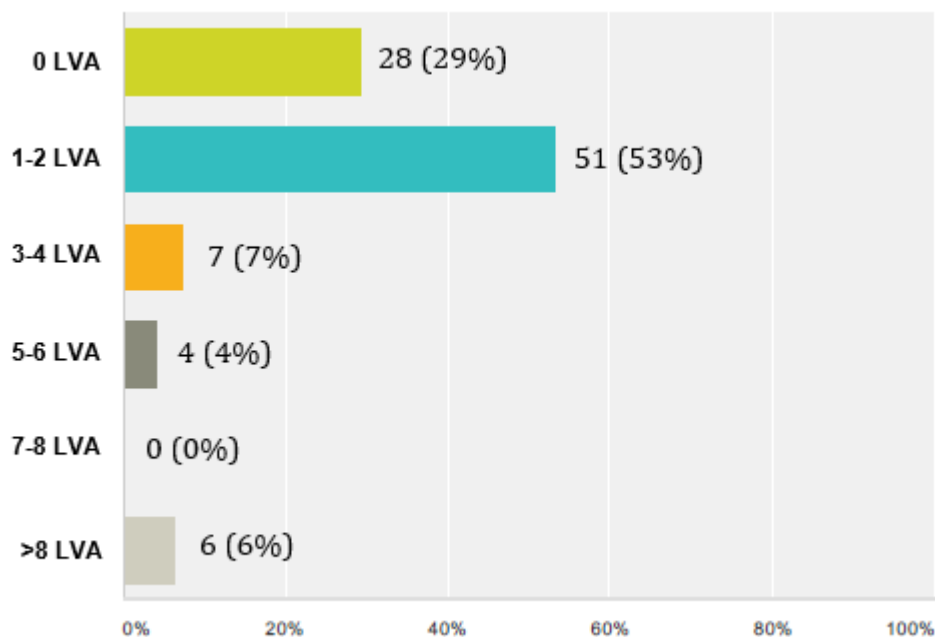


Figure 3: Number of English-taught courses attended (total answers: 96)
LVA: Lehrveranstaltungen, i.e. courses

It has to be taken into consideration that more than half of the participants were still in their bachelor studies at the time of the survey. For this study programme, research in 2012 found that only one and a half lectures were taught in English (Vogler 2012: 10) and thus such a result from the current survey, as presented in Figure 3, is not very surprising. Like in 2012, most students named “Physikalische Chemie I – (Einführung)” and “Physikalische Chemie 2 – (Chemische und Elektrochemische Kinetik)” as the courses that they had attended in English. It can be assumed that the number of English-

taught courses increases along with the semesters of studying. This assumption is reinforced firstly by the finding that the six students who had attended more than eight courses were either studying at the master or doctorate level. Secondly, the assumption is verified by students who, when asked what these courses were, answered “die Hälfte meines masters”¹⁴ (Q5:A14¹⁵) and “[w]ährend des gesamten Masterstudiums, wenn immer ein Hörer anwesend war, der kein Deutsch konnte” (Q5:A36) or mentioned that English-taught courses only really started with the master programme (Q5:A22). In Sweden, English is especially dominant at the master level as well (Bolton & Kuteeva 2012).

49 (of 58) students say that all or the majority of the English-taught courses they have attended had been compulsory for them, i.e. they had to take them in order to proceed in their studies. Nine (of 58), however, say that only very few or even none of these courses have been an integral part of their study programme. It is difficult to find out what these compulsory courses were, as after the bachelor programme there is no fixed curriculum and students can choose between different areas in which they want to study for their master degree. They are also very free in their choice of what courses and lectures they want to attend at this level. The same holds true for the doctorate level. At this point it can therefore only be said that the “Physikalische Chemie I – (Einführung)” and “Physikalische Chemie 2 – (Chemische und Elektrochemische Kinetik)” have to be taken by each student in order to receive a bachelor or teaching degree as can be seen from the respective study programmes¹⁶.

6.2. Level of English

It is, of course, crucial how easy or difficult students perceive the level of English to be that their teachers use. If it is too easy, the effect of language learning, if this is intended at all, will be dramatically reduced, whereas a too high level of English can reduce

¹⁴ Note that all direct quotes of answers given by students are reproduced here in exactly the same way that they were given. Spelling, grammatical mistakes or typing errors were not corrected as long as they did not hinder an understanding of the meaning of students' remarks.

¹⁵ Q5:A14 refers to: Question 5 of the survey, answer number 14 on that specific question

¹⁶ Information retrieved from:

http://chemie.univie.ac.at/fileadmin/user_upload/fak_chemie/bachelorstudium/Curr_Bach_Chemie_2011modifiziert.pdf and http://chemie.univie.ac.at/fileadmin/user_upload/fak_chemie/lehramtsstudium_a423/Lehramt_Chemie_Kurzfassung_inkl_StEOP_09_2011.pdf (30 Dec. 2013)

students' motivation in general, i.e. for content as well as language learning. As the perception of easy or difficult English is highly dependent on students' own language level, they were asked about their own level of English concerning their listening skills. Descriptors of the European Language Portfolio (Abuja et al. 2009) for the B2 level of the Common European Framework of Reference for Languages (CEFR) were used. The B2 level was chosen as this is the level that Austrian students are expected to have after their secondary education, i.e. when passing their Matura. Also descriptors for the B1 and C1 level were included to see if students are below, above, or at a B2 level. It was found that most students reported their listening skills to be at least at a B2 level although some do not feel as proficient and others see themselves at a C1 level. It can thus be concluded that listening to a lecture in English should not be a problem for most students if the lecture's language level is appropriate for a B2 level. In order to meet the needs of this level, teachers would need to be instructed and even trained accordingly. The descriptors from the European Language Portfolio and students' self-evaluation are provided in Table 4.

descriptor	CEFR-level	can do (per cent)	cannot do (per cent)
Ich kann einfache technische Informationen verstehen, z.B. Anleitungen zur Bedienung von Geräten und Werkzeugen des täglichen Gebrauchs.	B1	96	4
Ich kann Interviews, Berichten und Vorträgen in den wesentlichen Punkten folgen.	B1	95	5
Ich verstehe die wesentlichen Inhalte von Erzählungen, Geschichten, gespielten Szenen und Liedern.	B1	96	4
Ich kann technische Informationen verstehen, z.B. detaillierte Beschreibungen von vertrauten Produkten, Funktionen und Dienstleistungen.	B2	77	23
Ich kann Gesprächen von native speakers gut folgen, wenn sie miteinander in Standardsprache sprechen und wenn ich mit dem Thema einigermaßen vertraut bin.	B2	96	4
Ich kann einem Vortrag oder einem Gespräch innerhalb meines Fachgebietes oder meiner beruflichen Situation folgen, soweit der Beitrag klar vorgetragen wird.	B2	88	12
Ich kann einem komplexen Vortrag oder einem Gespräch innerhalb meines Fachgebietes oder meiner beruflichen Situation relativ leicht folgen.	C1	51	49
Ich kann lebhaften Alltagsgesprächen, Diskussionen und Debatten zwischen native speakers gut folgen, auch wenn mir die Themen wenig vertraut sind.	C1	59	41
Ich verstehe unerwartete Fragen, Einwände oder Auskünfte meiner Gesprächspartnerinnen und -partner selbst bei schlechter Übertragungsqualität am Telefon.	C1	43	57

Table 4: Students' self-evaluation of their listening skills.

Students were also asked to comment on the teachers' level of English. Figure 4 presents these results considering different forms of interaction that a teacher might use to communicate with students. Generally speaking, all of the skills in question were graded as very good, good, or average by more than half of the students. A difference can be seen between the skills of interest represented in Figure 4. While only about 10% of students say that their teachers' English is very good when answering questions, more than 20% of them think that teachers have 'very good' English skills when presenting. Almost 20% of students, however, graded the latter skill only as 'Genügend'. Some students have experienced "Professoren, die meinen Sie könnten Englisch und [die] uns dann mit graußigstem österreichischem Akzent den Vortrag halten" (Q14:A38) or claim that teachers are not native speakers and have "furchtbare Akzente[...]" that foster the learning of "Kauderwelsch" rather than that of the English language (Q14:A25). Opposed to this, another student remarks that "die Lehrenden [...] oft sehr gute Englisch-Kenntnisse [haben]" (Q14:A37). These two very contradictory observations imply that it depends not only on students' subjective perception but that each teacher might have a different English-language proficiency.

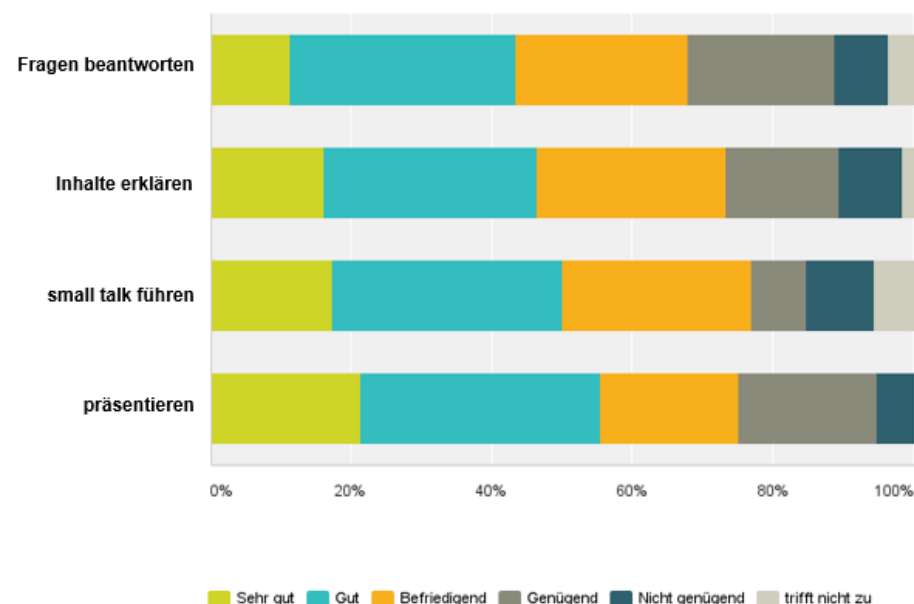


Figure 4: Students' perception of teachers' English language skills

When discussing teachers' English language proficiency it has to be considered how they achieve this proficiency, i.e., as it seems, simply learning by doing as discussed in the previous chapter. It can be assumed that skills graded as 'Befriedigend' will be sufficient

to conduct a lecture in English. Therefore, results presented in Figure 4 on the one hand are fairly good. As mentioned in the previous chapter, teachers claim not to encounter problems when teaching in English despite the fact that some of them rated their language skills as rather weak (T1). On the other hand, according to students' perception, there is still room for improvement of teachers' English language skills. Students are, however, not language experts and thus the grading of teachers' skills remains very subjective and is probably not based on sound evidence but still, these numbers give a good impression of how students perceive their teachers' English language skills.

In an English-taught course, English is not only used as the language of instruction but can be present in the materials used, like course books or PowerPoint slides, and might even play a role in an exam at the end of the course. Figure 5 presents in what forms students have encountered English in English-taught courses. It was found that at the Faculty of Chemistry English is most likely to be used as the language of instruction, followed by the materials used both during the course and for exam preparation, and is also used in the exam itself. Only very few students had used English to write a final paper in a course. Apparently, some of the courses do not follow an English-only strategy but use some sort of bilingual approach. This was also indicated in teacher interviews (see section 5.2.).

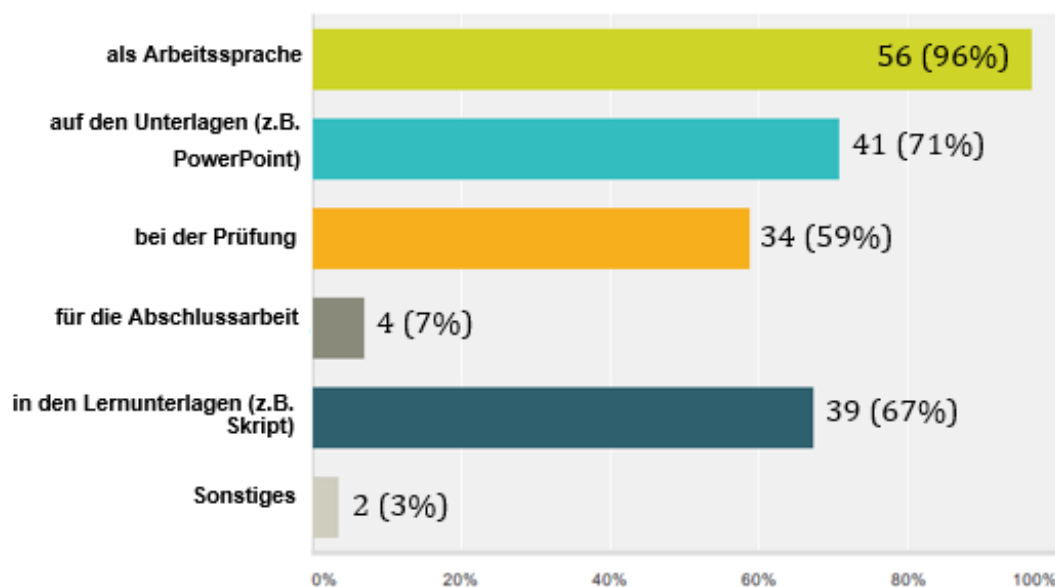


Figure 5: How is English used in English-medium courses? (multiple answers possible, total answers: 58)

It can be an advantage if the lecturer follows lecture materials, e.g. a book, closely. If the lecture is held in English and the accompanying book is in English as well then students might benefit from this. It was found that “[f]ollow[ing] a book or lecture notes that students have read before the lecture” was indeed appreciated by the participants of that study (Airey & Linder 2007: 168). Despite this appreciation, English-medium lecture comprehension seems to be unaffected by pre-reading as it was found that “preparing for the lecture by reading improves lecture comprehension in the L1, but not in English” (Hellekjær 2011: 244). Previous research also found that following a book too closely, i.e. reading from this book aloud, can be a highly unsuccessful approach as students might stop attending the lecture at all (Vogler 2012: 11f.) and thus this strategy needs to be applied with great care. In 2012, it became also clear that questions were asked in English in exams. Answering in English was, however, not obligatory and also answers in German were accepted (ibid.). This possibility to choose the language to answer in was also found by research conducted for this thesis (T1, lines 65ff.; T4, lines 45ff.).

If in an exam the questions are asked in English and the students answer in English, inevitably the question arises if students’ language skills are graded as well. While all of the teachers negate the fact that language might be graded (T1, lines 77f; T3, lines 105ff.; T4, line 51), some students think that their English language proficiency plays a role in passing the exam and therefore also in grading. Interestingly, none of the students mentions that their productive English-language skills, e.g. spelling or grammar, influence their grade while receptive skills, e.g. reading and understanding the exam questions, are perceived as problematic by them. 11 of 58 students state that language influence their grade at least in parts. The majority of students (47 of 58), nonetheless, does not feel that language influences their grade in any way. One student sums this up nicely when saying, “[d]ie Sprache fließt nur in die Benotung mit ein, wenn sie vom Studierenden nicht verstanden wird, etwa bei Prüfungen” (Q11:A2).

Despite the fact that the majority of students self-reported their language skills to be at a B2 level, it has been shown that some of them feel that their language proficiency influences their performance in exams. In order to really eliminate this feeling, one suggestion could be that exam questions should be provided in every students’ mother tongue. Because of the multitude of nationalities and languages present at the Faculty of Chemistry at Vienna University, this is a fairly unrealistic claim.

Firstly, because too much administrative effort would be needed and secondly, because teachers are probably not able to formulate questions and assess answers in most of students' native languages. Nonetheless, questions could be provided in English and German if a lecture is conducted in English at a German-speaking university. Giving the answer to an exam question asked in English in German seems to be quite common at the Faculty of Chemistry (e.g. T1, T4; see also Vogler 2012). The next section does not only intend to show what problems there are with English-taught courses but will also present advantages that students saw in such courses.

6.3. Problems with and advantages of English-taught courses

Obviously, in an English-taught course outside an English-speaking area the language of instruction is a different one from a country's traditional language of teaching. This might result both in problems and in advantages for students taking part in such courses. In the questionnaire students were asked what differences they perceive when attending an English-taught course. In terms of workload, only a single student (out of 55, master level student, German-native speaker) claims that it is less workload if the lecture is in English without giving any further explanation of this answer. All the others feel that it is either the same workload as with German-taught lectures (29 of 55 students) or even more workload (25 students). These findings tie in with a study conducted in Norway, which found that "about 63% of the respondents find [English-medium] courses more laborious than in their L1" (Hellekjær 2010: 242). This increase in workload that students feel definitely needs to be considered when introducing English-taught courses. Another study found that the 22 participating students *felt* that language did not play a significant role in content learning but they could identify problems arising from the shift of languages when a stimulated recall method was used (Airey & Linder 2007: 166). These findings suggest that some students might not be aware of the influence that a change of language has on their workload. Further research might be conducted in order to find out if this is also the case at the Faculty of Chemistry.

The major problem that students at the Faculty of Chemistry in Vienna see is translating whole texts or specific vocabulary. Almost half of them (12 of the 25 who find English-taught courses more laborious) name this as the reasons why English-taught lectures are more laborious for them. One even claims that he sometimes has to

read the text again in German to fully understand its content (Q16:A20). Problems are, however, not only seen when preparing for the exam or when reworking the lecture content at home but also during the lecture. Students find it more tiring to listen to lectures in English and they need to concentrate more in order to understand the complex content that is presented. Researchers are aware of the problem that complex scientific fields like chemistry or physics pose when taught in a foreign language. It was claimed that “[e]ven without the added *complication of a second language*, [...] language problems in undergraduate physics are particularly acute due to the experienced complexity and abstractness of the subject” (Airey & Linder 2007: 162, emphasis added). This observation also holds true for chemistry as it is a complex and abstract subject as well. A participant in Vienna notices this problem by commenting that “[g]erade bei komplizierten Inhalten [...] eine Fremdsprache für viele eine weitere Verständnishürde da[rstellt]” (Q14:A29).

Apart from these rather general observations, chemistry students in Vienna were also asked to give their opinion on and to share their experience with English-taught courses. They observe several problems which, for example, include the lecturer’s weak command of English (although graded somewhat differently, see above) or the fact that English is not as easy to follow and some students might therefore face problems in English-medium lectures. Interestingly, one participant of the study claims that the problem of using English is a “Vereinfachung des Unterrichts” (Q14:A43) and considers this to be a drawback of instruction in English. A reduction and not a simplification of content is observed by one teacher (see section 5.2.). Research in this area came to the conclusion that “the lecturer takes 22% longer to present the same content” (Airey & Thøgersen 2011: 209). Another study on oral presentations also concluded that content was significantly reduced when the lingua franca, i.e. English, was used instead of the native language when the same time-frame was given (Hincks 2010). In addition to this reduction of content, another student describes two German-native speakers communicating with each other in English simply as an unnatural situation (Q14:A1).

While students seem to have many problems when English-taught courses are concerned, they also notice advantages of such courses. One of the students remarks,

Dass Englisch nunmal die Vorrangige Sprache in der Wissenschaft ist und es somit leichter ist, es direkt auf Englisch zu lernen und sich nicht später das Fachvokabular in Englisch noch aneignen zu müssen. Zudem ist es für die

Internationalen Studierenden vielleicht einfacher der Lehrveranstaltung auf Englisch zu folgen. (Q13:A7)

This is a perfect summary of the major advantages that students see in English-taught courses. These advantages are the possibility for non-German (native) speaking students to follow and take part in a course and the chance to practice the international language of science. Also the preparation for students' later working lives is an advantage that some of them mention (see section 6.6.). The benefit of these advantages can even be increased if language skills are explicitly addressed and if students are supported when needed. The next section intends to find out if any language support is offered at the Faculty of Chemistry or the University of Vienna.

6.4. Support offered by University and Faculty

This section first deals with language support that students get when writing a paper in English and then moves on to language support offered when giving presentations. There are studies that show how writing a thesis in English can further enhance students' reading skills (Loranc-Paszylk 2007). It has to be kept in mind that this study considered students taking courses that followed an ICLHE methodology. Nevertheless, according to Loranc-Paszylk's findings, it would actually prove useful for students at the Faculty of Chemistry in Vienna to be encouraged to write theses in English. In order to make the language learning outcome as effective as possible, language support is needed here. At the Faculty of Chemistry in Vienna this holds especially true for two reasons. Firstly, because no ICLHE setting is present at the Faculty of Chemistry and only single lectures and courses are conducted in English. Thus, students are not exposed to the English language on a regular basis and are therefore not as familiar with the scientific English language as would be needed to write a scientific paper in English without problems. Secondly, such language support would foster even more the enhancement that was observed by researchers. To find out if the Faculty offers any language support for students writing a paper or thesis in English, respective questions were included in the questionnaire.

It has to be mentioned first that only 13 of 80 students had already written a scientific paper in English¹⁷. The context in which they did so was for most of them their

¹⁷ One of them misunderstood the question and answered 'Yes' but then said that it was not for the chemistry studies but in a different context.

bachelor, master, or diploma thesis. Additionally, a few of the participants have already published articles and had done so in English. Some have written protocols for their laboratory work in English. As a follow-up question, students were asked if they got any support language-wise when writing their papers in English. Almost half of them did not get any language support in this phase of their studies. Some of them, however, also mention that they did not need any support because they consider their English-language proficiency as good enough to write scientific texts in English. Two of them mention that they got papers written in English, which they considered as being supportive of their own writing process. Others found support in their supervisor who proof-read their papers for them. It can be concluded from these findings that no official language support is offered for students of chemistry who write a scientific paper in English. It is up to the students to have sufficient language proficiency and in some cases the supervisor might be a helpful resource.

As not only writing in English is considered an important language skill for chemists but also speaking and giving presentations are, questions aiming at finding out if any language support existed for oral communication were also part of the questionnaire. As with writing in English, only 13 of 80 students have already had to give a presentation in English in the courses of their studies¹⁸. Nine out of these 13 have both written a paper *and* given a presentation in English. The contexts of the presentations in English were different as some students had either spent time abroad and had to give presentations there or had to present their bachelor, master, diploma, or doctoral thesis in English. The latter reason was named by the majority of students. On the one hand, when asked if there had been any language support for their presentation in English almost all students answered 'none'. Some of them did not seek support or even did not feel they needed it. On the other hand, two students felt they had got support from the university. One of them perceived "Korrektur"¹⁹ (Q34:A5) as being supportive and the other one had to hold the presentation in a working group in advance and s/he²⁰ got useful feedback and tips for improvement there (Q34:A8).

¹⁸ Three of the students, who said they had given a presentation in English had not done so for their chemistry studies at the University of Vienna. One did so in a seminar on general pedagogy, one at a Fachhochschule in Bratislava, and one studies at the Militärakademie where they had to give presentations in English.

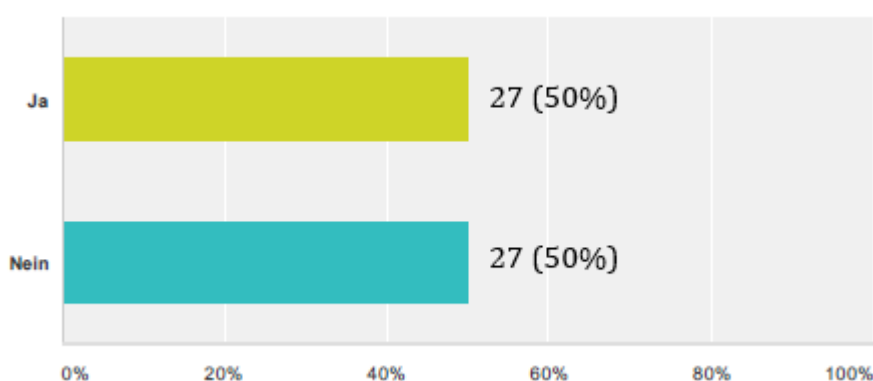
¹⁹ Unfortunately, s/he does not explain in more detail what s/he means by this.

²⁰ Students were not asked about their sex. As it is not known whether the respective student is female or male the form s/he will be used in this paper.

The conclusion that can be drawn from these findings is that, generally speaking, the Faculty of Chemistry does not offer language training or support, e.g. in form of ESP or EST courses, for students who have to present in English. There are, nonetheless, teachers who seem to offer support in a working group. The question that these findings pose is whether students want to have more language support and more exposure to the English language in terms of more English-taught courses. It was already implied in this section that some students did not perceive the need for language support when writing a scientific paper or giving a scientific presentation in English. The following section deals with these issues in more detail but also takes into consideration students who have not had to use English for writing a paper or giving a presentation so far in their studies.

6.5. Wish for more courses in English and language support

The question that needs to be asked first is whether students want to have more courses in English at all. The answers to this question were equally divided among those who are in favour of more English-taught courses and those who are not. This means that while 27 students would like to have more courses that use some form of English, 27 students would rather stick with the current number of English-taught courses or would even like their amount to be reduced (see Figure 6).



*Figure 6: Do you want to have more English-taught courses in your study programme?
(total answers: 54)*

To find out why students do or do not want to have more of these courses, some of their answers will be provided here. The reasons that many students give for being in favour of more English-taught courses are practicing the language and further improving their language skills. Other students name English as the language of science and are

therefore in favour of using it more often as the language of instruction at the Faculty of Chemistry. Also the fact that they will need English in their later working lives is a reason for students to wish for more English-taught courses.

The reasons that students who are against the introduction of more English-taught courses give are that it is more difficult for them to follow courses that use English as the medium of instruction and that the use of English makes the content of courses even more difficult than it already is. One student, when asked why s/he does not want to have more English-taught courses answers “[w]eil es mir im Moment zu viel Aufwand bereitet. Es wäre besser, erst ab dem dritten Semester mit englischsprachigen Vorlesungen zu beginnen und im zweiten eine freiwillige Vorlesung über wichtige englische Fachwörter der Chemie zu halten“ (Q20:A2). With this claim s/he mentions courses that focus on the teaching of the (scientific) English language, e.g. ESP or EST courses. A question on this topic was also part of the questionnaire.

In European tertiary education “62 percent of [English-taught] programmes provide language training (be it in English, the domestic language, or both)” (Wächter & Maiworm 2008: 54, 59f.). As this is a fairly high number, it was also part of the research for this thesis to find out whether the Faculty of Chemistry offers any language support despite the fact that language, especially the English language, does not seem to be considered much. It is striking that almost two thirds of students (53 of 82) do not know whether any English language support is offered by the Faculty of Chemistry and that only five out of 82 know that such courses are conducted there. As an example for such a course two students mention the courses on scientific writing, whose teacher was also interviewed for this paper. Compared to this fairly low number, more than 30% of students know of courses that focus an improvement of their English language skills offered by the University of Vienna or its Sprachenzentrum. But still, more than 30% of the participants say they do not know whether such courses are offered. These results inevitably lead to the conclusion that courses are offered both by the Faculty of Chemistry and the University of Vienna but that they need to be promoted far more as many students are not aware of the possibility to take them.

A better promotion of these courses by the Faculty and the University would definitely be beneficial for several students. As results of research show none of the 82 participants has attended a course with the focus on improving their English language proficiency. More than half of them (46 of 82), however, would like to have such courses

as part of their studies. The importance of English as a language of science and the need for sufficient English language skills, especially field-specific vocabulary for their future working lives, are named as reasons for this several times. For example, one student remarks, “Englisch ist eine der meist verwendeten Sprachen in der Wissenschaft und schlechte Englischkenntnisse würden dann die Jobaussichten schmälern” (Q27:A6) and another one adds, “[g]ute Englischkenntnisse sind heute in allen Bereichen und Berufen essentiell. Ohne sie geht es einfach nicht” (Q27:A10). Furthermore, being able to understand English-taught courses at university is a reason for students to wish for (more) English language courses. Most of the students who want to have courses to improve their language skills seem to be aware of the fact that English is important internationally. One of them, for example, remarks the following.

Ein Großteil der wissenschaftlichen Texte und jegliche Neuentdeckungen werden in Englisch verfasst und werden in dieser Sprache publiziert. 2013 ist es nur zum eigenen Nachteil, sich der englischen Sprache und somit den neuesten Entdeckungen und Kommunikation mit anderen Universitäten weltweit zu entziehen. (Q27:A2)

There were also students not in favour of having English language courses as part of their studies (36 of 82). Their arguments will be presented here. The main reason for rejecting the idea of having language courses as part of the chemistry study programmes is that students perceive their English as good enough. Some students also remark that such courses need not necessarily be offered by the Faculty and that there are other ways of improving one’s language skills, e.g. spending a semester abroad, reading in English, or watching films in English. Interestingly, none of them mentions that English courses would pose additional workload for students, which was one of the issues that came up in 2012 (Vogler 2012: 15).

To sum up, these findings show that, on the one hand, more than half of the students that took part in the survey are in favour of having courses that help them to improve their language skills. On the other hand, there are students who do not see the need for this kind of courses. The best solution would therefore be to offer language training on a voluntary basis. As a consequence, too few students might actually attend these courses which would then be a waste of money. Anyway, language training would be a helpful preparation not only for students’ academic lives but also for their later professional careers. The next section intends to find out how students perceive the role of the English language in their future working lives.

6.6. English in future working life

It is implied by Airey and Linder (2007: 162, referring to Airey 2003) that using English as a medium of instruction in tertiary education will give students “competitive advantages on the job market and preparation [...] for an academic world dominated by English”. “In fact, in Engineering, Science and Pharmacy, English was the only [foreign language] [...] nominated as important for their work” (Argondizzo, de Bartolo & Ting 2007: 52). Therefore, students should really appreciate any language training and exposure they can get at university, for example in English-taught lectures or in ESP or EST courses. The question is whether students who do not think they will have to use English in their professional careers see this the same way and whether they show a different attitude towards English-taught courses than their colleagues do who think English will be important in their jobs.

Argondizzo and Laugier (2004: 275) observed that especially students who are well aware of the fact that English plays an important role in their current academic lives but will also be important in their later professional lives will see a need for English-taught courses in their study programmes. A similar tendency was also observed at the Faculty of Chemistry. It has to be kept in mind, however, that students studying chemistry to become teachers influence the following numbers as the more than 60% of them did not see the need for English in their later work situations (see also Figure 8).

Almost 60% of the students who consider English as important for their working lives are in favour of having more English-taught courses (compared to 50% of all participants). More than 63% of them want to have courses that help them to improve their language skills (compared to 56% of all students). A correlation between students’ awareness of the importance of English in their future working situation and their wish for more English to be used already during their studies is evident. It is even more impressive when considering students who do *not* think that English will be important for them later on. Two thirds of these students do not want to have courses focussing on language skills (compared to 44% of all students) and more than 80% do not want to have more English-taught courses at university (50% of all students). Figure 7 visualises these numbers.

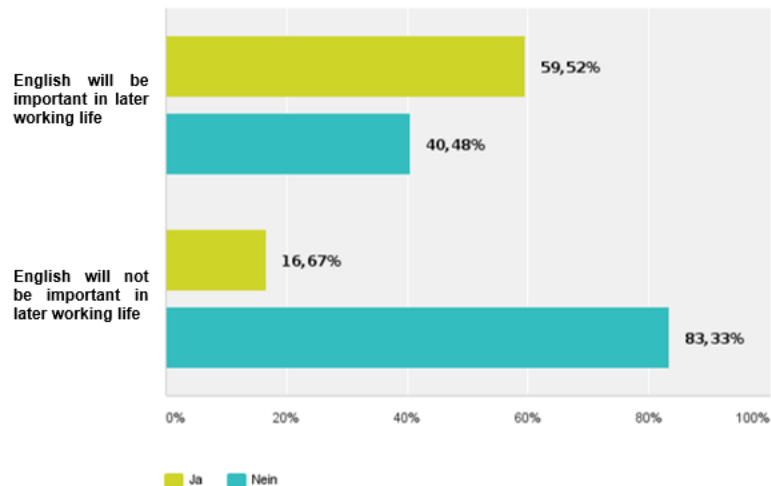


Figure 7: Do you want to have more English-taught courses in your study programme?

In order to achieve a more significant result for the question if students think that English will be important later in their working lives, answers were divided between those studying to become teachers and those studying to become chemists. On the one hand, of the 21 future teachers, only eight consider the role of English in their later job as an important one. The other 13 justify their choice with the fact that English is not the language of instruction in Austrian schools. On the other hand, when future chemists are considered, i.e. students in the bachelor, master, doctorate, or diploma programmes, almost 97% think that English will play an important role in their later working lives. This number clearly shows that students are well aware of the role that English plays in science internationally and is visualised in Figure 8.

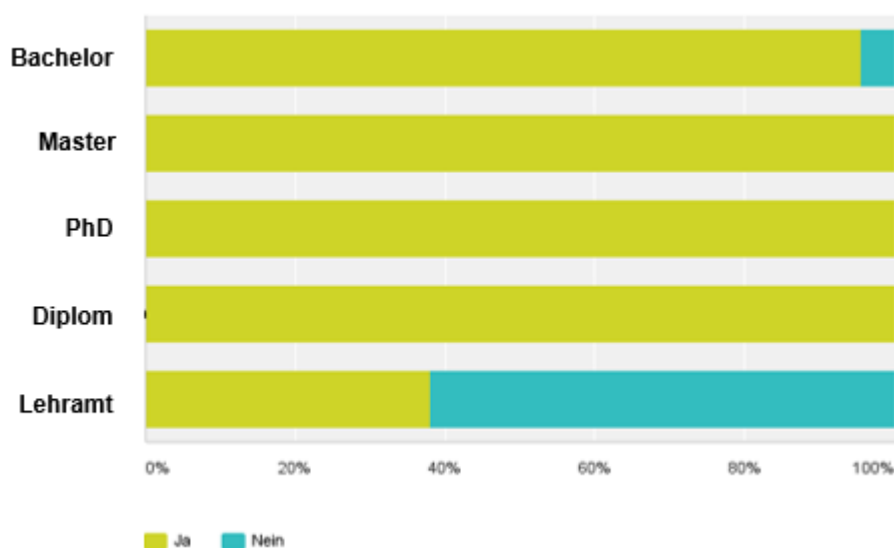


Figure 8: Do you think English will be important in your later working life? Answers divided by study programmes.

Some of the reasons named for this opinion are presented here. One student remarks the following,

[ich] denke, dass die Chemie ein vernetztes Fach ist; viele große Firmen beschäftigen Chemiker, die nicht nur in deutschsprachigen Gebieten sesshaft sind. Außerdem ist Forschung immer international. (Q39:A10)

Thus, he clearly highlights the importance of English when working in an international company and when conducting research. Another one notices, “[v]iele fachspezifische Themen werden auf Englisch behandelt. Fachlektüre ist meistens auf Englisch verfasst” (Q39:A14). While these are the reasons given by most students, others mention reasons like, for example, planning to live and work abroad. Some students say that language skills are “heutzutage einfach standard” (Q39:A43) or see English as “sprache der zukunft” (Q39:A45) or as a “Weltsprache” (Q29:A62). The reasons that the eight future teachers who see a need for English in their later jobs give include bilingual education at secondary level (e.g. Q39:22) and being a good role-model for pupils (Q39:17).

It was found that teachers at university also “recogni[s]ed the necessity of exposing students to more English and sensiti[s]ing them to the use of English as a communicative tool and a *necessary professional skill*” (Argondizzo, de Bartolo & Ting 2007: 63, emphasis added). For these reasons, the aim of improving students’ English language proficiency should definitely be part of their education at university level, even more so when a field of study is concerned in which English is the dominant language of research, communication, and exchange.

6.7. Why English and what are the consequences of it being used

In the survey, students were also asked if and why they think that English plays such an important role in chemistry. As results show, students are generally aware of this importance and are also able to give reasonable justifications why they think so. These range from the influence of the United States to historical developments in general and the simplicity of learning the English language (e.g. Q40:A1). One student remarks, “[Englisch] ist die lingua franca und wird in den kommenden Jahren aufgrund seiner Vormachtstellung und der zunehmenden europäischen Vereinigung weiter an Bedeutung gewinnen” (Q40:A41). These arguments are in line with the development of English as the “scientific ‘lingua franca’” (Alexander 2008: 52) outlined in section 3.1.3. Also the fact that worldwide more people speak English than German is a reason for

students why English has become so important (e.g. Q40:A6). As outlined before, when looking at Europe only, the situation is different as most people here have German as their mother tongue. Students also remark, however, that English is learned by many people as a first foreign language (e.g. Q40:A15) and that they are therefore more or less able to read, write, and speak in this language. A very nice summary of all these reasons is given by one student.

Weil doch ein großer (und in Bezug auf Technologie/Innovationen wichtiger) Teil der Weltbevölkerung diese Sprache als Muttersprache spricht und ein noch viel größerer Teil es als Fremdsprache (zumindest in Ansätzen) lernt. Außerdem ist die Grammatik relativ einfach (verglichen mit Deutsch oder slawischen Sprachen, etc.) und es ist möglich, auch komplexe Sachverhalte klar und unmissverständlich auszudrücken, ohne dass dafür ein großer Wortschatz erforderlich wäre. (Q40:A22)

Having outlined why students think that English has become such an important language in worldwide scientific communication, in the following, changes that students notice when attending English-taught courses are discussed.

Concerning the influence of the different attitudes which students bring to university, it was argued that

students' overall intelligence level, learning style, motivation and attitude, mother tongue, educational and cultural background, and, naturally, their foreign language skills all determine whether the innovation [of teaching in English] will negatively affect student intake, throughput or output. (Sercu 2004: 547f.).

The survey intended to find out if such a negative influence is noticed by students at the Faculty of Chemistry at Vienna University, i.e. if English-taught courses are more difficult for them to attend than German-taught ones are.

For doing so, students were asked to compare English-taught lectures to German-taught ones with respect to certain elements (e.g. taking notes, preparing for the exam) and to say whether it is easier or more difficult for them or if they do not notice a difference between lectures in German and English. When it comes to following a lecture that is taught in English (number 1 in Figure 9 below), about 64% of students find this more difficult, about 23% see no difference. More than 50% find it more difficult to ask questions during an English-taught lecture (number 7). This might lead to a reduction of student-teacher interaction as was also observed by Airey and Linder (2007: 166f.). In their study, students rather focused on note-taking than on listening to the lecturer properly. Hence also the "shared space of learning" (Airey & Lindner 2007: 166,

referring to Tsui 2004) will be drastically reduced. The problem with these results is that note-taking in a foreign language is not an easy task either. Many students at the Faculty of Chemistry apparently are of this opinion as well. Note-taking even is the feature rated as most difficult by students. More than 28% of them claim that they perceive it 'slightly more difficult' ('etwas schwerer') to take notes in an English-taught lecture, almost 25% feel that it is even 'much more difficult' ('viel schwerer') (number 2). A student also observes that when the teacher asked questions in English, even fewer students would be willing to answer them than when asked in German (Q9:A20). Generally speaking, most students perceive features of a lecture in English as more difficult than in a German-taught lecture.

The features that a majority of students (about 45%) considers to be equally challenging in German and English are understanding scientific content (number 6) and explaining scientific concepts in German when they were presented to them in English (8). The latter issue was examined by Airey (2010: 45), who concluded that "students give similarly rated descriptions of disciplinary concepts in English or Swedish, regardless of the language used to teach them". Moreover, using English learning materials for exam preparation (number 5) was perceived by students to be equally challenging in either of the two languages.

Interestingly, no correlation could be observed between students' perception of a lecture's features and their mother tongue. Those few students stating that features of lectures in English are easier for them, are well distributed between German, English, and other mother tongues. Concerning the equalising function that English can therefore be said to have, one student, when asked about the advantages that English-medium teaching has, remarks, "Ich habe mich gefreut, mal auf der gleichen Niveau zu stehen wie die mit Deutsch als erster Sprache ausnahmsweise (als Ausländerin)" (Q13:A45).

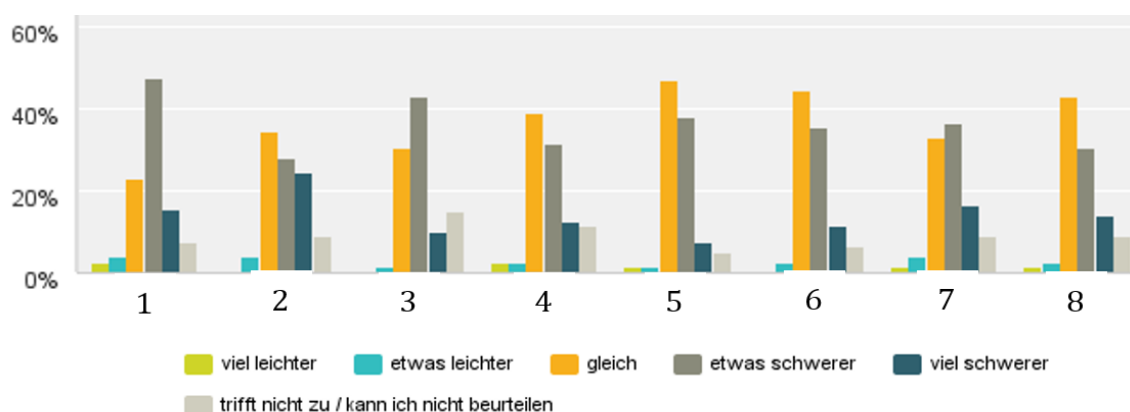


Figure 9: Students' perception of the difficulty of certain features of an English-taught lecture

Key: Compared to a lecture in German, how do you perceive...

1: following a lecture that is conducted in English?

2: taking notes in a lecture that is conducted in English?

3: preparing for an exam that is held in German but the lecture is in English?

4: preparing for an exam that is held in English and lecture is also in English?

5: preparing for an exam with learning materials that are in English?

6: understanding scientific content of a lecture that is conducted in English?

7: posing questions to the lecturers when the lecture is in English?

8: explaining scientific concepts in German when they are presented to you in English?

Although English-taught courses might appear to students to be more laborious and certain features seem to be more difficult for them, they might really benefit from these courses. As research revealed that “students found that learning a subject matter through English not only did *not* hinder their acquisition of subject content but did indeed provide the added benefit of improving their language competence in English” (Argondizzo, de Bartolo & Ting 2007: 61, emphasis added), the introduction of more English-taught courses should definitely be considered by the stakeholders at the Faculty of Chemistry at the University of Vienna.

6.8. Student mobility

A possible way of improving one's language skills is to spend some time in a foreign country and to use English there because no other shared language is available. Of 80 students, who answered the question about an exchange semester, only 5% had taken the change to study abroad so far. For two of these four students the time in Austria is their exchange semester, which leaves two students who really had spent a term abroad. These two went to China and Poland and were in the Lehramt and bachelor programme, respectively. It goes without saying that a term abroad is no obligatory part of any study

programme at the Faculty of Chemistry at the University of Vienna. In European higher education, “16 percent [of English-taught programmes] include a mandatory study period abroad” (Wächter & Maiworm 2008: 54). This comparison, however, remains questionable as there are no English-taught programmes offered at the faculty under investigation.

The fact that only very few students at the Faculty of Chemistry at Vienna University spend some time in a foreign country is known to the responsible university staff (mentioned, for example, by T4). It seems that in the natural sciences exchange programmes are far less popular than in other sciences (T4, lines 356ff.). According to T4, the numbers for incoming students are fairly low as well. Concerning these students, T4 remarks that “die[se Studierenden] sollen kommen, genauso wie unsere [Studierenden] hin gehen sollen” although he thinks that sometimes students come to Vienna with different expectations and a different educational background and might thus be hard to integrate fully (ibid.). His assumption that the number of exchange students increases with the duration of study, was not proven by students’ answers, at least not for the outgoing students, as no student at master or doctorate level had studied abroad.

6.9. Summary

Chapter 6 has presented findings on students’ ideas on and their experience with the use of English as a medium of instruction at the Faculty of Chemistry at the University of Vienna. It has been pointed out that conclusions that can be drawn from these findings remain limited for the higher levels of study, i.e. master and PhD levels, as most students that took part in the survey were still in the bachelor programme. As a consequence, most of participants had only attended very few English-taught courses, i.e. between one and two. It has been concluded that the number of English-taught courses increases after the bachelor programme, i.e. English is used more often in courses offered at the master and PhD levels. In the English-taught courses English is mostly used by teachers for presenting content.

While teachers negated the question whether language plays a role in exams in which the questions are asked in English, students’ opinion on this issue is divided. Some of them feel that their English-language proficiency plays a role in exams, especially

when they have to understand the exam questions in English. Moreover, students' opinion differs from teachers' when it comes to problems they face with English-medium teaching. While the latter claim that students do not have problems with this, students consider English-taught courses as being more laborious than courses taught in German. Furthermore, students perceive certain features of courses, e.g. following a lecture, taking notes, or posing questions to the teacher, as more difficult when English is used instead of German as the language of instruction. This might be one of the reasons why half of the participants of the survey do not want to have more English-taught courses as part of their study programmes. 44% of participants consider their English-language proficiency as sufficient for following English-taught courses or simply do not want to have additional workload. Therefore, they do not want to have any courses focusing on the English language. The majority of students (56%), however, see a need for such courses and therefore also for an improvement of their English-language skills in order to be (more) successful in their studies and later in their working lives. Surprisingly, almost all students (97%) in the bachelor, master, PhD, and Diplom programmes think that English will be important for them in their later working lives. Although some students claim that an exchange semester is a possibility to improve one's English-language skills, only very few had taken the chance to do so.

Overall, it can be concluded that students see a need for English in their later working lives and that courses focusing on the improvement of their English-language proficiency would certainly be beneficial for some of them. Concerning the use of English as a medium of instruction, the survey found that as many students are in favour of (having more) such courses as are not.

7. Discussion of findings

Although English today is, without any doubt, the dominant language used internationally in the natural sciences, in a traditionally German-speaking country like Austria, German was still found as the major language used for teaching chemistry at the University of Vienna. Most students that took part in the survey had only attended very few courses or lectures that were taught in English and also teachers use English for teaching only occasionally. This lack of English-medium teaching can be explained by the dominance that German had in chemistry in the early 20th century (Ammon 2008; Ammon & McConnell 2002) and the strong tradition of conduction research and teaching in tertiary education in that language. Despite the idea of introducing more programmes taught through another medium than German at Vienna University (Uni Report 2010), the former lack of a clear language policy at this higher education institution (de Cilia & Schweiger 2001) contributes to the observation that English-medium teaching is still in its early stages of development.

At the moment, teaching in English only seems to be an issue if exchange students or teachers without sufficient German-language skills are present in a course. While at the Faculty of Chemistry at the University of Vienna and according to research also in Sweden (Airey & Linder 2007) English is used *if* such a student is present, Coleman (2006) suggested introducing English-medium teaching *in order to* attract more foreign students. Although none of the other reasons for introducing English-medium teaching, e.g. internationalisation, graduate employability, and the use of English teaching materials, was explicitly mentioned by the interview partners, students are well aware of the fact that a good command of English is necessary for their later working lives and hence their employability. Many of them are therefore in favour of using more English in their study programmes both in form of English-medium teaching and extra language courses.

In other countries, for instance in Sweden, English is much more often used as a medium of instruction in higher education and also used for writing papers. About “87% of all dissertations in Sweden are written in English” (Bolton & Kuteeva 2012: 432). There is no such clear tendency towards writing theses in English at the Faculty of Chemistry at the University of Vienna, at least not for bachelor theses. About 50% of these are written in German, 50% in English according to an interview partner. It can be assumed that the percentage of English used for writing papers increases along with the

study programme as, for instance, at the PhD level more international students should be present. Interestingly, it is assumed by their teachers that students have enough skills in the English language to write these theses without any language support.

Students are also expected to be able to follow an English-taught lecture without any language training after their secondary education. It was found that this expectation even is “[a]n unwritten assumption” (Räisänen & Fortanet-Gómez 2008: 43) in some countries. Students’ self-evaluation of their listening skills reported most of them to have at least a B2 level. The aim of improving students’ English language skills should, nevertheless, be part of every study programme in the natural sciences because these skills are nowadays “so gut wie unerlä[ss]lich” (Ammon 2008: 39) for scientists in that field.

There are many ways in which students’ language skills can be improved. One way would be to offer courses focusing on the English language (e.g. ESP or even EST courses). The offer of such courses by the Faculty does currently not meet students’ expectations. While 56% of participants said they wanted to have courses focusing on the improvement of their English language skills, only 6% claimed that such courses already exist, but no student had already taken one of these courses. Firstly, this might be, as implied above, that they do not know that these courses are offered by their Faculty. Secondly, students might consider their language skills as sufficient enough and therefore not see a need to further improving them. Another reason could be that students just do not have the time for taking additional courses. Like one teacher mentioned, there is already a lot to be taught content-wise and there are simply no lessons left to introduce courses on the English language in the chemistry study programmes.

Although the teacher of the “Scientific Writing and Presentation” course negates the presence of language learning aims in this course, it was argued that language is part of the course as writing and presenting are about using language. Moreover, students mentioned this course to be one that focuses on the improvement of their language skills. Following this argumentation, it could even be claimed that the “Scientific Writing and Presentation” course is in a way an EST course as such courses “[cover] the area of English for written [...] purposes” (Trimble 1985: 6). This course is an extra course that needs to be taken and might therefore be rejected by students because of time problems.

One way of solving this time issue is to implement the English language into content courses. Although a large number of research attests to the success of integrated approaches like CLIL (Mehisto, Marsh & Frigols 2010: 9), the only approach used at the Faculty of Chemistry at Vienna University is EMI. In this approach, language learning might occur incidentally but is not explicitly included in the aims of such a course or lecture (Unterberger & Wilhelmer 2011: 96). Teachers interviewed for my research confirm that language (neither German nor English) is not addressed directly in their teaching. Despite these courses are simply a teaching in a different language, they are perceived as being more laborious than courses in German by about 45% of the students that took part in the survey. At FH Joanneum Graz students are of the same opinion as “students feel that English-medium instruction increases their workload” (Tatzl 2012: 262). Another 53% at the Faculty of Chemistry, however, think that workload is the same regardless of the language being used.

For teachers, teaching in English does not pose a problem. They all claim to be competent enough in the English language. Generally, students graded their teachers’ English skills as rather good, especially when it comes to presenting content in English. There were, however, also some students who complained about lecturer’s accents and weak command of English in general. T1 also self-assesses her English skills as rather weak but claims not to face any problems when teaching in English. This is in line with Argondizzo, de Bartolo, and Ting’s (2007: 48) findings that teachers’ language competence is actually sufficient for teaching in English but some teachers simply do not feel competent enough. Most interview partners at the Faculty of Chemistry do not know about language courses that would support their English-medium teaching. At the FH Joanneum Graz there are courses on teaching in English and even CLIL offered for teachers but they are not well-attended (Tatzl 2012).

It has been shown that the current practices concerning the use of English as a medium of teaching at the Faculty of Chemistry are somewhat unplanned and are a reaction to the dominance of that language in chemistry. Furthermore, many students would appreciate the use of more English in their studies. Hence, it can only be suggested that responsible staff at the Faculty of Chemistry start thinking about the issue in order to better meet students’ needs and expectations. As the interview partners claimed that students usually do not face problems in English-taught courses, teachers

should also be made aware that teaching in English *is* a problem for many students and that this needs to be considered when changing the language of instruction.

8. Conclusion

This thesis intended to give an overview of the status quo of English-medium teaching at the Faculty of Chemistry at Vienna University. The purpose was to find out how much English is used there and what it is used for. Teachers' and students' opinions were part of the research in order to present the situation as thoroughly as possible.

In order to establish a theoretical background for the study, the first part of this thesis pointed out developments that lead to the fact that English-medium teaching is becoming more and more popular in tertiary education all over Europe. Firstly, while German had been important until the 1940s, after the Second World War, English became the dominant language of science. Secondly, as there was a need seen for a shared European higher education area, many reforms were adopted, the best known of which is the Bologna declaration of 1999. It fostered a common degree system but also promoted language learning at the tertiary level. Although no explicit language was mentioned there, English took over this role and today is a very important language in teaching in higher education in Europe also outside its traditionally English-speaking areas.

In recent years, many English-taught programmes and courses have been established (see e.g. Wächter & Maiworm 2008). The reasons for stakeholders to introduce such programmes and courses are thoroughly discussed in this paper. These reasons include the processes of globalisation and internationalisation which also affect higher education institutions, the promotion of students and staff mobility and a resulting linguistic diversity at European universities, the increase of graduates' chances to find employment, attracting foreign students especially if financial benefit can be gained from it, and the first-hand availability of research publications that could be used in teaching and also that of teaching materials as such (see Coleman 2006).

If English is introduced, for whatever reason, it can take different forms. The ones presented in this paper are English-medium instruction, which is a simple switch of language of instruction without any further considerations and English for Specific Purposes, the main focus of which lies on the teaching of language skills for special academic or professional situations, using content related teaching materials. Furthermore, Content and Language Integrated Learning (CLIL) has been presented here. As the name suggests, this is an integrated approach in which both language and content are taught in one course. In higher education CLIL is known as Integrated

Content and Language Learning in Higher Education (ICLHE). For the latter, findings from research were presented that suggest a potential benefit of this approach for students' language learning.

The second part of the paper presented and discussed research conducted at the Faculty of Chemistry at the University of Vienna, which includes both teachers' and students' views on the use of English at their Faculty. It needs to be pointed out again that only four teachers took part in this research and that findings therefore remain limited. All of these teachers are in favour of teaching in English and do not really see any problems when doing so. However, only three of them have conducted lectures in English, i.e. they have used English-medium instruction (EMI) as no language learning aims were included in their teaching according to them. Moreover, they do not have a clear strategy that they use when teaching in English. It seems that although lectures are conducted in English, this is often not planned in advance and English is mainly used if non-German speaking students, e.g. exchange students, are present in the lecture and the language of instruction is then switched to English spontaneously if demanded.

All four teachers would favour using more English in the chemistry study programmes because they see the value and importance that this language has in chemistry and that it allows international communication without translating. Therefore, using more English already at university would prepare students even better for their later working lives as chemists. Students' ideas on English-medium teaching at the Faculty of Chemistry were also part of this study. A need of English for their future careers is also seen by the majority of students, with those in teacher education being an exception. While three of the four teachers reject the need for courses focusing on the English language, more than half of the students see a need for such courses in order to brush up their language skills. However, none of the students participating in the survey has attended such a course yet. This might be the case because the majority of students does not know if language courses are offered by their Faculty.

There are courses offered that focus on scientific writing and presenting and literature research in English that can be found in the Vorlesungsverzeichnis. Obviously, these courses need to be promoted far more to make them known to students. The teacher of these courses was interviewed for this study. He rejects the idea that language learning aims are really part of these courses. Nonetheless, writing and presenting is

about using language and therefore it should really be (part of) the focus of these courses. Even more so if these courses are called “Scientific Writing and Presentation”.

One of the problems why the use of English appears to be unplanned is that there are no clear prescriptions concerning language use known to the teachers. This seems to be a typical symptom of Austrian Universities (de Cilia & Schweiger 2001). Hence, it is up to the University of Vienna to foster a common strategy to deal with language issues for all teachers as this might help to make English more present at the Faculty of Chemistry and to better meet students’ needs and expectations. It was also pointed out that, according to the Uni Report (2010), the University of Vienna intends to introduce more programmes taught through other languages than German.

Up to now, at the Faculty of Chemistry this is not being put into practice. Therefore, individual teachers are free to choose the language of instruction themselves. Maybe my research might raise some awareness in some of them on the issue and maybe some might even re-think the strategies that they use to make their use of English-medium teaching more effective both for themselves and for their students. Therefore, one benefit of my research might be a chance that future students at the Faculty are exposed to more English and in a more systematic and planned way. Although it might be financially challenging, maybe stakeholders also start thinking about introducing some (scientific) English language-focussed courses for those students in need of improving their English language skills. Moreover, my research at the Faculty of Chemistry can contribute to current research trends and might thus be one small piece of a more thorough picture of the use of English in European tertiary education.

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Appendix

Teacher interviews – interview guide

CLUSTER 0: Teachers' background

Muttersprache?

Englischkenntnisse? Wie gut? Woher? (Studium/Forschung im Ausland?)

CLUSTER 1: Lehren auf Englisch

Halten Sie LVA oder Teile davon auf Englisch? Wie viele? Welche? Warum (nicht)? Inwiefern verwenden Sie hier Englisch (Vortrag/Unterlagen/PPT/...)?

(Wann und warum würden Sie eine LVA auf Englisch halten, obwohl Sie dies normalerweise nicht tun?)

Wie werden solche Kurse von Studierenden angenommen?

Was ändert sich für Sie, wenn sie auf Englisch lehren? (Inhalt? Tempo? Vorbereitung?) Haben Sie mit diesen Veränderungen gerechnet? Womit haben Sie nicht gerechnet? Stellt es sprachlich gesehen ein Problem für Sie dar, auf English zu lehren?

Inwiefern gibt es Ziele in Bezug auf den Spracherwerb, wenn Sie auf English lehren?

Gibt es für Studierende die Möglichkeit, Fragen auch auf Deutsch zu stellen?

Wird Englisch in den Prüfungen verwendet (und bewertet)?

Wenn Studierende ihre Abschlussarbeit (BSc, MSc, ...) bei Ihnen verfassen, geben Sie diesen dann Vorgaben in Bezug auf die Sprache? Welche? Warum (nicht)?

CLUSTER 2: Englisch im Chemiestudium

Kennen Sie Möglichkeiten für Studierende, ihre Englischkenntnisse im Laufe des Chemiestudiums zu verbessern? Welche?

Was würden Sie Studierenden raten, wenn diese Sie nach Möglichkeiten fragen, ihr („fachliches“) Englisch zum Zweck ihres Studiums zu verbessern?

Halten/Hielten Sie es für sinnvoll, mehr Englisch im Chemiestudium einzuführen? Warum (nicht)? In welcher(n) Form(en)? In welchem Studienprogramm (BSc, MSc, Doktorat)?

CLUSTER 3: Unterstützung und Vorgaben

Gibt es Vorgaben seitens der Universität / Fakultät bezüglich der zu verwendenden Sprache?

Für welche Tätigkeiten (Lehre/Prüfung/Arbeiten)? Sollte es Vorgaben geben? Welche?

Wenn Sie auf English lehren, gibt es Unterstützung seitens der Universität / Fakultät für Sie?

Gibt es Ansprechpersonen zum Thema „Lehren auf English“?

CLUSTER 4: Englisch als scientific lingua franca

Verwenden Sie Englisch (z.B. als Arbeitssprache) in Ihrer Forschung? Wann? Wie?

In welcher Sprache publizieren Sie die Ergebnisse Ihrer Forschung überwiegend? Warum?
(Wenn Sie in English publizieren, gibt es sprachliche Unterstützung für Sie? Sollte es welche geben?)

Welche Sprache verwenden Sie in Ihren Forschungs- bzw. Arbeitsgruppen?

CLUSTER 5: Beliefs

Wie würden Sie die Rolle des Englischen in der Chemie beschreiben? Welche Rolle spielt Deutsch? (Österreich vs. Rest der Welt)

Welche Vorteile/Nachteile/Probleme sehen Sie in der Verwendung von Englisch in Forschung und Lehre?

CLUSTER 6: Fragen an SPL

Wie wird die Möglichkeit von Auslandssemestern an der Fakultät für Chemie angenommen?
(Österreich ins Ausland und umgekehrt)

Gibt es viele ‚ausländische‘ Studierende an dieser Fakultät? Auf welchem Level besonders (BSc, MSc, Doktorat)?

Gibt es Gastprofessoren in der Lehre? Lehren diese auf Englisch?

In wie weit wird vorausgesetzt, dass Studierende einer Lehrveranstaltung auf Englisch problemlos folgen können bzw. eine Arbeit auf Englisch verfassen können?

Welche Gründe gibt/gäbe es, Lehrveranstaltungen auf Englisch einzuführen? In welchen Studienprogrammen (BSc, MSc, Doktorat)?

Haben Sie noch weitere Anmerkungen zu dem Thema, die Sie gerne loswerden möchten?

Teacher interviews – list of codes

Number	Cluster
1	languages spoken
2	language skills - where from
3	study abroad
4	reasons for using English in teaching
5	problems when teaching in English
6	what is English used for in teaching
7	use of English: Austria (German-speaking areas) vs. rest of the world
8	students' problems with English-medium teaching
9	differences when teaching in English
10	loss of German as language of science
11	language-learning aims in content courses
12	asking questions in German in English-taught courses
13	English used in exams
14	is language graded?
15	final papers
16	why would students write their thesis in English
17	language support for students
18	advantages of teaching in English
19	how can students improve their English
20	should there be more English-taught courses?
21	in what forms should English be introduced?
22	when should English be introduced
23	prescriptions by university concerning language use
24	visiting professors
25	language level expected of students
26	language preparation for study abroad
27	support for teachers when teaching in English
28	how is English used in research
29	support when publishing in English
30	publishing in English
31	role of English in chemistry
32	why is English so important?
33	German in chemistry, globally
34	German in chemistry, Austria/Germany
35	advantages of using English in research
36	disadvantages/problems English in research
37	disadvantages English in teaching

38	reasons for not using E in teaching
39	educating future teachers vs. chemists
40	role of English in teacher education
41	preparation for students' later job
42	CLIL as a topic in chemistry teacher education
43	why chosen to teach English courses (e.g. 'Journal Club')
44	purpose of these courses (e.g. 'Journal Club')
45	who attends these courses (e.g. 'Journal Club')
46	what courses on English are there, what do these courses offer
47	motivations for students to take these courses (e.g. 'Journal Club')
48	English for administration
49	student mobility

Student questionnaire

The complete student questionnaire is provided on the following pages (102-108).

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Liebe Kollegin, lieber Kollege.

Im Rahmen meiner Diplomarbeit in Englisch befrage ich Studierende an der Fakultät für Chemie zu ihren Erfahrungen, Meinungen und Wünschen zum Thema "Englisch an der Fakultät für Chemie". Da ich selbst Chemie und Englisch auf Lehramt studiere, interessiert mich dieses Thema sehr.

Es hilft mir, wenn du die folgenden Fragen beantwortest und so deine Erfahrungen und Ideen mit mir teilst. Es dauert nur etwa 10 Minuten.

Natürlich bleiben deine Kommentare und Antworten anonym.

Ich bedanke mich für deine Unterstützung!

***1. Wie viele Semester studierst du schon Chemie an der Fakultät für Chemie an der Universität Wien?**

- ☐ 2-3 Semester
- ☐ 4-7 Semester
- ☐ 8-10 Semester
- ☐ 11-14 Semester
- ☐ mehr als 14 Semester

***2. In welchem Studienprogramm befindest du dich zur Zeit?**

- ☐ Bachelor Chemie
- ☐ Master Chemie
- ☐ Doktorat Chemie
- ☐ Diplomstudium Chemie
- ☐ Unterrichtsfach Chemie (Lehramt)

***3. Was ist/sind deine Muttersprache/n?**

- ☐ Deutsch
- ☐ Englisch
- ☐ andere (bitte angeben)

***4. Wie viele Lehrveranstaltungen (Seminare, Vorlesungen, Praktika, etc.) hast du im Laufe deines Studiums an der Fakultät für Chemie der Universität Wien schon besucht, in denen Englisch die Vortrags- bzw. Arbeitssprache war?**

- ☐ keine Lehrveranstaltungen
- ☐ 1-2 Lehrveranstaltungen
- ☐ 3-4 Lehrveranstaltungen
- ☐ 5-6 Lehrveranstaltungen
- ☐ 7-8 Lehrveranstaltungen
- ☐ mehr als 8 Lehrveranstaltungen

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*** 5. Nenne bitte diese Lehrveranstaltungen und wenn möglich das Semester, in dem du sie besucht hast.**

*** 6. Waren diese Lehrveranstaltungen verpflichtender Teil deines Studiums?**

- ☐ alle diese Lehrveranstaltungen
☐ der überwiegende Teil dieser Lehrveranstaltungen
☐ wenige dieser Lehrveranstaltungen
☐ gar keine dieser Lehrveranstaltungen

*** 7. Wie wurde English in diesen Lehrveranstaltungen verwendet?**

- ☐ als Unterrichtssprache
☐ auf den Unterlagen (z.B. PowerPoint Folien)
☐ bei der Prüfung
☐ für die Abschlussarbeit
☐ in den Lernunterlagen (z.B. Skript, Artikel, Buch)
☐ Sonstiges (bitte angeben)

*** 8. Beschreibe bitte kurz die Unterschiede, die du wahrnimmst, wenn eine Lehrveranstaltung auf Englisch gehalten wird.**

*** 9. Fließt die englische Sprache in die Benotung dieser Lehrveranstaltungen mit ein?**

- ☐ Ja
☐ Nein
☐ Teilweise (bitte angeben)

*** 10. Wie fließt die Englische Sprache in die Benotung mit ein?**

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*11. Wie würdest du das Sprachniveau der Lehrenden bezeichnen, wenn diese auf Englisch lehren?

In Bezug auf Erklären von
Inhalten auf Englisch

In Bezug auf das Vortragen
auf Englisch

In Bezug auf das
Beantworten von Fragen
auf Englisch

In Bezug auf das Führen
von "small talk" auf
Englisch

*12. Welche Vorteile siehst du, wenn Englisch als Lehrveranstaltungssprache verwendet wird?

*13. Welche Probleme siehst du, wenn Englisch als Lehrveranstaltungssprache verwendet wird?

*14. Stellen Lehrveranstaltungen auf Englisch für dich mehr, weniger oder gleich viel Aufwand dar, wie Lehrveranstaltungen auf Deutsch?

- ☐ mehr Aufwand
☐ weniger Aufwand
☐ gleich viel Aufwand

*15. Inwiefern stellen Lehrveranstaltungen, die auf Englisch gehalten werden mehr Aufwand für dich dar?

*16. Inwiefern stellen Lehrveranstaltungen, die auf Englisch gehalten werden weniger Aufwand für dich dar?

*17. Hättest du gerne mehr Lehrveranstaltungen, in denen Englisch als Arbeitssprache verwendet wird?

- ☐ Ja
☐ Nein

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*** 18. Warum hättest du gerne mehr Lehrveranstaltungen auf Englisch?**

*** 19. Warum hättest du nicht gerne mehr Lehrveranstaltungen auf Englisch?**

*** 20. Bietet dir die Fakultät für Chemie Kurse an, die sich mit dem Verbessern deiner Englischkenntnisse beschäftigen?**

☐

Ja

☐

Nein

☐

Ich weiß es nicht

*** 21. Bietet dir die Universität Wien Kurse an, die sich mit dem Verbessern deiner Englischkenntnisse beschäftigen?**

☐

Ja

☐

Nein

☐

Ich weiß es nicht

22. Falls möglich, nenne bitte solche Kurse, die dir seitens der Fakultät oder Universität angeboten werden.

*** 23. Hast du schon einen solchen Kurs besucht?**

☐

Ja

☐

Nein

*** 24. Welchen Kurs, der sich mit dem Verbessern deiner Englischkenntnisse beschäftigt hast du besucht?**

*** 25. Siehst du eine Notwendigkeit für Kurse, die sich mit dem Verbessern deiner Englischkenntnisse beschäftigen?**

☐

Ja

☐

Nein

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***26. Warum siehst du diese Notwendigkeit?**

***27. Warum siehst du diese Notwendigkeit nicht?**

***28. Hast du im Laufe deines Studiums schon eine wissenschaftliche Arbeit auf Englisch verfasst?**

- ☐ Ja
☐ Nein

***29. In welchem Zusammenhang hast du diese Arbeit verfasst (z.B. Bachelorarbeit)?**

***30. Welche Unterstützung hast du zum Verfassen dieser Arbeit im Bezug auf die englische Sprache seitens der Universität erhalten?**

***31. Hast du im Laufe deines Chemiestudiums schon eine Präsentation auf Englisch gehalten?**

- ☐ Ja
☐ Nein

***32. In welchem Zusammenhang hast du diese Präsentation gehalten?**

***33. Welche Unterstützung bezogen auf die Englische Sprache hast du beim Halten dieser Präsentation seitens der Universität bekommen?**

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***34. Hast du ein oder mehr Semester deines Chemiestudiums im fremdsprachigen Ausland verbracht?**

- ☐ Nein
- ☐ Ja (bitte angeben welches Land)

***35. Wie oft hast du dort Englisch verwendet um mit deinen Kolleginnen und Kollegen oder Lehrenden zu kommunizieren?**

- ☐ Regelmäßig
- ☐ Manchmal
- ☐ Selten
- ☐ Nie

***36. Wie oft verwendest du an der Fakultät für Chemie an der Universität Wien Englisch um mit deinen Kolleginnen und Kollegen oder Lehrenden zu kommunizieren?**

- ☐ Regelmäßig
- ☐ Manchmal
- ☐ Selten
- ☐ Nie

***37. Denkst du, dass Englisch in deinem späteren Berufsleben eine wichtige Rolle spielen wird?**

- ☐ Ja
- ☐ Nein

***38. Warum denkst du, dass Englisch in deinem späteren Beruf wichtig sein wird?**

***39. Warum glaubst du, kommt gerade dem Englischen eine solche Bedeutung zu?**

***40. Warum denkst du, dass Englisch in deinem späteren Beruf nicht wichtig sein wird?**

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41. Wie findest du es, verglichen mit einer Lehrveranstaltung, die auf Deutsch gehalten wird,

	viel leichter	etwas leichter	gleich	etwas schwerer	viel schwerer	trifft nicht zu / kann ich nicht beurteilen
einer Lehrveranstaltung zu folgen, wenn diese auf Englisch gehalten wird?	☐	☐	☐	☐	☐	☐
mitzuschreiben, wenn die Lehrveranstaltung auf Englisch gehalten wird?	☐	☐	☐	☐	☐	☐
dich auf die Prüfung vorzubereiten, wenn die Lehrveranstaltung auf Englisch gehalten wird, die Prüfung aber auf Deutsch abgehalten wird?	☐	☐	☐	☐	☐	☐
dich auf die Prüfung vorzubereiten, wenn die Lehrveranstaltung auf Englisch gehalten wird und die Prüfung auch auf Englisch ist?	☐	☐	☐	☐	☐	☐
dich auf die Prüfung vorzubereiten, wenn die Lernunterlagen (Skripten, PowerPoint Folien, Bücher, etc.) auf Englisch sind?	☐	☐	☐	☐	☐	☐
den fachlichen Inhalt einer Lehrveranstaltung zu verstehen, wenn die Lehrveranstaltung auf Englisch gehalten wird?	☐	☐	☐	☐	☐	☐
Fragen an die Lehrenden zu Stellen, wenn die Lehrveranstaltung auf Englisch gehalten wird?	☐	☐	☐	☐	☐	☐
wissenschaftliche Konzepte und Vorgänge auf Deutsch zu erklären, wenn sie dir in der Lehrveranstaltung nur auf Englisch erklärt wurden?	☐	☐	☐	☐	☐	☐

Vielen Danke für deine Unterstützung bei meiner Diplomarbeit. Bitte beantworte nur noch diese eine letzte Frage.

42. Ich würde mich gegebenenfalls für ein Interview zu diesem Thema bereit erklären. (Auch diese Daten bleiben selbstverständlich anonym!)

☐ Nein

☐ Ja (bitte E-Mail -Adresse angeben)

Abstract in English

This thesis focuses on the quite recent trend of English-medium teaching in European higher education institutions. It sketches the circumstances that led to the increasing use of English as the language of teaching and why it is used particularly in natural sciences. These include political reasons that led to the decline of German as the scientific lingua franca, thus opening the door for English, as well as economic reasons (e.g. attracting tuition-fee paying students) and practical reasons like the usage of first-hand teaching materials. Furthermore, student and staff mobility are fostered by the idea of unifying the European higher education space. English language proficiency is nowadays seen as a necessary skill for future scientists.

Hence, students at universities should be frequently exposed to the English language and even receive further training in it. Both exposure to and training in the language can be achieved by using different approaches. This paper discusses English-medium teaching (EMI), English for Specific Purposes (ESP), and Content and Language Integrated Learning (CLIL) or to be more precise, Integration of Content and Language in Higher Education (ICLHE). The advantages of the latter approach are pointed out in this paper, using findings from research.

Research for this paper was conducted at the Faculty of Chemistry at the University of Vienna and included four teachers and 107 students. It is concluded from its findings that teachers as well as students are aware of the importance of the English language in chemistry. Nonetheless, the language as such does not really play a role in the education of future chemists and chemistry teachers. No English language training is offered and students are only exposed to the English language infrequently in single English-taught lectures. It was also found that teachers and students generally welcome the use of English as the language of teaching. While for some this poses problems, others see benefits of English being used in their education at university. This thesis thoroughly discusses these issues and suggests that more English should be introduced and if so, this should be done in a more planned way.

Deutsche Zusammenfassung

Diese Diplomarbeit beschäftigt sich mit dem recht neuen Trend, English in ganz Europa als Arbeitssprache in der Hochschulbildung einzusetzen. Die Umstände, welche zu einer Zunahme der Verwendung des Englischen in der Lehre führten, werden aufgezeigt und es wird darauf eingegangen, warum gerade in den Naturwissenschaften Englisch besonders oft verwendet wird. Zu diesen Umständen zählen die politischen Entwicklungen, die zum Rückgang der Verwendung von Deutsch als Wissenschaftssprache führten und so Englisch die Tür öffneten, aber auch ökonomische Gründe (z.B. Studierende, die Studiengebühren bezahlen) und praktische Gründe, wie etwa die Möglichkeit Lehrmaterialien aus erster Hand auf Englisch zu verwenden. Außerdem wird der Austausch von Studierenden und Lehrenden durch die Idee eines vereinten europäischen Hochschulraumes gefördert. Englischkenntnisse werden heutzutage als eine notwendige Fähigkeit für zukünftige Naturwissenschaftlerinnen und Naturwissenschaftler angesehen.

Aus diesem Grund sollten Studierende an einer Universität regelmäßig der englischen Sprache ausgesetzt sein und sogar weiterführende Ausbildung darin erhalten. Sowohl der Sprache ausgesetzt zu sein als auch die Ausbildung in dieser Sprache können in verschiedenen Formen realisiert werden. Diese Arbeit thematisiert English-medium teaching (EMI), English for Specific Purposes (ESP) und Content and Language Integrated Learning (CLIL), beziehungsweise Integration of Content and Language in Higher Education (ILCHE). Die Vorteile des letzteren werden in dieser Arbeit aufgezeigt, indem sie vorhandene Forschungsergebnisse aufzeigt.

Die Forschung für diese Arbeit wurde an der Fakultät für Chemie der Universität Wien mit vier Lehrenden und 107 Studierenden durchgeführt. Die Ergebnisse lassen darauf schließen, dass sich sowohl Lehrende als auch Studierende der tragenden Rolle der englischen Sprache in der Chemie bewusst sind. Dennoch spielt Sprache an sich keine Rolle in der Ausbildung zukünftiger Chemikerinnen und Chemiker und Chemielehrerinnen und Chemielehrer. Es wird also keine Ausbildung in der englischen Sprache angeboten und Studierende werden nur unregelmäßig in einzelnen, auf English gehaltenen Vorlesungen, der englischen Sprache ausgesetzt. Die vorliegende Arbeit zeigt auf, dass Lehrende und Studierende die Verwendung von English als Arbeitssprache im Allgemeinen begrüßen. Während dies für einige ein Problem darstellt, sehen andere Vorteile, welche die Verwendung von Englisch in ihrer

Hochschulbildung mit sich bringt. Diese Diplomarbeit diskutiert diese Aspekte eingehend und schlägt vor, dass mehr Englisch und zwar in geplanter Form eingeführt werden sollte.

Curriculum vitae

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