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"CLIL in lower secondary biology classes:
Influences of a CLIL project on Austrian students' learning experiences and attitudes"

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1. Introduction

Globalization has led to a significant change in today's world with technical innovations being responsible for high mobility, rapid knowledge exchange and the interconnectedness of people all around the world. In accordance with these developments, the mindset of people, especially of those born into the so-called 'Cyber Generation', has notably changed. Likewise, the former 'learn now, use later' mentality has morphed into a 'learn as you use, use as you learn' approach (Mehisto, Marsh & Frigols 2008: 11). Content and language integrated learning, abbreviated as CLIL, appears to be the common answer to new generational needs and the idea of applying it in school has spread rapidly over Europe and some other parts of the world, including Asia and South America (Georgiou 2012: 495).

Even though various definitions for CLIL exist, each describes it as a teaching approach in which a non-language subject is taught with the help of a language. In this way, the focus is not solely placed on the content, but also on language skills. One of the definitions that comes closest to my personal understanding and will thus guide my future argumentations is the following as posited by Georgiou (2012: 495):

> [CLIL] refers to a dual-focused, learning and teaching approach in which a non-language subject is taught through a foreign language, with the dual focus being on acquiring subject knowledge and competences as well as skills and competences in the foreign language.

While the European Union extensively supports CLIL to provide young people with skills needed for communicating globally, national policy makers and individual schools are increasingly giving particular attention to CLIL as well. By 2008 all countries of the European Union except for 6 states had introduced CLIL either as a pilot project or as a crucial component of mainstream secondary education (Eurydice 2008: 40). The reason for this widespread enthusiasm might be the wide range of advantages CLIL appears to have. While numerous people highlight motivational and intercultural benefits of CLIL (e.g. Coyle, Hood & Marsh 2010), others are convinced that students will profit cognitively from being in a CLIL environment or stress the efficient learning situation (e.g. Dale & Tanner 2012). However, even though it is often claimed that CLIL has a strong positive impact on students' motivation, language learning success and cognitive development, studies focusing on actual students' perceptions are rather limited.

My personal interest in CLIL started during my 'Lehramtstudium' at the University of Vienna. The manifold advantages of this relatively new approach played a role in several seminars and lectures. Moreover, as my own subjects are English and biology, I soon became a strong proponent of this relatively new approach myself. However, when designing and teaching a CLIL lesson in one of my seminars for the first time, I realized how challenging CLIL can be. Through conversations with CLIL teachers about their experiences, I realized that even seasoned professionals sometimes struggle with the approach in terms of preparing materials that fit students' needs, finding the right balance between language and content and simultaneously creating a learner-friendly, enjoyable atmosphere.

Therefore, this thesis aims at focusing on students' opinions and perceptions of CLIL, shedding light on various factors that possibly influence pupils' learning experiences during CLIL lessons. Results will be drawn from a teaching project conducted in two Austrian lower secondary biology classes and might contribute to improving current practices and making CLIL more effective.

First of all, a relatively brief overview of the goals of CLIL, its history, and its use in Austria will be given. This will be followed by a critical analysis of potential benefits of CLIL, including, for instance, influences on non-linguistic content, students' cognitive development or materials' authenticity. The next section will then elaborate on challenges, including a shortage of teachers and limitations of materials, and misconceptions. Subsequently the paper will narrow down to CLIL in biology, focusing on didactic concepts of CLIL, didactic principles in biology, as well as particular language use in CLIL biology lessons and reasons for choosing natural science classes for CLIL. After this theoretical section, the focus will shift to the CLIL project conducted in a lower secondary school in Austria. The primary chapters in this part will mainly deal with the research questions, the design of the project, its evaluation and implementation. Following this, the results section will present outcomes calculated with the help of SPSS and a descriptive analysis of questions that could not be evaluated with the program. After a thorough discussion of these results, a conclusion depicting the most significant findings and its consequences for teaching CLIL will be given.

2. Conceptual and historical background of CLIL

2.1. Goals in CLIL

Coyle, Hood & Marsh (2010: 17) presumably provide one of the most detailed lists of goals that CLIL should fulfil. Their 5 categories include 'content', 'language', 'learning', 'culture' and 'context'. These categories seem to co-occur in various other handbooks, differentiated only by slight differences in wording. In the following section, the categories will be outlined briefly and parallels will be made to the aims stated in the Eurydice report (2006: 22) and by Mehisto, Marsh & Frigols (2008: 12).

'Content' highlights that CLIL enables teachers to use original and authentic materials that can help students to become more proficient in the subject taught. Additionally, these materials can support students to obtain skills that they will presumably need in their future working lives or for further studies (Coyle, Hood & Marsh 2010: 17). In the Eurydice report (2006: 22) this goal is presented in a similar way, as it is mentioned that one of the two primary goals in CLIL is the acquisition of subject-related knowledge. Mehisto, Marsh & Frigols (2008: 12) speak of 'grade-appropriate levels of academic achievement in subjects taught through the CLIL language'.

The second category 'language' deals with the improvement of students' competences in the language used in CLIL. CLIL should aim to render students more self-confident and provide them with solid communication abilities (Coyle, Hood & Marsh 2010: 17). In the Eurydice report (2006:22) this is stated as well, but in a less elaborated way, as it is solely claimed that students should "(...) develop their competences in a language other than the normal language". In contrast, Mehisto, Marsh & Frigols (2008: 12) do not solely stress the importance of the CLIL language, but also address appropriate competencies in the students' mother tongue as a CLIL goal.

'Learning' comprises enhancing students' motivation through CLIL and extending learning strategies and methods. According to the authors (2010: 17), mixing subject content and language skills should enable teachers to work with a variety of different methods that make the lessons more interesting and appealing for students, thus motivating them. While Mehisto, Marsh & Frigols (2008: 12) do not list this goal, the Eurydice report also highlights this aspect. As students use the language for real life purposes they will be willing to work harder (2006: 22).

In terms of 'culture', Coyle, Hood & Marsh (2010: 17) state that CLIL should aim at improving students' intercultural awareness. Students should become more tolerant and develop skills that facilitate cooperation. Tolerance and respect for other cultures through

language use are also defined as primary aims in the other two sources (Eurydice 2006: 22, Mehisto, Marsh & Frigols 2008: 12).

The last category, 'context', refers to the aim of many schools to introduce CLIL in order to prepare students for today's globalized society, improve 'school profiles', and give learners access to 'international certification' (2010: 17). Instead of 'globalization', the Eurydice report mentions a similar aim, namely the support of students in an 'internationalized society'. In accordance with this, Mehisto, Marsh & Frigols (2008: 12) talk about an 'ever-changing world' that requires specific skills acquired through CLIL. Interestingly, the authors also clearly highlight the influence parents have on CLIL aims in society today. In order to succeed in their future lives, parents want their children to become proficient in the CLIL language, their first language, as well as the subject's content.

As is shown above, the five categories by Coyle, Hood & Marsh (2010:17) seem to serve as a useful guideline for the overarching aims in CLIL. However, these goals from handbooks or the Eurydice report do not entirely overlap with the objects stated by CLIL teachers. As discussed by Dalton-Puffer (2008: 140), teachers in Austria, for instance, primarily named 'increasing exposure, increasing practice, increasing language competence' and in some cases intercultural awareness as CLIL aims. Content, learning and motivational aspects were not mentioned. It could be interpreted that teachers enhance these skills unconsciously. However, it could also be that CLIL in practice does not succeed in focusing on so many goals.

2.2. Combining CLIL and language classes in school

In addition to the goals of CLIL, more light should be shed on its relation to language classes to clarify the role of CLIL in education. Abuja (1998: 210-211) argues that CLIL should not be seen as an appropriate substitution for mainstream language education in schools. Rather, CLIL lessons should serve as an opportunity for additional language practice. According to the author, CLIL and language lessons differ in terms of five main components. Firstly, language classes provide students with an introduction to fundamental aspects of the target language such as cultural features or basic grammar. CLIL lessons make use of this basis and then support students' knowledge extension. Furthermore, Abuja mentions the importance of 'formal aspects' in language classes that differs from the strong content focus in the CLIL units. Here, grammatical mistakes or lexicon related missteps are often not taken into account, as communication in class is prioritized. Another crucial difference is the use of topics in language classes and in CLIL. Whereas topics in regular lessons are primarily used to support students in improving their language skills, CLIL focuses mainly on the content, while

language is used to learn new concepts in the field of the CLIL subject. The fourth difference that is mentioned is the extent to which time is devoted to every language skill. In regular lessons, students usually train all skills equally whilst teachers attempt to raise their awareness of the skills explicitly. In CLIL, receptive skills are prioritized as they are needed in order to understand the content. Lastly, Abuja draws attention to the curriculum by pointing out that unless CLIL is part of a bilingual education programme, it is not part of the curriculum and is thus voluntary. In contrast, language lessons are compulsory and there is a certain number of units per week that have to be taught.

In accordance with Abuja's line of argumentation, the Eurydice report from 2006 (3) advises schools to avoid 'the exclusive use of the foreign language as the only medium of instruction'. The report shows that in Austria, for instance, students start to learn a foreign language from the first year in primary school onwards. CLIL is introduced in some schools already in the first two years as well. However, the CLIL units are relatively short and should not exceed one hour per week. In secondary education exposure to CLIL ranges from projects that last for a few lessons to entire bilingual branches. Foreign language teaching is thereby never replaced by CLIL (2006: 4-5). Nonetheless, these results must be treated with caution, as the report is already 11 years old and therefore might be outdated.

2.3. CLIL: from its beginnings to today's variations

Even though CLIL appears to be innovative at first sight, being taught in a language that is not one's mother tongue is not as new as it might seem. Latin, for example, was the common language used for teaching 'through much of European history' (Dalton-Puffer 2002: 6), even though Latin education always remained restricted to wealthy people and the learners' mother tongue did not play a role in teaching as it does in CLIL nowadays (Mehisto, Marsh & Frigols 2008: 9). New technological revolutions, the wish to 'increase European cohesion', along with globalization noticeably helped to pave the way for CLIL education. As the long-prevailing monolingualism in schools no longer seemed adequate, alternative teaching programmes had to be found. America reacted to these trends most rapidly and developed adequate teaching methods (Mehisto, Marsh & Frigols 2008: 9-10). Nevertheless, these early forms cannot be compared entirely to CLIL today. Numerous students in America use English as a second language and the overall goal is to integrate these speakers into society, while students in EAA settings are already 'part of the mainstream school' (Dalton-Puffer 2002: 12).

In Europe teaching in a foreign language was seen as 'something almost exotic' (Wolff 2007:13) until the beginning of the 1990s. Even though people were aware of the

advantages of speaking multiple languages, only the upper classes could afford employing foreign language speaking teachers or sending their children abroad (Mehisto, Marsh & Frigols 2008: 9). However, in the 1970s, the access to bilingual programmes became increasingly facilitated and the students' financial situation was no longer a critical factor. The idea of 'Language across the Curriculum' developed in the United Kingdom, already focusing on the integration of language in other subject to strengthen students' language abilities (Mehisto, Marsh & Frigols 2008: 10). As described in the Eurydice report (2006: 8-9), the European Union also started to notice that foreign language teaching methods required updates over the course of the globalization process in the following years. In the Resolution of the Council that appeared in 1995, the importance of new methods was highlighted and it was further suggested that non-language subjects should be taught in foreign languages with the help of bilingual programmes. In the White Papers that were released by the European Commission in the same year, it was stressed that all people living in a country belonging to the EU should be proficient in at least three languages spoken in Europe. To achieve this goal, the idea of teaching particular subjects entirely in students' first foreign language was developed. This political advice had 'a catalytic effect' (Eurydice 2006:9). Programmes focusing on plurilingualism, international mobility or the development of bilingual curriculums were financially backed and various new actions were taken that further paved the way for CLIL (Eurydice 2006:9). With the expansion of the European Union (from 15 to 25 member states in 2004, and further to 27 in 2008), official languages also rose in number while the issue of multilingualism became increasingly relevant. In 2008, the Commission finally decided that all Europeans should be supported in learning two other languages in addition to their first language (Eurydice 2008: 3).

Even though CLIL has hence been promoted by the European Union over several years, only a small number of the member states 'responded with substantial management investments into CLIL implementation, teacher education and research'. As a result, precise goals are often missing and CLIL guidelines are frequently created through 'grass-root actions'. This led to an increasing number of schools implementing and promoting their own CLIL programmes. These programs are based on individual interpretations of and beliefs about the term, without empirical foundations (Hüttner, Dalton-Puffer & Smit 2013: 270-271). In the following, Austria will serve as an example to outline the variety of CLIL implementations that exists mainly due to grass-root actions. These descriptions will be accompanied by a brief overview of the differences that can be found Europe-wide.

2.4. CLIL in Austria and Europe-wide differences

Even though the trend of teaching CLIL seems to be steadily increasing, the number of official sources and the amount of data on the practices in schools is rather limited. One source that provides a good insight into Austrian CLIL routines, though already slightly outdated, is the Austrian 'Serviceheft 06' that was published by the Austrian 'Sprachenkompetenzzentrum' in 2005. The list of variants that the editor Nezbeda (2005: 40-60) provides includes the following teaching practices:

1. Interdisciplinary projects: Non-language subjects are taught periodically in a foreign language. This might include the subject teacher using CLIL for one or several topics on his own or cooperating with a language teacher who accompanies the subject teacher. This occasional use of CLIL does not appear in the students' annual reports but is seen as part of the subject's grades. Interdisciplinary projects are widely used in Austrian schools for two reasons. First of all, schools can decide autonomously whether they want to include CLIL projects in their subjects or not without having to report their decisions to official education boards. Secondly, curricula demand a certain degree of interdisciplinary teaching that CLIL classes can easily provide.

2. CLIL in some or all compulsory teaching sequences: CLIL is frequently or exclusively used for teaching non-language subjects. However, school timetables and the organization of the lessons remain the same. Permission from the educational board is needed.

3. CLIL in 'Unverbindlichen Übungen' (optional subjects): Additional CLIL subjects are introduced, which students can join in their spare time. One example noted by Nezbeda is the optional subject 'drama', offered by many schools. No report to the educational board is needed.

4. CLIL in 'Wahlpflichtfächern' (elective subjects): A certain number of subjects have to be chosen by Austrian students in upper secondary education. Some schools offer these elective subjects in CLIL after having gained permission from thfe educational board.

5. CLIL as part of an autonomous curriculum: In Austria schools are allowed to define their own primary focus and adjust the subjects accordingly. Former subjects might be reduced in the number of lessons per week and new subjects can be integrated in the curriculum instead. Various schools in Austria are thus specialized in languages and have integrated CLIL into their curricula. CLIL lessons can either be a part of common subjects or can play a role in new subjects, such as 'English for Specific Purposes' (Nezbeda 2005: 45). However, until schools

can act according to their newly defined language goals, various measures must be taken. These steps include a two-third majority of each stakeholder group in the school forum along with an autonomous curriculum and didactic objectives that the official board of education has to check. Even though this procedure seems rather complex, the number of schools having their own curriculum is continuously increasing.

6. CLIL in 'Schulversuchen' (school experiments): All actions that exceed those named in number five belong to this last category. Schools that introduce a new CLIL subject called 'communication and presentation skills', for example, need to send an application to the board of education after having reached an agreement in the school forum.

However, not only on a national basis, but also European-wide CLIL characteristics differ to a certain extent. For example, whilst students wishing to take part in CLIL education are mostly not required to pass an entrance test, seven European countries require certain admission criteria. In Poland, Romania and Hungary, students' language skills are the only admission criteria. However, in case of a high number of applicants, subject knowledge is additionally tested in Hungary. In Slovakia, the Netherlands and Portugal both subject and language knowledge are requirements for CLIL programs. Bulgaria is the only country with entrance tests focusing on general knowledge, dealing with all subjects that are part of the curriculum (Eurydice 2008: 44-45). During the term, assessments also differ between countries. Solely in Austria and in Hungary students can decide whether they want to be assessed in the language that is normally used in the subject or in the language used for CLIL. In other countries, including but not limited to France, Germany and Spain, students always have to use the target language. In countries, such as the Netherlands and Sweden, pupils are not assessed in CLIL in addition to their normal subject-related tests, but receive a certificate at the end of the CLIL program that should show their language competence. However, it must be taken into account that this data stems from 2005 research and practices might have been subject to change over the course of the last ten years (Eurydice 2006: 29). Further differences exist when looking at the teachers' qualifications for education in the CLIL sector. In most countries, no extra qualifications are required for working in the field of education, therefore the schools choose the teachers they believe to be competent enough for CLIL. However, CLIL teachers need 'special qualifications' in 6 countries, including Belgium, Hungary, Spain, the Czech Republic, Bulgaria and Latvia. In most cases these qualifications are related to the teachers' language skills. After proving that they are proficient enough to teach a subject in a language that is not part of the usual school system, they are allowed to

give CLIL lessons (Eurydice 2008: 84-85).

Even though the aforementioned differences are only a small selection of features that could be compared in European-wide CLIL education, it shows that besides a certain consensus in most countries, no common CLIL philosophy seems to be used throughout Europe.

3. Potential benefits or drawbacks of CLIL: empirical evidence

Handbooks of CLIL often highly praise the manifold advantages of CLIL. Mehisto, Marsh & Frigols (2008: 2-3), for instance, stresses the 'positive "can do" attitude' that is created through mixing English with a non-language subject, as well as the 'hunger towards learning languages' that results from this innovative approach. As empirical evidence is often scarce, this chapter is dedicated to critically investigating potential benefits, such as an increase in motivation, authenticity or better subject knowledge by taking a look at various studies conducted in these areas of research.

3.1. Influences on non-linguistic content

In their handbook, Coyle, Hood & Marsh (2010: 11) claim that CLIL settings have a noticeably positive effect, as foreign languages motivate students and ease the process of conceptualization. This hypothesis seems to be supported by several investigations. Over the course of a study on the negotiation of meaning in 22 classes of two Italian high schools by Mariotti (2006: 34-35), for instance, participating CLIL teachers were asked about their students' level of the non-language subjects. Even though these teachers all used Italian solely in case of major comprehension issues, all of them agreed that their students' results did not differ from the ones achieved by students attending non-CLIL education. Similar perceptions were reported in an article by Svenhard et al. (2007: 140) focusing on surveys that were sent via email to various primary and secondary schools in Norway in order to locate schools with CLIL teachers and examine their perceptions. Svenhard's team (2007: 143) highlighted that according to these surveys Norwegian students faced few problems in following English instructions in their non-language classes. Especially history teachers, for instance, pointed out that students would develop even a preference for English material in their lessons. Multiple social sciences teachers answered in the questionnaires that the communication was by no means impeded by using English.

One study that sees CLIL in a slightly more critical light in terms of non-language achievements was conducted in Finland. The author Seikkula-Leino (2007: 332) aimed to find whether CLIL students and students from mainstream education differed in terms of

achievements in their subjects by analysing tests that focused on maths and Finnish as a mother language. The investigations involved 217 students from years 5-6 in a comprehensive school in Finnland (Seikkula-Leino 2007: 333). The results were then divided into 3 categories, namely 'underachievers', 'achievers' and 'overachievers'. It was found that the number of CLIL students who belonged to the achievers was higher than in the non-CLIL group. However, when looking at the 'overachievers' category, non-CLIL students lay ahead with 21.8% of the non-CLIL students having excellent content-related skills, with solely 8.6% of the CLIL students belonging to this group (2007: 334-335). The author hence concludes that although students benefit from CLIL in terms of becoming proficient in a foreign language and also achieving average results in the content of the subject, the mother tongue seems to still provide students with more possibilities in reaching the highest grades (2007: 336). An older study that was conducted by Washburn in 1997 (in Airey 2004: 102) also demonstrated that there is a certain risk of students becoming outperformed by their mainstream colleagues in terms of subject knowledge. Washburn compared the grades of CLIL students to the ones of a control class and found that CLIL students had similar or even better grades than their peers. However, at the end of the study CLIL students' grades were poorer in chemistry and also physics to an extent.

This is to say, even though most studies provide evidence for the fact that students in CLIL settings achieve similarly high levels of education in the subjects offered to them, the language barrier might still cause minor disadvantages leading to a decrease in overachievers, for instance.

3.2. Cognitive development

Another advantage that is often pointed out is the support of 'a learner's cognitive development' (Coyle, Hood & Marsh 2010: 10) due to CLIL programs. CLIL is claimed to have a substantial influence on students' ways of thinking and memory abilities (Dale & Tanner 2012: 11). Support comes from the field of psychology. In his famous cognitive development theory, Piaget suggests, for instance, that children must encounter cognitive conflicts to learn as they constantly try to reach an equilibrium between their present knowledge and new experiences (Piaget 1970: 109). CLIL might represent such a conflict as well due to the discrepancy between language and subject matter. However, the question is raised whether empirical studies also lead to similar results.

Even though literature on CLIL specific cognitive studies is rather scarce, there is some evidence that supports the claim that cognitive development takes place due to CLIL. One particular study providing supporting evidence was conducted by Garcia del Carmen

Mendez (2014: 28) who interviewed 15 teachers from Spanish primary and secondary CLIL schools. According to their answers, CLIL students profited in terms of lower and higher order thinking skills. Students were, for instance, reported to remember and summarize content better, as using their mother tongue and a foreign language 'reinforces the content' (Garcia del Carmen Mendez 2014: 33-34). An example that teachers provided concerning higher order thinking skills was, for example, students' skill of 'critiquing', as teachers noted that their CLIL students would question content to a greater extent and would stay more open-minded concerning new ideas (Garcia del Carmen Mendez 2014: 36).

In order to find further evidence for an increase in learners' cognitive thinking, the research area of bilingualism appears to serve as a valuable source. This is not to say, however, that CLIL can be compared to children being fluent in two languages from their birth onwards. Adesope et al. (2010: 207), for instance, collected and analysed 63 studies that investigated cognitive functions of bilinguals and concluded that being a native speaker of two languages leads to 'increased attentional control, working memory, metalinguistic awareness, and abstract and symbolic representation skills'. I would hereby like to briefly outline two studies that are named by Adesope to provide the reader with an insight into evidence for bilinguals' enhanced cognitive thinking skills. The first study was conducted by Bialystock and investigated the 'selective attention' and 'cognitive complexity' of 60 Chinese preschoolers, half of which being bilingual English-Chinese speakers (1999: 636). Among various other tests, every child was presented with two pictures, one of a king and one of a tree, and a card with the word king on it. The researcher explained what was on the card, but then shifted the card around several times over the course of the following conversation. At the end of the exercise, the child was asked what was written on the card. Hence, the task tried to assess in how far children can concentrate selectively on one aspect of the task, namely the word card, while ignoring the visual input around it (1999: 639-640). Bilinguals answered correctly more often, hinting towards the hypothesis that being skilled in more than one language has an effect on children's attentional facilities (1999: 642). Another study mentioned by Adesope et al. was conducted by McLeay to reveal differences in bilinguals' and monolinguals' success in completing complex spatial tasks (2003: 423). The 41 participants were all either Welsh and English bilinguals or English speaking university students from Wales. All of the students were presented with intertwined ropes that they had to identify either as similar or dissimilar from each other (2003: 428-429). Results showed that bilingual students solved the exercises noticeably faster. McLeay hence concludes that bilinguals seem to be able to develop more effective strategies for problem-solving tasks due

to their capacity to master 'mental manipulation or comparison of topological properties' (2003: 436).

Even though children in CLIL programs are not surrounded by two languages as often as bilinguals, the integration of two languages might still lead to a rise in cognitive flexibility and complex thinking skills similar to the studies presented above. CLIL students cannot exclusively rely on their mother language and have to develop strategies to succeed in the tasks provided. These strategies might then be beneficial and stimulating for other exercises and contents as well.

3.3. Students' motivation

Dale & Tanner (2012: 11) assert that CLIL learners are more motivated than mainstream EFL learners, as they consider their lessons to be more efficient due to the integration of language- and subject-focused learning at the same time. Coyle, Hood & Marsh (2010: 11) also stress the increase in motivation due to CLIL, but for a slightly different reason. According to them, the language serves as an incentive for studying the subject. Students who are otherwise not interested in natural sciences, for instance, might become more motivated when the lessons are taught in a foreign language that they are interested in. The so-called Polish Profile Report that was published in 2008 by Marsh et al. appears to support this hypothesis by listing intrinsic as well as extrinsic motivational aspects that were named in students' interviews from bilingual classes. Intrinsic motivations included amongst others 'gaining different perspectives' or 'broadening horizons and connecting to the world'. More extrinsic motivations covered aspects, such as 'preparing for future studies in other countries', 'participating in a prestigious type of education' or ' having greater access to learning resources (internet)' (Marsh et al. 2008: 25). However, disadvantages were also named in the interviews that could lead to a decrease in motivation. Students mentioned, for instance, that 'objectives for learning through English [were] unclear' and that there was a 'lack of suitable English language materials' (Marsh et al. 2008: 26). However, to illuminate motivation fully, quantitative results should be taken into account as well.

Lasagabaster (2011: 8) investigated differences in motivation between 191 Basque CLIL students and mainstream EFL students from four different secondary schools, all being approximately 15 years of age. While the regular students had 3 hours of EFL teaching per week, the CLIL students were additionally exposed to English in other subjects. Students' motivation and their proficiency in English was tested with the help of a motivation survey based on insights from L2 motivational studies and an English language test (2011: 9). Results support the belief that CLIL raises students' motivation, as they were more motivated

in all three categories assigned to the survey, namely 'interest and instrumental orientation', 'attitudes towards learning situation' and 'effort'. In addition, it could be shown that students' motivation is correlated with the language learning outcomes. However, it is interesting to note here that motivation was significantly more linked to writing and grammar skills than to speaking and reading abilities. Hence, motivation seems to only trigger better results to a certain degree.

Another study that is in favour of an increase in learners' motivation through CLIL is Doiz, Lasagabaster & Sierra's (2014) investigation of motivation and the effect the learners and the context might provide. 393 first and third graders from five secondary schools in the Basque country were divided into CLIL and non-CLIL groups and had to fill in questionnaires focusing on their motivation for learning English (2014: 214-216). CLIL students' motivation was shown to be significantly higher in all motivational categories. Students were more intrinsically, as well as extrinsically motivated, they showed an increased interest in the English language and in cultural backgrounds (2014: 217). While gender did not have an influence on students' motivation, the type of motivation seemed to change with age. Whereas first graders were more intrinsically motivated and showed a higher level of 'motivational strength', third graders were more instrumentally motivated. Interestingly, Fontecha & Alonso (2014: 23) also mention that gender-related motivational differences could not be found in CLIL, but were present in several studies investigating foreign language teaching.

Besides these studies various other investigations led to highly similar results, depicting CLIL as a motivating alternative to regular EFL lessons (Denman et al. 2013, Seikkula-Leino 2007 or San Isidro 2010). However, doubts concerning an increase in motivation due to CLIL could also be found. Bruton (2011: 527-528), for instance, criticises a study by San Isidro (2010) on advantages of CLIL. Even though San Isidro concludes that CLIL seems to be highly beneficial in terms of learning outcomes, Bruton draws attention to San Isidro's remark (2010: 74) that CLIL students attended the program voluntarily and their motivation for learning languages was generally higher from the beginning onwards. Sound empirical evidence for such 'a priori differences' derives from a large-scale study by Rumlich (2016: 303). 953 students from North-Rhine-Westphalia in Germany attending either regular secondary schools without CLIL provision or schools with CLIL strands participated in Rumlich's study (2016: 261). Investigations began in year 6 at the beginning of the 'Gymnasium' in Germany and ended two years later. Results clearly show that even though CLIL students were more proficient, interested and convinced of their language-learner

qualities than non-CLIL children after year 8 (2016: 361), these differences largely existed before the beginning of the CLIL program already (2016: 426). According to the author, these initial differences possibly stem from the fact that even though parents are officially the ones who can choose the strand for their children (2016: 80), limited places often 'render secondary schools rather powerful' (2016: 84). As a consequence, schools often choose the most talented and motivated students for the CLIL program. Rumlich uses the term 'creaming' to refer to this selection process (2016: 438).

Due to these counterarguments, it becomes relatively difficult to decide whether CLIL motivates students or whether higher levels in motivation are solely the result of selective processes in schools.

3.4. Increased authenticity

Authenticity belongs to one of the concepts that seems to be co-occuring with the term CLIL most frequently. According to research by Pinner (2013: 44), 'authenticity' can, for instance, be found in 37% of the articles published in the *International CLIL Research Journal*. While handbooks, such as the one by Coyle, Hood & Marsh (2010: 4) stress the increase of authenticity through CLIL, Graddol (2006:86) even calls CLIL 'the ultimate communicative methodology' that is more authentic than previous CLT programs. However, when speaking of authenticity, a definition should be given before further elaborating on the degree of authenticity in CLIL lessons. In the past, authenticity was often believed to be strongly linked with native speaker language (Pinner 2013: 45). However, as the majority of CLIL teachers are not native speakers, shown in a study by DeGraaf et al. (2007: 611) for instance, this definition appears to be rather problematic. Hence, Breen's definition of authenticity as 'devices [...] which generate communication in the target language' (1985: 61) seems to fit noticeably better with the language use in CLIL.

Even though empirical research on authenticity in the CLIL classroom seems to be rather scarce, a study by Pinner (2013) that investigated CLIL students' perception of authenticity provides evidence for the fact that students perceive CLIL lessons as more authentic and 'content-driven' than their regular lessons (2013: 44). With the help of questionnaires, interviews and classroom journals, the opinions of students from Sophia University in Tokyo were analysed. Over the course of the interviews, several students stated that regular lessons were not authentic and that they wished for more 'real English' in school (2013: 47-49). The questionnaires further revealed that content was seen as the most crucial variable to increase authenticity in class. Therefore, CLIL lessons that generally have a strong focus on content seem to have a much higher potential in authenticity than regular EFL

lessons, according to this study. Even though empirical evidence from one study does not serve as a thorough basis for profound statements, it might still be concluded that the handbooks are correct in praising CLIL for providing students with an authentic learning environment.

3.5. Learners' positive self-perceptions through CLIL

Several studies focusing on education in EFL settings stress the relevance of students' perceptions of their language learning. Mercer & Ryan (2010: 442), for instance, found noteworthy correlations between 4 Japanese, as well as 5 Austrian first-year university students' regarding their self-perceptions and degree of motivation in language learning. Notably, positive attitudes led to stronger effort. Other researchers that share this opinion are, for instance, Dörnyei and Ushioda who stress that 'the way individuals feel about themselves and others and the ways in which they appraise their achievements (...) will have a significant impact on their learning' (in Coyle 2013: 246). CLIL might boost students' language learning perceptions even further, as learners receive varied and subject-specific input and are encouraged to 'interact meaningfully' (Dale & Tanner 2012: 12).

Various international studies undermine this thesis. For example, in a longitudinal study by Lasagabaster and Doiz (2016: 221) with 195 Basque CLIL students from secondary schools, learners were shown to perceive their language improvement in CLIL classes as noticeably higher than in regular English sessions. These results seem to be in line with a study conducted on the Balearic Islands with 170 participants, indicating that CLIL students feel more motivated to learn a foreign language (Amengual-Pizarro & Prieto-Arranz 2015: 215). Further support derives from an investigation by Asomazo Nuñez (2015: 111) in Mexico. 11 university students in their 5th semester of a CLIL bachelors' programme were asked to describe the initial impressions they had of CLIL in their first semester and compare them to their recent view of CLIL at university. Even though almost half of the students stated that they had experienced feelings of anxiety in the beginning (2015: 115), the number of advantages students named at this stage of the programme was surprisingly high, including, for example, 'increasing English levels', 'learning academic vocabulary' and 'increasing TOEFL scores in some skills' (2015: 120). Hence, these statements seem to demonstrate learners' strong belief in the efficiency of the CLIL program. However, it should be noted that students in Asomazo Nuñez's study also raised criticism. Several learners struggled with understanding the content of the CLIL lessons and felt that training the subject knowledge in their mother tongue was partially neglected (2015:120). Therefore, it might be concluded that CLIL supports students' confidence in language learning, but at the same time subject

knowledge and skills in students' mother tongues should possibly receive increased attention as well.

In Austria studies on CLIL students' perceptions are rather limited to upper secondary schools focusing on technology and crafts, so-called Höhere Technische Lehranstalten (HTL). Nevertheless, they provide further evidence for learners' positive attitudes towards CLIL. In a study by Dalton-Puffer et al. (2009: 18) questionnaires were filled in by 1660 students from different HTLs in Austria and interviews with 20 alumni were conducted. Results show that CLIL learners have an overall higher self-perception in terms of speaking, reading and listening abilities, as well as a lower level of inhibition when speaking the CLIL language as compared to their non-CLIL colleagues. A great number of students especially appreciated the high number of tasks requiring active involvement in CLIL that encouraged them to use the newly learnt language and cooperate not only with their colleagues, but also with the teacher (2009: 24). Highly similar results were found in a later publication of the same investigation by Hüttner, Dalton-Puffer & Smit in 2013 (273), this time exclusively including interviews. Frequent expressions, such as 'security', 'feel (more) secure', 'more relaxed', 'more familiar', 'no inhibitions' appear to support former results describing a decrease in learners' anxiety through CLIL. Moreover, students again perceived themselves as being more skilled than their non-CLIL counterparts (2013: 278). Even though both studies did not make use of language tests to compare students' self-perceptions to their actual language skills, the authors seem to be right in concluding that CLIL's success is strongly linked to students' higher self-esteem and motivation (2013: 278-279). Although CLIL students might not be particularly better educated in the CLIL language, their positive learning experiences presumably provide them with the necessary confidence and motivation to succeed in foreign language situations.

As regards teaching project included in this thesis taking place in a lower secondary class, the impact of age on learners' perceptions of CLIL should be taken into account as well. In the study by Doiz, Lasagabaster and Sierra (2014: 219) already mentioned in 3.3., for instance, 107 first-year CLIL students and 114 third-year learners from the Basque country received questionnaires on the advantages and disadvantages of CLIL. Results showed that third-year students attributed more advantages to CLIL than first-year students who repeatedly expressed concerns about their lack of language knowledge. Even though Doiz, Lasagabaster and Sierra (2014: 221) claim that this change towards more positive perceptions could be based on students' growing maturity, learners' lack of language skills in the beginning could arguably be another crucial reason why students frequently find CLIL difficult in the first year. Surprisingly, the results seem to contrast with the later investigation

by Lasagabaster & Doiz (2016: 117) with 195 Basque learners, showing that students from first to third year have highly similar positive perceptions of language progress in CLIL. Interestingly, in this study, the authors also focused on instructional preferences of students and provide evidence for differences between the two investigated groups (2016: 118). While first-year learners favoured active group work, third-year participants perceived slightly more passive methodology as most beneficial. Furthermore, the need for practice in vocabulary and speaking skills declined with the increasing age of students (2016:121). In brief, despite the fact that results are rather limited and occasionally slightly contradicting, certain age-related trends especially in instructional preferences of younger students seem to exist. As younger students appear to profit more from activities that require active involvement, the number of these tasks should presumably be increased in the first years of CLIL education. Furthermore, initial CLIL training should focus on vocabulary and speaking skills to meet students' needs.

The concept of the teaching project used in this thesis to collect the necessary data for analysis was already applied by Müller in Austria in 2007 over the course of a study on CLIL in computer sciences. Müller herself taught the same topic once in English and once in German in two 9th forms within two lessons. After these lessons both classes filled in a questionnaire to evaluate the project (2007: 47). Even though students in the CLIL group had never been in contact with such an approach before, results showed a high level of satisfaction. The great majority of students did not only perceive the CLIL classes as beneficial for their professional career, but also stated that they would like to have computer science lessons in English on a more regular basis (2007: 72-74). Moreover, students neither faced crucial comprehension problems when talking to the teacher, nor when working with the handouts provided (2007: 70-71). Hence, these results stress CLIL's potential of motivating students to learn a foreign language and giving learners a positive attitude towards the subjects of English and computer sciences.

To conclude, research in the field of students' perceptions of CLIL has primarily led to highly positive results, depicting students as feeling confident and being convinced of their language learning progress in CLIL. Occasionally, students even perceived themselves as more skilled than their non-CLIL colleagues. According to studies from EFL contexts, this persuasion of CLIL's benefits might boost students' actual language learning and might hence result in better language skills. However, investigations also showed that there is still room for improvement in CLIL education in terms of age-specific methodology and balancing the use of students' mother tongues and the CLIL language, for instance.

4. Major challenges and misconceptions in CLIL programs

Amongst the most challenging factors for implementing CLIL in European schools the Eurydice Report (2006: 51) identified the requirement of 'human resources (specialist teachers) and suitable teaching materials'. Even though the report is already 11 years old, these issues seemingly still exist, as various more recent resources mention them as well (e.g. Dale & Tanner 2012: 20). Therefore, these two issues will be examined below. Additionally, light will be shed on two misconceptions in the field of CLIL that various authors in the field of CLIL discuss in their works (e.g. Pavón Vázquez & Gaustad 2013: 83, Fürstenberg & Kletzenbauer 2015: 3, Mehisto, Marsh & Frigols 2008: 47)

4.1. Teacher qualifications

Due to the new situation of having to cope with subject and language teaching simultaneously, being a CLIL teacher brings major challenges with it. For the so-called CLIL/EMILE report, a framework including a collection of innovations from the European Commission, the Council of Europe and various grass-root actions (Marsh 2002:11), a table was developed that highlights competencies of an ideal CLIL teacher. These abilities are divided into the following seven categories:

- having sufficient target language and communicative skills
- being familiar with the theory of language learning
- knowing about methodological possibilities
- creating a supporting classroom atmosphere
- combining language and subject contents
- having appropriate assessment skills

An extract of the manifold competencies belonging to each category can be found in Figure 1. Taking into account that most teachers do not have to have specialized qualifications for teaching CLIL (Eurydice 2008: 84-85), the long list of competences in the extract strikingly demonstrates the immense difficulties that new CLIL teachers will most likely face. For example, teachers who do not have a degree in the CLIL language will most likely find it difficult to ‘identify linguistic difficulties’ or ‘exploit methodologies which enhance the use of socially- and message-oriented language’.

BASIS OF COMPETENCY	SPECIFIC COMPETENCY REQUIRED
Language/ communication	Sufficient target language knowledge and pragmatic skill for the CLIL/EMILE type followed, so as to be a producer of comprehensible input for learners
	Sufficient knowledge of the language used by the majority of learners
	Fluency in an additional language, which may be the CLIL/EMILE target language or some other (e.g. one of particular relevance to target language native-speaker teachers as regards their personal additional-language learning experience)
Theory	Comprehension of the differences and similarities between the concepts of *language learning* and *language acquisition*
Methodology	Ability to identify linguistic difficulties (e.g. with language construction rules) resulting from first/other languages interference, or subject conceptualisation
	Ability to exploit methodologies which enhance the use of socially - and message-oriented language, thus providing optimal opportunities for learner communication through employing enriched communication strategies
	Ability to use communication/interaction methods that facilitate the understanding of meaning

Figure1: CLIL/EMILE report extract of idealised competences (Marsh 2002: 79)

The difficulty of developing such a high number of skills, as depicted in the extract above, was also shown in empirical studies. Bernabé Moliner (2013: 200) investigated 27 CLIL teachers' profiles working in primary schools in the area of Salamanca, Spain. Even though results might not be entirely comparable to other parts of Europe, they reveal noticeable qualification deficiencies. For example, 68% of the teachers stated that they had a B1 level in English (2013: 207). However, a B1 level seems unlikely to suffice in order to be a successful 'producer of comprehensible input for learners', for example, as proposed by Marsh (2002: 79). Another 68% reported that they had attended a voluntary course on CLIL before starting to use CLIL, while only 8% attended a compulsory course (2013: 208). In line with these results, 62% admitted that they did not feel competent enough for teaching CLIL and 85% wished for further training to improve their methodology (2013: 211-212).

Despite the need for an increase in CLIL trainings, most researchers also highlight the importance of cooperation between subject teachers and language teachers. Dale & Tanner

(2012: 14-25), for instance, describe certain roles that subject teachers should be responsible for and additional functions language teachers should fulfil in order to guarantee efficient teamwork. It is stated that subject teachers should focus on goals such as establishing materials that lead to students' previous knowledge activation, supporting learners in understanding the process and contents explained or developing motivating tasks with an appropriate information content (2012: 14-16). On the other hand, language teachers should support content teachers by defining text types and language levels, acting as language monitors during lessons or giving feedback to students or subject teachers (2012: 21). Especially the last two aspects of language teachers' functions can, however, only be achieved when teachers are given the chance to teach as a team, which is barely the case (2012: 20). Mehisto, Marsh & Frigols (2008: 21-22) emphasize that in order to guarantee efficient cooperation, school administrators play an important role, as they should provide subject teachers and language teachers with the time needed to prepare lessons together. They further suggest that administrators should also become familiar with the basic elements of CLIL and the languages in order to understand the situation and issues in their schools better.

In brief, CLIL teachers encounter new challenges that often seem to be slightly ignored in today's CLIL programs. Teachers do not only have to adjust their methodologies, but must also take language skills related to their subjects, assessment criteria and various other factors into account. In depth pre- and in-service trainings, as well as enhanced cooperation not only between CLIL and language teachers, but also between teachers and administrators would thus potentially lead to an increase in CLIL lessons' quality.

4.2. Lack of teaching materials

Teaching a CLIL lesson does not only require CLIL teachers to be highly qualified, but also materials to suit the students' content- and language requirements. However, most researchers concur that there are not enough CLIL materials available. While Meyer (2010: 11) highlights 'a lack of appropriate teaching materials', Mehisto, Marsh & Frigols (2008: 22), on the other hand, stress the 'greater workload for teachers' as teachers often have to invest a great deal of time in developing their own concepts. They must talk to more proficient speakers of the language taught in CLIL and take their students' language knowledge and interests into account. In the Eurydice report (2006: 51-52) the restricted number of teaching materials is named as problematic in the case of Germany, Norway and the Netherlands. Preparing new materials is time-consuming and financial support for extra preparation hours is often lacking in schools implementing CLIL.

Contrary to this critical view on materials, Abuja (2007: 21) claims that finding

teaching materials for CLIL in Austria does not pose major problems due to today's access to the internet, providing teachers with authentic resources in the CLIL language that have to be adapted to the students' needs only. Moreover, Abuja asserts that 'prefabricated teaching material for many purposes' exist in the world wide web as well. However, as will be shown in section 7 dealing with the project's teaching materials, finding appropriate tasks and adapting the language to the students' levels seems to be significantly more complex and time-consuming in many cases than described in the text by Abuja.

In order to reduce the effort needed for creating CLIL resources, Coyle, Hood & Marsh (2010: 162) argue for 'research-led, international and collaborative' platforms online that give teachers the possibility to not only share their tasks and ideas, but exchange experiences they made during their CLIL lessons. One such website, called 'CLIL4teachers', is run by the FLAME (Future for language as a medium of Education) initiative that was founded to inform teachers of the advantages of integrated learning (www.clil4teachers.pbworks.com). Teachers are not only given the chance to talk to others via an online forum, but there is also space for adding lesson plans and teaching materials according to subject, level and topic.

4.3. Misconceptions

Besides shortcomings in terms of teachers and materials, various misconceptions about the relatively new approach of CLIL exist. One misinterpretation that Pavón Vázquez & Gaustad, name is the view that changing to a foreign language in subject lessons equals CLIL (2013: 83). As pointed out by Smit (2013: 15), the complexity and relevance of discourse within the classroom is often overlooked, even though the efficiency of learning and the development of subject-related skills might be noticeably improved through focusing on discourse. This misconception might be one of the primary reasons for the lack of pre- and in-service teacher training that was analysed in chapter 4.1 on teachers' qualifications. Teachers who perceive themselves as knowing the CLIL language in question are often seen as qualified enough to teach CLIL without taking their pedagogical know-how into account (Fürstenberg & Kletzenbauer 2015: 3). Therefore, raising awareness of the implications of CLIL might hopefully lead to an increase in training programs and support for CLIL teachers.

Another prevailing view is the assumption that CLIL education is 'only for academically inclined students', as Mehisto, Marsh & Frigols (2008: 47) highlight. This perception might perhaps stem from the historical situation of bilingual education. As explained in chapter 2.3, only the upper class could afford teachers from abroad or sending their children to foreign schools (Mehisto, Marsh & Frigols 2008: 9). Therefore, the idea that

teaching in another language is connected with elitism might still exist in some minds. However, the Eurydice report (2008: 44) provides evidence that CLIL today is part of mainstream programmes in the majority of European countries, including amongst others Austria, Norway, Sweden and France. In general, using more than one language in school is common in various countries, such as Singapore or Luxembourg and students in these areas are unlikely to all have an elitist background or being extraordinary intelligent either (Mehisto, Marsh & Frigols 2008: 20). Furthermore, Mehisto, Marsh & Frigols (2008: 21) included an experiment in their handbook showing that learners mostly obtaining Cs had comparable grades in the CLIL program, but additionally learnt a foreign language. Nevertheless, one argument for the view that CLIL is elitist relates to the nature of existing entrance exams in some European countries. As already mentioned in chapter 2.4, students' language skills and skills in the CLIL subject are used for selection purposes in countries such as Slovakia, the Netherlands and Portugal (Eurydice 2008: 44-45). In these cases, CLIL seems to be admittedly elitist to a certain extent. Moreover, as the study by Rumlich (2016: 438) in chapter 3.3 showed, even in countries such as Germany where there is no official selection process, limited places also lead to a certain 'creaming' in schools that offer CLIL strands.

As a result, it is difficult to determine whether CLIL is an elitist approach or not. As schools might differ considerably in their admission criteria for CLIL strands, some of the programs might be more elitist than others.

5. CLIL meets Biology

CLIL teachers have to be familiar with the didactic concepts and methodology in CLIL, as well as in the subject they teach. This chapter aims at providing the reader with a sound discussion of principles and concepts in CLIL as well as in biology, as this will be the school subject under investigation in the following empirical study.

5.1. Didactic models of CLIL

One of the most popular models in the CLIL literature was created by Coyle in 1999 and is called the '4C's framework' (2010: 41). The model depicts CLIL as comprising four main principles; namely content, communication, cognition and culture. 'Content' stands for the skills and knowledge that students should acquire in the course of their CLIL education. Coyle, Hood & Marsh (2010: 53) thereby stress the fact that the goal of this category is not 'simply knowledge acquisition' but supporting students' access to resources and progress in understanding. The next C represents 'communication' and emphasises that language in CLIL classes should focus on two aspects, namely 'learning to use language and using language to

learn' (2010: 54). While students in traditional foreign language education are primarily supported in the first aspect, CLIL learners are taught to make use of the foreign language for communication and subject learning as well. With the help of interactions about subject matters in the target language, content and language are integrated in the lessons and students should be able to profit in both areas (2010: 54). The third principle is 'cognition', that highlights the need to include 'higher order thinking skills and understanding' besides 'lower-order thinking' in CLIL. The approach should not be seen as a simple method of transferring new knowledge to the learners. Rather, students should be challenged, taught how to deal with arising difficulties, all the while being encouraged to reflect on current issues (2010: 54). As a study comparing CLIL classes to non-CLIL students by Vollmer (2008: 272) showed, students lack 'academic language use' not only in the foreign language that is used for teaching in CLIL, but also in their first language. Meyer (2010: 21) also takes special note of these higher order thinking skills, or H.O.T.s as he calls them. Students must learn in school how to think and express themselves in complex manners. According to him, having a sufficient command of H.O.T.s is 'the key to success in the Information Age'. The last component that belongs to the model is 'culture'. As this principle seems to be forgotten most often, it is sometimes called 'the forgotten C', as stated by Coyle, Hood & Marsh (2010: 54). Studying a subject in a foreign language should lead to an increase in learners' understanding of other cultures that can consequently strengthen students' self-perception as well. However, it must be mentioned that although CLIL in itself seems to have a noticeable potential for the teaching of intercultural awareness, it should be consciously integrated in the lessons. Coyle, Hood & Marsh give some examples for CLIL lessons that focus strongly on culture, such as investigating typical architectural features in a maths or design lesson, or perhaps analysing the role of bicycles around the world as part of technical engineering (Coyle, Hood & Marsh 2010: 54-55). Even though this description depicts each C as an individual component, the four principles do not occur on their own in actual CLIL lessons. Cognitive abilities must, for instance, be in accordance with the content that is taught, or communicative aims must fit to the students' level of cognition. Overall, the principle of 'content' is seen as the defining factor for the other categories. Once the knowledge and abilities that students should acquire in the CLIL lessons are set, cognitive features, communication skills and cultural components can be defined in a facilitated manner. In order to exemplify this relationship Coyle, Hood & Marsh refer to the task of reporting an experiment in the natural sciences. If CLIL teachers want their learners to succeed in this task, they also have to familiarize them with the past tense and provide them with phrases that they can use for communicating the individual steps

that they took (2010: 55).

The 4Cs framework forms the basis for another model, namely the CLIL pyramid that was created by Meyer and is now used in various parts of Europe as a useful tool for preparing CLIL sessions and designing materials (Meyer 2010: 13). Content, communication, cognition and culture are the 'cornerstones of the base area' (Meyer 2010: 23) that always have to be taken into account before planning a CLIL lesson. The pyramid itself consists of a four-step-sequence that should be followed to construct a successful CLIL lesson. At first, the content of the lesson should be chosen according to the aims of the subject. Following this, 'multimodal input' for the particular topic of the CLIL unit should be sought that attracts the attention of all students and provides support for different learner types. This input then determines the study skills that students need, as well as the degree to which the content must be simplified. The next step includes the design of the tasks. Thereby, Meyer stresses the importance of varied interactions that should have a high level of authenticity and lead to 'higher order thinking skills' (2010: 21). H.O.T.s are acquired in atmospheres that challenge students and engage them with different ways of thinking. Students must learn how to think and express themselves in complex manners, something that can solely be achieved through language use, as stated by Meyer. In order to be able to use higher order thinking skills, learners must be taught how to express themselves and communicate with others (2010: 21). After defining the H.O.T.s, the planned output should be taken into account. Depending on whether a poster, a presentation or an interview is required, students should be provided with support in terms of phrases, visuals or other aids in order to succeed in the tasks. On top of the pyramid Meyer finally situates the finished 'CLIL workout' (2010: 23-24). Figure 2 below serves as an illustration of the model.

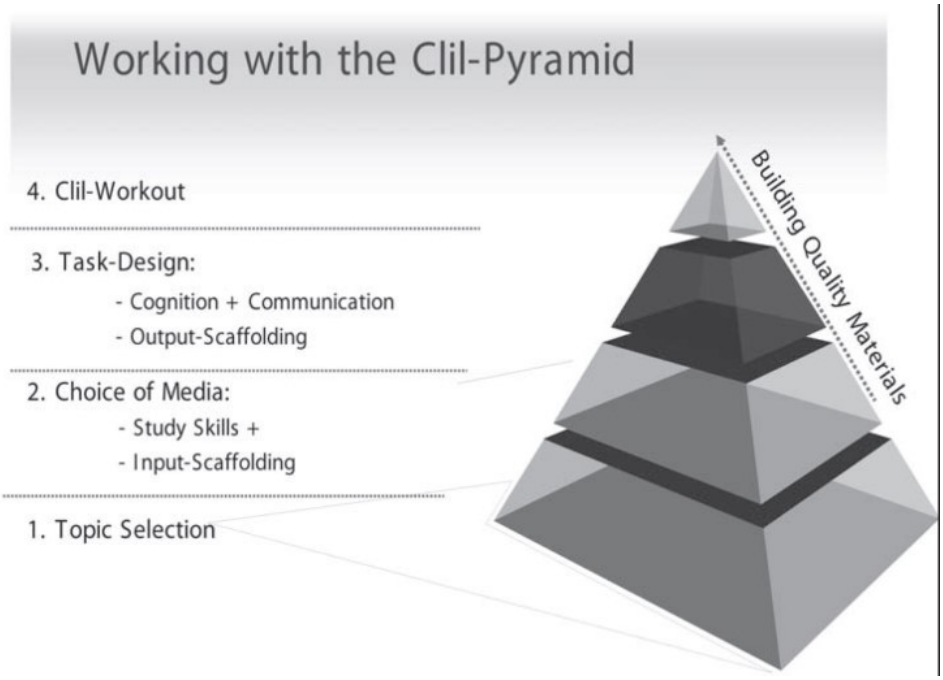

Figure 2: CLIL-Pyramid (Meyer 2010: 24)

Advantages of the CLIL pyramid appear to be manifold. Due to the model CLIL teachers must reflect on 'multi-modal input' and 'higher order thinking skills'. Moreover, they learn to pay attention to study skills and interaction techniques (Meyer 2010: 25). In order to facilitate the lesson planning with the pyramid, Meyer also provides the reader with a template (2010: 25). As this template was extensively used for designing the lessons of the thesis' teaching project, a sample is provided below.

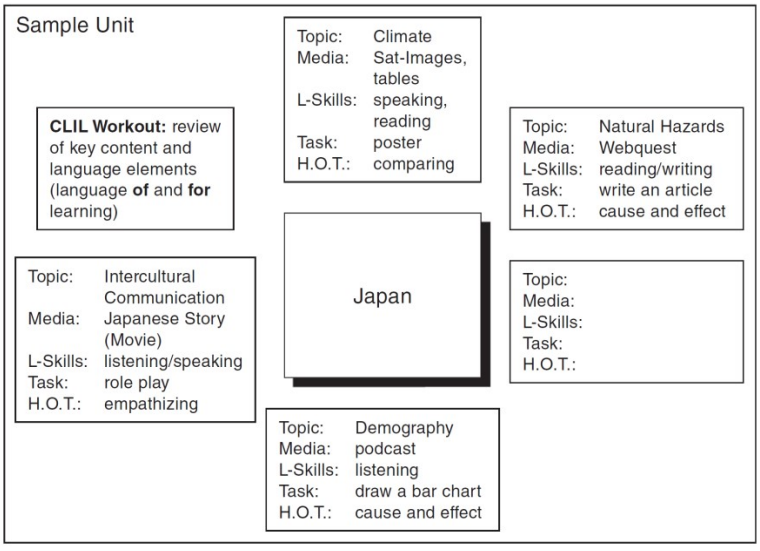

Figure 3: Sample template accompanying the CLIL-Pyramid (Meyer 2010: 25)

The template shows the overall topic of the CLIL unit in the centre surrounded by individual parts of the lessons. They all consist of five subcategories that fit to the pyramid and include the topic, media, language skills, the actual task, as well as the higher order thinking skills that should additionally be trained. Even though Meyer does not specifically mention whether he created the indicated higher order thinking skills himself or took them from a certain source, he states that the 'revised Bloom taxonomy' provides a useful resource for defining these skills (2010: 21). This taxonomy includes 6 categories 'remember', 'understand', 'apply', 'analyze', 'evaluate' and 'create' with the complexity in cognition rising continuously along the continuum (Anderson & Krathwohl 2001: 5).

Another useful model of CLIL is the so-called 'CLIL matrix' that was developed by Maljers, Marsh, Kitanova, Wolff and Zielonka, all of whom are researchers or teachers involved in CLIL, bilingual education or foreign language acquisition from various European countries (CLIL matrix team: http://archive.ecml.at/mtp2/CLILmatrix/EN/qMain.html). Similarly to the CLIL Pyramid, it should provide teachers with a profound basis of the knowledge and abilities needed in efficient CLIL units and should make them aware of 'the extent to which they are prepared for teaching through CLIL' (Welcome to the CLIL Matrix: http://archive.ecml.at/mtp2/CLILmatrix/EN/qMain.html). The authors of the CLIL Matrix describe their model as a '4 dimensional core framework built around the core elements of CLIL', including content, language, integration and learning. These elements can be implemented through the following four factors: 'culture, communication, cognition and community', seeming to correspond quite closely to Coyle's 4Cs framework (2010: 41) except for the principle 'community', which in Coyle's model is 'content'. These 8 factors create a matrix with 16 indicators represented by different colours. By clicking on one of the indicators the user receives a closer explanation, is provided with concrete examples on how to integrate the criteria into everyday CLL lessons, and can do a survey with reflexive questions related to the indicator.

All three models certainly support teachers noticeably in planning successful and effective CLIL lessons. However, for the CLIL project of this thesis, solely the CLIL pyramid and the 4C's framework were used, as the pyramid's template was an especially useful resource for designing a transparent and structured CLIL unit dealing with the topic of 'evolution'. In terms of the higher order thinking skills the 'revised Bloom taxonomy' (Anderson & Krathwohl 2001) was applied.

5.2. Scaffolding

One term that is often named when CLIL materials and teaching are addressed is 'scaffolding'. According to Hammond & Gibbons (2001: 15), scaffolding can be defined as 'support that is designed to provide the assistance necessary to enable learners to accomplish tasks and develop understandings that they would not quite be able to manage on their own'. Dale & Tanner (2012: 31) additionally stress the difference between the idea of scaffolding and help. According to their research, help is mostly connected to providing students with answers, while scaffolding primarily includes giving clues that should ideally motivate students to finish tasks on their own. Contrary to common beliefs, scaffolding is thus not restricted to language learning, but can also be a useful tool in subject related matters. Hammond & Gibbons (2001: 15-18) name three key categories to highlight the characteristics of scaffolding. First of all, scaffolding should support students in 'extending understanding'. Due to the teachers paying attention to and knowing their students' skills and understanding, they can provide them with appropriately challenging tasks and the right level of support in terms of vocabulary, additional information and other forms of assistance that motivate students to learn. This relationship between support, challenge and learners' motivation is visualised in one of the authors' graphs that was adapted from Mariani (1997).

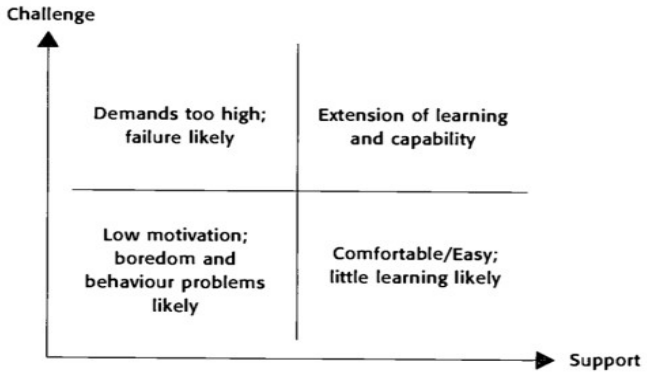

Figure 4: Relationship between support, challenge and motivation (Hammond & Gibbons 2001:16)

Students learn most and become most autonomous when both the challenge, as well as the support from teachers are high (Hammond & Gibbons 2001:15)

The other two characteristics that Hammond and Gibbons address are ‚temporary support' as well as ‚macro and micro focuses' (2001: 16-18). It is argued that teachers support students most when only assisting them in a timely manner and by giving them the chance to work on their own afterwards. Their last feature, namely 'macro and micro focuses', refers to the

different levels of scaffolding. While the micro level includes communication between teachers and learners in the course of CLIL, for instance, the macro level comprises the way the tasks are selected and sequenced, as well as the development of the program overall (2001: 18).

However, the question arises how scaffolding is integrated in actual CLIL classroom practices. As scaffolding written materials during preparation time played an important role in the CLIL project of this thesis, this particular aspect of scaffolding should be explained in more depth. In order to choose an appropriate text, Dale, van der Es & Tanner (2010: 54) suggest that approximately 5% or 10-15 of the words per page should be new to the learners in order to challenge them appropriately. In terms of vocabulary, teachers should pay attention to the category to which the used words belong. The authors differentiate between three main vocabulary types, namely 'general vocabulary', 'subject terminology' and 'academic words'. 'General vocabulary' includes everyday words that are needed to communicate in all kinds of situations, such as 'the', 'he', 'be'. 'Subject terminology' comprises specialized words that are needed in a certain subject. In biology these words are, for instance, 'cell, evolution or habitat'. 'Academic words' are usually more formal, rather occuring in academic texts and prevading all subjects. Examples might be 'adaptation', 'policy', and 'stability' (2010: 49). Students especially at lower levels will most likely struggle with texts that contain a high number of subject terminology or academic words. Therefore, teachers have to either choose a text that is high on general vocabulary or adapt the text accordingly. Interestingly, the authors also stress that particular care has to be taken of words that can change their meaning depending upon whether they are used as 'general vocabulary' or as 'subject terminology'. The noun 'force' is an example of this, as it could refer to physical strength or influence in everyday communication, but likewise means 'a power that makes something move' in the field of the natural sciences. Verbs such as 'put' might also easily change their meaning when being used as a phrasal verb, such as in 'put across' and 'put someone down' (2010: 50). According to the authors, grammar structures should also be at least briefly investigated, as texts might seem appropriate at first sight, but frequent use of passive constructions or conditional tenses could lead to crucial difficulties in understanding (2010: 53).

After having chosen a text, adaptations can either deal with 'simplifying the language' or with 'visualising information' (2010: 58). Research books stress various simplifying methods. Those that were most relevant for the preparation of CLIL materials in the teaching project include:

- decreasing sentence length (Mehisto, Marsh & Frigols 2008: 140)
- inserting support in the original text to provide vocabulary 'immediately, as it is needed' (Mehisto, Marsh & Frigols 2008: 140)
- using active formulations and concrete phrases instead of phrasal verbs or metaphors (Dale & Tanner 2012: 58-59)
- deleting unnecessary information (Dale, Dale, van der Es & Tanner 2010: 58)

The use of students' first language for scaffolding input is not named as an option in the above resources. However, especially for the first lessons, translations might be necessary. This is supported by Georgiou (2012: 499) who claims that the L1 can be useful in 'promoting and supporting L2 learning'. Unfortunately, research on the success of integrating students' L1 in written materials is difficult to find. A study by Tavares (2015: 322-323) at least sheds more light on the use of the learners' L1 as a means of scaffolding during in-class activities. The study took place in a secondary school all-girls class in Hong Kong. Classroom observations, as well as students' interactions and interviews with the learners and their teacher who taught them maths in English were taken into account. While the teacher tried to reduce her use of L1 to a minimum, students were encouraged to speak in their L1 to overcome linguistic difficulties. The author, for instance, describes a situation in which a student could only respond in her L1. The teacher appreciated the answer, but then motivated her and her peers to use their books and language knowledge to develop a correct English formulation (2015: 328). Thus, the students' L1 could be used as an efficient scaffolding method to overcome communication problems in the first place. As the teaching project in the second part of this thesis took place in a lower secondary class with students who still have highly restricted English skills and have never experienced a CLIL lesson before, their L1 was used to simplify contents as well.

Concerning the second category of scaffolding, namely 'visualising information', Dale, van der Es & Tanner (2010: 60) primarily suggest 'adding non-linguistic input' to the text, such as diagrams, graphs or pictures in order to facilitate the meaning-making process. Mehisto, Marsh & Frigols (2008: 140) provide the reader with various other methods for visualisation, such as dividing a text into meaningful parts, highlighting parts in a text, adding a margin and using the space for including explanations or making use of word boxes. For the teaching project mainly visuals and divisions of the text were used. English explanations in word boxes or the margin might have been overly challenging for the students, as learners in their third year of English education tend to still have a rather restricted vocabulary. Most

explanations would possibly include quite a high number of unfamiliar terms again and would therefore not support students' understanding.

Another type of scaffolding that was used in the teaching project was 'output scaffolding', as pointed out in the pyramid by Meyer (2010: 24). Depending on the output that teachers want their students to produce, different scaffolding methods are needed. In order to give a successful presentation, for instance, students might require phrases that they can use readily, as well as advice on body language. For an interview, learners might, for example, need a revision on how to formulate questions. Thus, teachers always have to decide which skills students need for the task. Chapter 7.4.3. will provide information on the scaffolding techniques explicitly applied for the thesis' project.

5.3. Didactic models of biology

The most crucial aim in biology, as well as in other natural sciences subjects such as chemistry and physics, is the development of the so-called 'scientific literacy' that the OECD (2013: 7) defined as follows for the PISA tests in natural sciences 2015:

'Scientific literacy is the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person, therefore, is willing to engage in reasoned discourse about science and technology which requires the competencies to:
1. Explain phenomena scientifically (...)
2. Evaluate and design scientific enquiry (...)
3. Interpret data and evidence scientifically (...)'

In order to develop this literacy in students, various models exist. One model that Austrian biology teachers should currently base their teaching on is the so-called 'Kompetenzmodell' (model of competences) that was developed by a section of the Federal Ministry of Education, known as 'BIFIE' in 2011 (1-5).

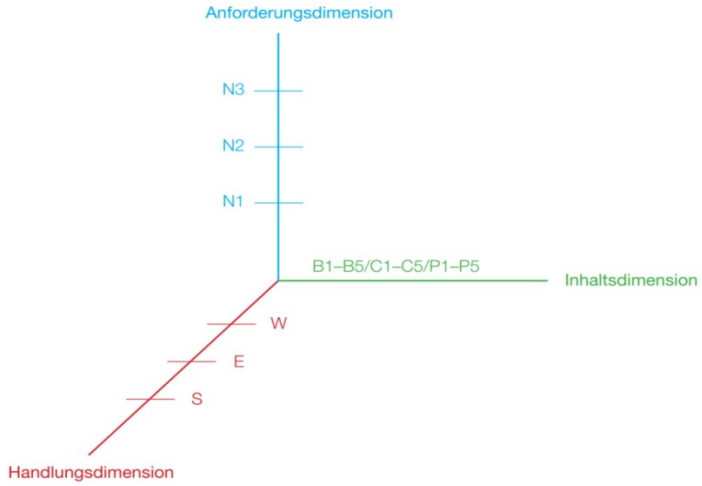

Figure 5: Model of competences (BIFIE 2011: 1)

The model is divided into three branches that form a three-dimensional space. The first branch represents the 'Handlungskompetenz' (competence of action) that is further subdivided into three levels with skills that students should train. First of all, students should be capable of describing and naming processes and phenomena in nature; they should know how to access resources for further research and communicate findings and effects in an appropriate way (level W). When this first stage is reached, students should progress to making their own observations, creating hypotheses and designing experiments (level E). The third stage then comprises the skill of evaluating outcomes, discussing them in a scientifically correct way and being able to identify the effects on one's personal life or progress in technology (level S). The next axis stands for the so-called 'Anforderungsdimension' (dimension of requirements) that comprises three levels of difficulty. The first level includes tasks that are strongly based on teachers' support and mainly focus on the reproduction and description of biological topics with the help of everyday life language (level N1). The second level requires students to use a restricted number of biological terms and models learnt so far. In addition, they should be able to work partially on their own (level N2). The last level illustrates that students should know how to solve tasks autonomously with a rather wide range of technical terms and models (level N3). Students should be capable of drawing more complex links between biological issues. The third axis is called 'Inhaltsdimension' (dimension of contents) and includes

specific areas that should be covered in lower and upper secondary Austrian biology classes. As the model is also used by physics and chemistry teachers, topic areas exist for all three subjects. Notably, in biology, the following topic areas are included: 'planet Earth' (B1), 'ecosystems' (B2), 'organisms' (B3), 'organs' (B4) and 'the cell' (B5) (BIFIE 2011: 1-5).

Due to the categorisations and the descriptions of each level the model serves as a useful resource in addition to the curriculum for planning lessons and creating teaching materials. Especially for the New Matura this concept plays a crucial role, as students are required to succeed in tasks that are based on the model of competences. In accordance with the axis showing the competences of actions, students have to be able to solve one exercise per level. This means that students receive a task that includes one sub-question dealing with reproduction of learnt content in everyday language, followed by a sub-question focused on transferring the knowledge they have to other topic areas, creating hypotheses or describing possible experiments that could be created. The last question then requires the learner to reflect on the issue, find possible effects on one's own life and evaluate current problems (BIFIE 2012: 9).

One model that is similar to the competences model of the BIFIE, but focuses solely on the aspect of 'competence of action' especially in the subject of biology is the 'Rahmenmodell wissenschaftsmethodischer Kompetenzen' (framework of scientific and methodological competences) by Mayer (2007: 178). According to the author, students can become literate in biology through three main constructs. These constructs are 'practical skills', 'scientific reasoning' and 'epistemological views'. Each is linked to a number of skills that students must achieve and that are again subdivided into three categories.

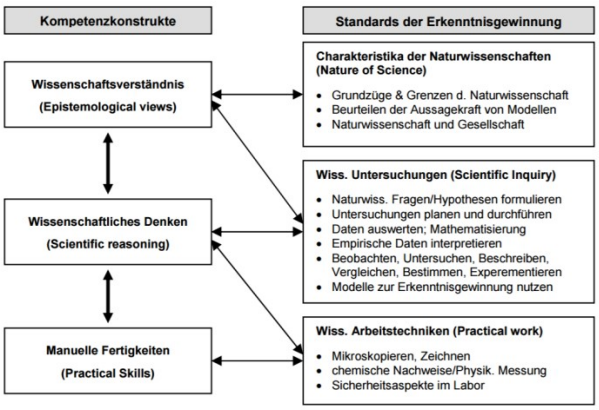

Figure 6: Framework of scientific and methodological competences (Mayer 2007: 178)

First of all, students have to develop 'practical work' abilities, such as microscopy techniques and drawing abilities, or a profound knowledge of safety instructions in school laboratories. According to the model, practical work skills are especially needed for students to become

literate in terms of 'practical skills' and 'scientific reasoning', as the arrows in Figure 6 show. However, 'scientific reasoning' is also strongly bound to 'scientific inquiry', including amongst others the ability to interpret empirical data, mathematize results or formulate research questions and hypotheses. All of these abilities also play a role in the third dimension, namely 'epistemological views', that is not only bound to 'scientific inquiry', but also to the 'nature of science'. This category of 'nature of science' includes the awareness of limits in the fields of biology, the connection between sciences and our society, as well as the evaluation of biological models. Students who are able to solve exercises in all categories are seen as being literate in the field of biology.

Another popular and successful model is called 'Fachdidaktisches Triplett' (didactic triplet) that was developed by Kattmann, Duit, Groppengießer and Komorek (1997), all researchers in the field of biology didactics. It is based on three principles, namely content, students' beliefs & perspectives and didactic structures and highlights the interaction between these categories in biology. The authors correctly state that scientific findings and hypotheses cannot be left unchanged when being included into a course book for learners. Students' perspectives, including their previous knowledge, their values and world views, have to be taken into account in order to facilitate the learners' understanding of natural sciences (Kattmann et al. 1997: 3-4), as visualized in Figure 7.

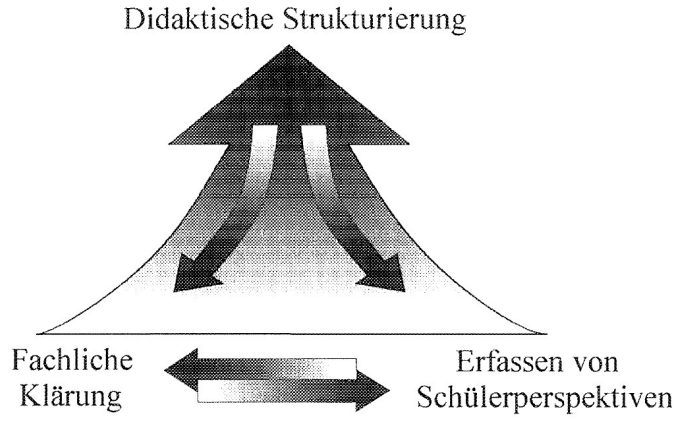

Figure 7: Didactic triplet (Kattmann et al. 1997: 4)

After connecting students' perspectives with the content, didactic structures can be developed for learners' education. However, the didactic structures also retroact on content and students' perspectives. Content is chosen in accordance with the didactic potentials that it has, as well as with the accessibility of students' thinking processes (1997: 5). To exemplify this interaction of the didactic triplet, the authors solely make use of examples that are not related to biology. However, as the teaching project took place in biology classes, the following

example should deal with the topic of 'evolution' chosen for the project as well. In order to teach students the process of natural selection, students' previous knowledge has to be taken into account first, as the new knowledge might contradict their current world view. Due to films and cartoons on TV, for instance, children might believe that an animal's chance to survive is directly linked to its physical strength, even though this is not necessarily the case in reality. By creating materials and thinking about individual steps on how to connect this everyday life knowledge with the scientific definition, appropriate didactic structures can be developed that clarify the characteristics of natural selection.

The last model that I would like to introduce deals with the use of experiments in school. It was created by Mayer (2006 in Mayer & Ziemek 2006: 7) and is shown in Figure 8.

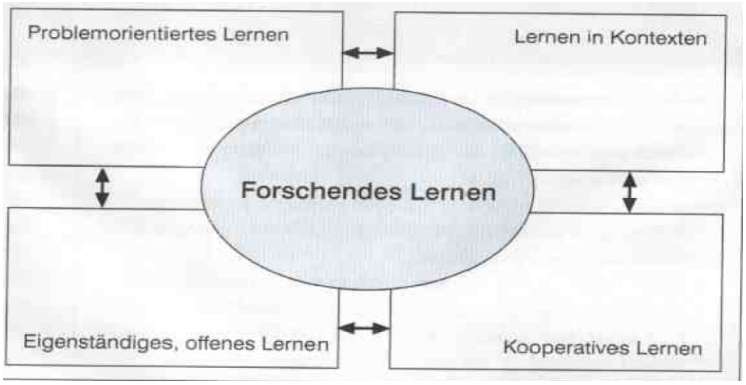

Figure 8: Explorative learning (Mayer 2006 in Mayer & Ziemek 2006)

Four elements should be included in explorative learning, including problem-oriented learning, autonomous learning, contextualized learning and cooperative learning. The term 'problem-oriented learning' stresses that in contrast to tasks, experiments do not have a specific solution and can be approached from various perspectives. Students should extend their thinking processes, become active and creative in new, challenging situations. Due to an 'autonomous working style' students are enabled to co-determine the course of the lessons and teachers can function solely as facilitators who support students to succeed in the experiments. 'Contextualized learning' focuses on the necessity of linking the learners' experiments to their personal lives to raise students' motivation for working in an explorative way. 'Cooperativeness' is seen as crucial in the article as students have the chance to support each other and thereby increase their output (Mayer & Sziemek 2006: 7-9).

To conclude, all of the models outlined above try to enhance students' 'scientific literacy'. Amongst various other skills, the three most crucial ones appear to be the use of appropriate methods in the field of biology (such as experiments or microscopy), the ability to interpret these results accordingly and the skill to think globally about the impact newly learnt

concepts could have. In the thesis' teaching project, the model of competences was primarily used, as it can serve as a basic orientation for the planning of all exercises. Furthermore, it assures that students train necessary skills that they will also need to succeed in their final exams at the end of their school career. The other models were only consulted for some exercises, as will be shown in chapter 7.4.

5.4. Science input and specific language use in natural sciences

First and foremost, in order to integrate foreign language education into biology classes, teachers most likely have to become aware of typical language and input features that are used in the subject. When teaching in one's mother tongue, these often seem to come unnoticed and it might thus be difficult for teachers to explicitly name language functions that are essential in their subjects and that they should focus on while teaching. In their book on CLIL, Dale & Tanner (2012: 80) focus on these language differences and stress features that all natural sciences have in common by firstly listing typical forms of input in biology and then explaining their language functions. When taking a closer look at typical input, it becomes obvious that various differences exist. Written materials include, for instance, reports, guidelines for experiments or articles taken from scientific journals. Natural sciences also make extensive use of specific visual. Apart from photos, pictures and videos that are also found in other subjects, periodic tables, diagrams and graphs play a crucial role. Moreover, models and objects are frequently part of the lessons, as teachers try to make their students familiar with atomic models, fossils, the human skeleton and various other topics. However, also students' exercises contrast from the ones in other classes, as learners have to deal with experiments, demonstrations, protocols and fieldwork, for example (2012: 80).

As a consequence, language functions also fit to these specific materials. Amongst various functions, Dale & Tanner (2012: 80) name 'retell[ing] in chronological order or in laboratory reports' as one of the most important language functions. Students who did an experiment, for example, have to be able to use the past tense to explain what happened, as well as the passive to describe processes. In addition, they have to be aware of words for time, such as 'next', 'afterwards', 'previously' to indicate the course of the experiment. Another language function that is crucial is the transfer of information and the use of descriptions. As Dale & Tanner state, students must be trained in using a neutral, technical language for describing problems in natural sciences and in forming rather complex sentences in order to make themselves understood. Dale & Tanner (2012:80-81) give the following example sentence: 'So whilst all cells have the same features, such as cell membrane, nucleus and cytoplasm, their appearance can be very different'. Bahamonde (2010: 83) also stresses the

importance of practicing descriptions in biology, but highlights its particular value in supporting students to look at objects form a new perspective, for instance, as well as to 'amplify the communication field'. In her opinion, students with sophisticated language skills face fewer difficulties in acquiring concepts in natural sciences, as language helps the brain to process new information. Another example of a language function that both Dale & Tanner (2012: 81) and Bahamonde (2010: 84) stress as being crucial in science classes is the ability to express justifications and pose arguments. According to Dale & Tanner, this includes specific training in hedging to soften one's arguments and make them less definite, such as in 'those in favour of nuclear power claim'. Moreover, students should learn how to link ideas, contrast them and formulate conclusions to succeed for instance in writing reports (Dale & Tanner 2012: 81).

In brief, language input and exercises, such as reports or reading diagrams, are highly specific in terms of natural sciences and have an influence on the language functions that are needed. Teachers must be aware of these language functions in order to support their students in succeeding in their tasks. In addition, it seems to be the case that students with extensive subject language skills will find it easier to process and understand scientific concepts.

5.5. Reasons for teaching biology through CLIL

Natural sciences and social sciences are the subjects that are most frequently taught in CLIL at secondary level, as shown in the Eurydice report (2006: 38). Belgium, Norway, Bulgaria or Lithuana, for instance, explicitly cited natural sciences to be part of their CLIL programmes (2006: 38). However, slight changes in data are possible, as the Eurydice report is already 11 years old. According to Gierlinger (2007: 100), biology along with history and geography belongs to the most popular subjects used for CLIL in Austria. However, this raises the question why natural sciences, or even biology in particular, are more often favoured for CLIL than other subjects.

First of all, Richter and Zimmermann (2003: 116) stress that English has developed into the language of natural sciences. Articles, as well as studies and lectures are most frequently in English, hence students should be provided with profound English skills. In CLIL classes, where English, along with French and German, belongs to the most frequently used target foreign languages (Eurydice 2006: 18), students seem to receive the necessary practice time to develop their English accordingly. Furthermore, even though it might seem difficult at first sight, science classes can support students in developing intercultural awareness. Topics such as 'climate' or 'reproductive biology' are neatly tied to cultural values and perspectives that can be investigated in the course of CLIL lessons (Richter 2004: 4).

Another strong potential of natural science classes is the diversity of input formats that support language learning. Leisen (2005: 9), for instance, describes 3 different categories of input, namely objects, visuals, symbols and oral/written input. To exemplify these categories, Leisen uses the topic of beans' growth direction. As an object a bean plant could be brought to school. Visuals, such as pictures or drawings could also be used. Additionally, longitudinal growth could, for instance, be described in a graph that belongs to 'symbols'. Input could come from the teacher through a short presentation. All of the aforementioned categories support students' understanding and serve various learner styles, even when the language spoken is not the students' mother tongue. Another strong advantage of using CLIL in natural sciences stated by Leisen (2005: 9) seems to be the precise, fact-based language that strongly contrasts the emotional, ironic or idiomatic language that is often used in the field of humanities. Therefore, students might find this discourse noticeably easier to understand and utilize. One final argument for the preference of CLIL in natural sciences that should be mentioned is the often close relationship of technical terms in students' mother tongue and the CLIL language, as most terms have common Latin or Greek roots. Thus, students who speak German and have CLIL lessons in English will not face noticeable difficulties in understanding words, such as 'photosynthesis', 'evolution' or 'bacteria' (Richter & Zimmermann 2003: 116). In brief, the natural sciences appear to be highly suitable for the implementation of CLIL, due to the increasing use of English in the field, the possibility to raise cultural awareness, the variety of possible input and the origin of technical terms. The following sections will now focus particularly on the teaching project in biology that was conducted for this thesis.

6. Development interest, research questions and project design

As depicted in the previous chapters, CLIL seems to have various advantages, ranging from providing students with authentic contexts (e.g. Pinner 2013) to supporting their cognitive flexibility (e.g. Garcia del Carmen Mendez 2014). Students were shown to appreciate the approach and feel convinced of their learning process through CLIL (e.g. Dalton-Puffer et al. 2009). However, the overall number of studies on actual students' perceptions is rather limited and research often focuses on students who are already used to CLIL lessons (e.g. Lasagabaster 2011). On these grounds, this thesis' teaching project was developed to examine students' perceptions in a lower secondary class with students who have never experienced CLIL lessons before and are therefore also not biased by exams or teachers from their regular CLIL lessons yet. The subject chosen for the investigations was biology, as this is the second

subject I studied at university and my knowledge thus supported me in designing a successful CLIL project. The overarching research question of the study was:

- To what extent does a CLIL project in an Austrian lower secondary class influence students' learning experiences in biology?

In order to answer this question, the study focused particularly on the following subquestions:

- Are students taking part in the CLIL project in favour of the approach?
- What are students' attitudes towards language and content-related progress in CLIL?
- In how far does CLIL have an impact on students' motivations for learning English?
- In how far are CLIL students' initial perceptions concerning the materials, the atmosphere in class and their willingness to participate changing throughout the project and in comparison to a German control class?
- Are differences in students' answers correlated to students' gender, grades or first language?

So as to investigate these questions, the same teaching project was taught once in English and once in German in neighbouring classes of the same year neither of whom had ever experienced CLIL lessons before. The German class should thereby serve as a control. Both classes received a German questionnaire at the beginning of the first lesson that should reveal their initial opinions concerning CLIL as well as their attitudes towards regular biology and English classes. The teaching project itself consisted of two lessons in each class taking place in the same week to guarantee that students will not be influenced by regular lessons in the meanwhile. The students had been informed beforehand that I would be their teacher for the duration of the project, while their regular teachers would observe the sessions. At the end of the second lesson students received another German questionnaire that included similar questions to the one handed out in the first lesson but this time focusing on their experiences made during the project. At the end of the project the two regular teachers were informally interviewed with the focus being primarily on the students' participation, the classroom atmosphere, the materials and the subject-related output. These short interviews should serve as an additional perspective to the one gained by myself as a teacher and the students' perspectives reflected in the questionnaires.

7. Design of the teaching project

7.1. Rationale for topic choice

The students' teachers and I agreed on the topic of 'evolution' for two main reasons. First of all, the Austrian curriculum for lower secondary biology classes (Bundesministerium für Bildung 2016a: 4) prescribes that teachers must include this topic in the 7th grade to raise the students' awareness of the development of life on Earth. As evolution plays a crucial role in understanding subsequent subject matters that should be taught in the same year, such as the physiology of mammals (Bundesministerium für Bildung 2016a: 4), 'evolution' should always be part of the first lessons in 7th grade.

Secondly, even though the process of evolution is rather challenging and complex, it has various characteristics that seem to qualify it as potential CLIL lessons or a CLIL project. Abuja et al. (1995:6-7) defines seven questions that should be considered when choosing a topic for a CLIL lesson. Although not all of them fit the topic of evolution, three of them reveal its potential as a teaching project. First of all, evolution is strongly linked to the English language due to Charles Darwin and his still highly influential theories on natural selection. Secondly, even though the number of appropriate tasks for a 7th form in school books or CLIL handbooks is restricted, the numerous videos, pictures and ideas for tasks on the internet facilitated the preparation process. Finally, despite the challenging technical vocabulary normally used for this topic, visuals and simplified expressions could be used to enhance understanding. In the following, aims for the lessons will firstly be defined before providing explanations for content choices. Subsequently, justifications for the choice of materials with reference to the concepts presented in chapters 5.1 and 5.3. will be given.

7.2. Aims of the CLIL lessons

The aims of the two lesson project were based on the Austrian lower secondary English and biology curricula, as well as on the '4 C's framework', one of the CLIL principles.

As stated in the English curriculum (Bundesministerium für Bildung 2016b: 4-5), students in year 7, hence in their third year of regular, secondary school English education, should aim at achieving an A2 language level. The overarching language aim for the two lessons consequently was practicing students' listening, reading, writing and speaking skills in order to increase their English skills in an effort to achieve A2. In terms of listening, students at this level should understand simple sentences, common words and the gist of rather brief messages. Furthermore, they should be able to listen for specific information. Reading skills at A2 comprise understanding the overall meaning of brief, simple texts and finding concrete information within these texts that are related to students' everyday life. Writing competences

include taking short notes and formulating simple texts about familiar topics or topics that learners are interested in. Speaking skills are divided into two sub-skills that comprise communication as well as speaking fluently. Students at an A2 level should know how to exchange simple information in everyday life situations. Concerning fluency, they should have the language skills to describe their family or their routines in short sentences. In general, all skills at this level are claimed to be restricted to situations that students are familiar with (Bundesministerium für Bildung 2016b: 4-5). Even though this is not possible in the CLIL setting, scaffolding techniques might help to support students sufficiently. In the first lesson the focus was primarily on listening for specific information, using skimming and scanning reading techniques and formulating short and simple hypotheses. In the second lesson the primary goal was then on communicating with other classmates and practicing students' fluency.

The biology curriculum (Bundesministerium für Bildung 2016a: 1) strongly focuses on topic-related aims. One of these aims should be providing students with skills in understanding major findings, principles, complex relationships, life cycles and mutual dependencies in the field of biology. As already explained in the previous section, this justifies why the topic of 'evolution' was chosen for the project. However, in contrast to the English curriculum, overall scientific skills in the biology curriculum are not presented as detailed or level specific as in the English curriculum. Nevertheless, some overarching abilities can be found, including first of all the improvement of students' scientific thinking and working skills (Bundesministerium für Bildung 2016a: 2). In this respect, one important aspect is the independent use of appropriate scientific techniques, including observations, comparisons, classifications or hypotheses. Students should also be encouraged to link newly learnt knowledge and acquired skills to their everyday lives. Moreover, they should train communication-, cooperation- and conflict solving skills, as they are needed to become efficient and successful in scientific research (Bundesministerium für Bildung 2016a: 2). Apart from these skills, students should also develop a positive body image and become skilled in using resources sustainably. However, these last two abilities do not fit well to the topic of 'evolution'. Therefore, besides understanding the concepts of evolution, fossilisation and natural selections, the biology aims or these two lessons were practicing students' scientific working techniques, linking their everyday beliefs to the newly learnt content, and training social and communicative skills during the project.

The 4C's framework by Coyle, Hood and Marsh (2010: 41) highlights similar goals to the curricular aims mentioned above. According to the authors, content, cognition,

communication and culture should all be part of qualitative CLIL lessons. The aim of making students understand fossilization, natural selection and evolution clearly fits to the aspect of "content". "Cognition" was interwoven in all the project's tasks, as students' scientific thinking should be encouraged through various exercises that focus on comparing, contrasting or hypothesising skills. "Communication", as stated above, was the central skill addressed in the second lesson. As the project only lasted for two hours, the 4th C, 'culture', could not be taken into account, but could surely be part of a subsequent lesson. A closer description of the individual tasks and their aims are presented below.

7.3. Rationale for content choices

As the number of subtopics in the field of 'evolution' is vast, the most crucial aspects for a two hour long school project had to be found. In the following section, reasons for the chosen content will be outlined briefly by referring to studies from biology didactics and literature on evolution itself.

The first step in understanding 'evolution' seems to be grasping the idea that all organisms are related and can be presented in one highly complex tree of life (Campbell et al. 2009: 621). However, understanding scientists' reasons for why certain animals belong to the same category in this tree of life can be quite difficult, as they differ considerably from people's intuitive way of classifying organisms. As shown in a study by Kattmann & Schmitt (1996: 22), these intuitive ways students use for categorizing plants and animals have long been ignored in biology education. In the course of their investigations, 536 students between 10 and 14 years were given the task of classifying animal names according to their own groupings (1996: 22). Results showed that children of all ages primarily used non-taxonomic categories, including locomotion and animals' habitats, instead of anatomy and physiology (1996: 32). However, focusing only on animal habitats, for instance, will not help in understanding the much more complex concept of evolution. Therefore, the tree of life and its categories should be addressed within the first lesson of the project.

Once students have understood the tree of life, the question of how extinct animals could be placed in this tree of life most likely arises, as their anatomy and physiology can no longer be examined. Therefore, fossils and the process of fossilisation have to be taken into account and introduced (Lawson 1999: 266). Several of Darwin's theses stem from fossils he found during his journey to South America (Campbell et al. 2009: 608) and palaeontologists still rely heavily on fossil records nowadays. Even though students might already be familiar with the term 'fossil', the processes and types of fossilisations, as well as the way conclusions can be drawn from fossils might probably be new to them and thus should be addressed.

Another question that needs to be answered in order to understand evolution is natural selection. Fossils often have similarities with today's animals, but they never look entirely the same. In order to understand these adaptations, students have to understand in how far certain characteristics of animals might be more beneficial than others and why different birth rates play a crucial role (Campbell et al. 2009: 613). However, this concept of natural selection is often difficult understand, as stated by Haydock and Arunan (2013: 106). The researchers investigated teaching methods, text books and students' as well as teachers' views on natural selection and found that the difficulty in conveying the concept primarily stems from the process' complexity and its line of argumentation that seems to contradict our implicit, everyday sense-making. According to the authors, students often think 'teleologically', believing that selection happens intentionally and has a fixed purpose (2013: 108). Due to these reasons, the teaching project should deal extensively with natural selection and should specifically address selective factors that reveal the unintentional change of features over time.

In the event of there being sufficient time, students should also get introduced to Darwin's life and the way he developed his theories, as he was certainly one of the most influential scientist in biology and his theories still form the basis of most of today's research in the field of biology (Campbell et al. 2009: 624).

7.4. Materials' design

The following section will now outline the development of the teaching materials with the support of the concepts and models described in chapter 5. Especially the concept of the CLIL pyramid (Meyer 2010: 23-24), the accompanied template and the model of competences (BIFIE 2011: 1) will serve as the main references. Further biology models that were occasionally used will be mentioned as well. Thereafter, scaffolding techniques that were applied will be presented.

7.4.1. First lesson

The figures below serve as an initial overview of the tasks prepared for the first lesson. Figure 9 shows the filled in CLIL pyramid template that was used during the preparation of materials. Figure 10 highlights which skills of the model of competences were trained. Subsequently, every task will be briefly explained by means of the pyramid and the biology models. For the higher order thinking skills, terms from the revised Bloom taxonomy (Anderson & Kratwohl 2001: 67-68) will be used.

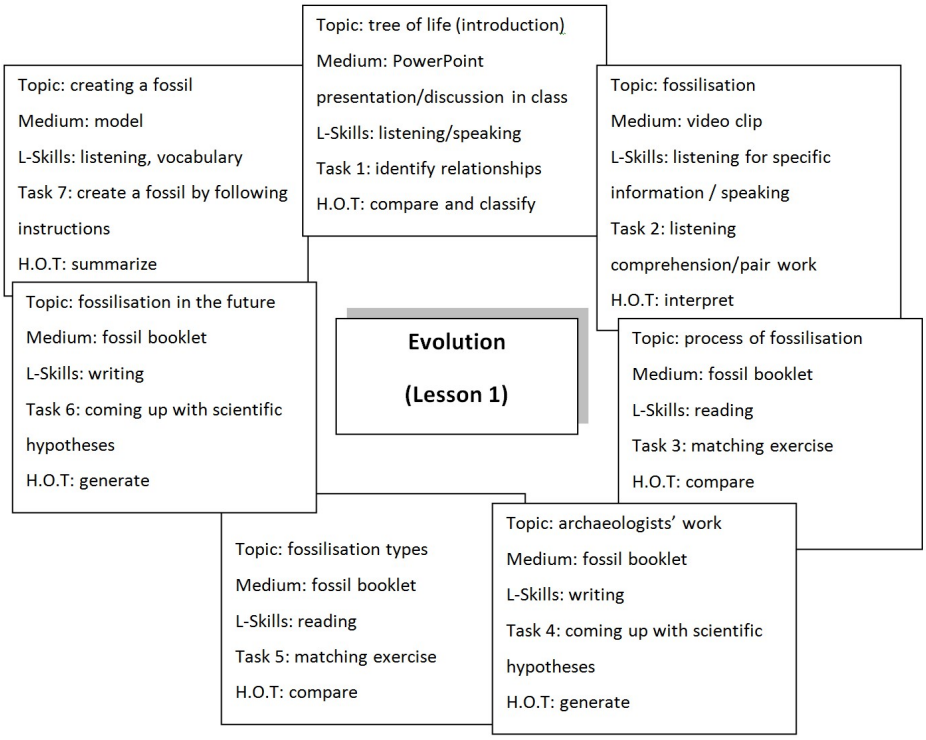

Figure 9: Lesson 1, template following Meyer's CLIL pyramid (2010: 23-24)

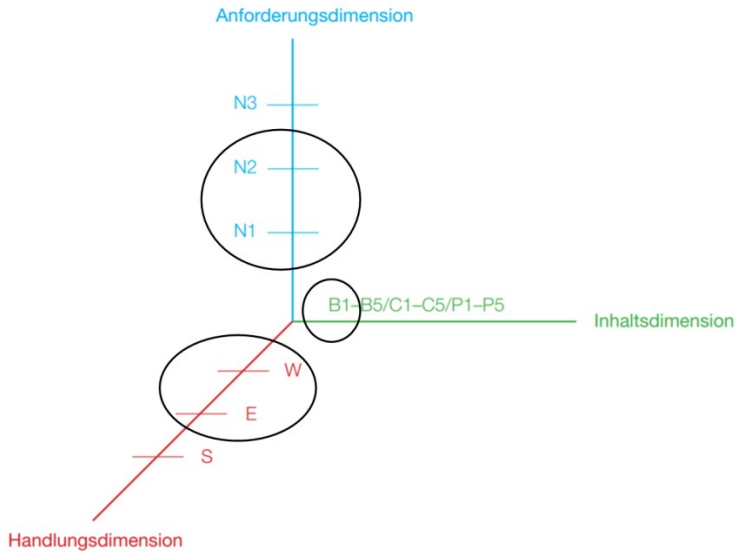

Figure 10: Model of competences (BIFIE 2011: 1-5): levels included in the first lesson's tasks encircled

Task 1: The tree of life

As explained in chapter 7.3, students must understand that all organisms are related and that the animals of today derive from earlier organisms in order to be able to understand evolution. Therefore, this topic was chosen as an introduction to the first lesson and forms the basis of the CLIL pyramid. In the following step, the medium of a PowerPoint presentation linked to a

classroom discussion was selected, as this medium made it possible to make oneself familiar with the students' language skills as well as with their knowledge of biology. The designed task requires learners to identify relationships and decide which animal is more closely related to humans, as shown in Figure 11.

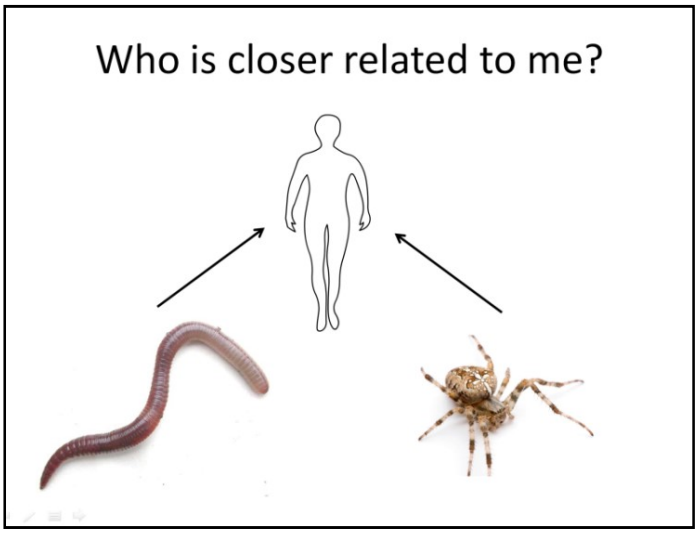

Figure 11: Guessing game at the beginning of lesson 1

After a rather easy example where students should decide whether a whale or a horse are more closely related to humans, the following questions should be more challenging. The example provided above shows one of the most difficult ones, as the spider having four legs seems to be misleadingly closer related to humans than an earthworm. This task should activate students and requires their listening, as well as speaking skills, as they have to understand instructions and answer accordingly. Additionally, the exercise could be seen as an 'icebreaker' as students most likely lose their fear of participating as the game progresses. In terms of higher order thinking skills this task together with the discussion in class should motivate students to use English to compare and contrast the animals closely before trying to classify them.

According to the biology model of competences, the PowerPoint presentation, as well as all other tasks in this lesson, belong to the category of 'the development and history of the earth and organisms' on the contents axis (B1). As this is the beginning of the project, this task is still very teacher-centred (N1 on the requirements axis). Much like the higher order thinking skills of the pyramid, this model also emphasizes the need of teaching students how to observe, describe and compare (W on the actions axis). Students have to think closely about the animals' anatomy and compare them in order to answer correctly. Another biology model that was included in the process of creating this task was the didactic triplet (Kattmann et al. 1997: 4). As students' previous knowledge of animal categorisations might stand in

opposition to the newly learnt categories, it is important to address these contradictions. The PowerPoint presentation and especially the classroom discussion seemed to be ideal formats for addressing both, scientific and the everyday, perspectives, as the teacher can talk to the students and ask them about their viewpoints.

Task 2: Fossilisation

The medium chosen for the process of fossilisation was a short video clip. Even though the information could have been included into the PowerPoint presentation, changing the medium possibly helps to suit the needs of more than one learner type and most likely makes learning more enjoyable, as also shown in the study by Lasagabaster & Doiz (2016: 112) described in chapter 3.5. Listening skills should be practiced through this medium. Students at A2 level should be able to listen for specific information in rather simple text (Bundesministerium für Bildung 2016b: 4-5). As the video seemed to be rather challenging, multiple choice questions were designed as an accompanying task in order to ease the listening process in the CLIL class. As no scaffolding was needed in the control class, a pair work activity was chosen during which students should discuss the process of fossilisation with their partner. Concerning higher order thinking skills, the video should motivate students to interpret the individual steps of the process shown in the video.

In terms of the model of competences, the exercise is again strongly teacher-oriented (N1), as students do still not have enough knowledge about fossilisation to work independently. Additionally, the same dimension of action is addressed as in the previous task (W). Students practice to observe, understand and analyse the process of fossilization in greater detail. Both exercises, the presentation and the listening activity, serve as the basis for the subsequent more learner-centred exercises that would otherwise be overly challenging.

Task 3-6: Fossil booklet

In order to elaborate on certain aspects of fossilisation, the medium of a fossil booklet was chosen. The advantages of such a booklet are numerous. Students cannot only work independently at their own pace and help each other, it also gives the teacher the possibility to support students more individually. In CLIL classes, where students' varying language levels lead to an even higher degree of heterogeneity than in regular classes (Abuja 2007: 7), this seems to be of high importance. Depending upon the tasks, the extent to which certain language skills are needed varies. However, in all of them students have to read instructions carefully and communicate with their colleagues in case of difficulties in order to complete the tasks. After briefly explaining every task, explanations concerning the biology models will be given at once afterwards.

Task 3: the process of fossilisation

In exercise 3, students should match the process description of fossilization, divided into individual steps, with the pictures provided. Therefore, students should use skimming and scanning skills to understand the gist of the texts. As the texts rely mostly on everyday language and contains some German translations, students should be able to comprehend the given information. Higher order thinking skills include comparing abilities, as students have to differentiate between the described individual steps of fossilisation and the pictures provided.

Task 4: scientific hypotheses

In exercise 4 students should interpret what the fossilized footprints on the pictures could mean. Figure 12 shows one of the two images that students should describe.

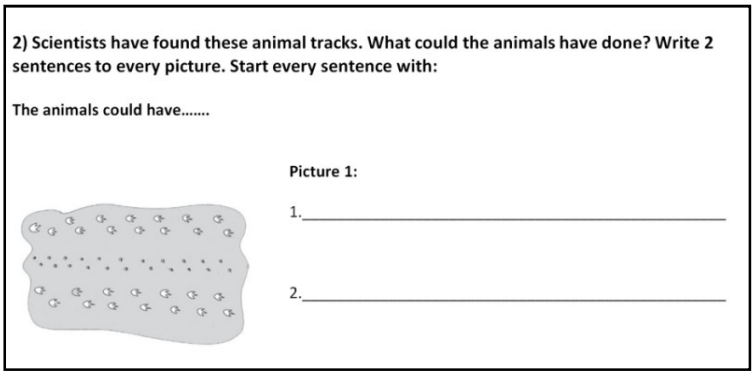

Figure 12: Extract from task 2 (fossil booklet)

For these tracks several interpretations are feasible, including for instance the assumption that the different sizes of the tracks stem from juveniles and adults. Another presumption would be that smaller animals were surrounded by predators. In terms of higher order thinking skills, this exercise clearly trains learners' hypothesising abilities that belong to the category of 'generate' in the new Bloom taxonomy (Anderson & Kratwohl 2001: 68). Additionally, even though the project takes place in a classroom, such an exercise seems to be quite authentic as actual archaeologists also have to formulate hypotheses when finding new fossils.

Task 5: fossilisation types

Task 5 is another matching activity in which students should familiarize themselves with different fossilisation types that should then be applied to other objects. As short information texts are part of the exercise, students must use skimming and scanning techniques in order to understand the individual fossilisation types. This task should encourage students to practice comparing and contrasting skills again. Learners should find similarities between the given

examples and the new objects to detect the appropriate category for each fossil.

Task 6: Fossilisation in the future

Task 6 should help students to apply the newly learnt concepts from task 5, by finding possible future fossils in a picture showing a water puddle with small animals, water plants and a plastic bottle. Language skills required in this exercise are especially writing skills, as students should formulate short sentences about how the animals, plants and objects that could become fossils. In order to write these presumptions, students must use hypothesis skills.

In terms of the model of competence, task 3 and 5, as well as task 4 and 6 share the same categories. On the requirements axis task 3 and 5 are again rather teacher-centred, even if students work on their own. The exercises only allow for one correct answer that learners have to find with the help of the provided materials and the instructions given. The tasks could thus be seen as guiding the students to the results. However, this is also needed to a degree, as the two exercises deal with new content that students should acquire. In addition, even though the tasks are rather teacher-centred and focus mainly on input, students can still practice describing and observing skills that are needed in order to understand biological processes and new information in general (W on actions axis). In task 3, learners must observe the pictures and read the texts closely to bring them in the correct order. In task 5, students have to observe the pictures depicting the different fossils closely in order to find the correct category.

In contrast to these tasks, exercises 4 and 6 do not lead to correct or incorrect answers. In this way, students are much freer in the manner in which they solve the task (N2 on requirements axis). As the PowerPoint presentation, the listening and exercises 3 and 5 already strongly focus on input and guided learning, these tasks should be a pleasant change of focus. Moreover, they should help students to practice crucial biology skills, namely hypothesizing abilities (E on the actions axis). In exercise 4, students should assume what the animals that caused the footprints could have done, and in task 6 they should decide how objects might become fossils. One aspect of the 'explorative learning' model by Mayer (2006 in Mayer & Ziemek 2006) is also strongly used in this part of the lesson, namely 'cooperative learning'. Even though students could theoretically do all exercises on their own, learners will most likely work together and communicate to find the answers more easily. As shown in the aims section (7.2.), this is a skill that students in lower secondary classes should acquire, according to the biology curriculum (Bundesministerium für Bildung 2016a: 2).

Task 7: Creating a fossil

The last task was chosen in order to revise the process of fossilisation. In case students need longer to finish the fossil booklet, the exercise can also be left out as it does not contain new information. The selected medium was a model of a fossil that students should create themselves. Students should listen to the instructions while preparing the clay, the plaster and filling both into the shell. At the end of the school day students should then be able to separate the shell from the clay in order to have their own fossil in the shape of an internal mold. The teacher should pay attention to using several time expressions. Thereby, students can train their listening and vocabulary skills. In terms of higher order thinking skills, students summarize the lesson and will likely remember it better.

This task is again highly guided by the teacher (N1 on the requirements axis). After the independent work, this might be a good closing of the lesson as all students come together and go through the most important elements again. Students produce their own fossils and thereby think the process through once more, albeit from a slightly different angle (W on the actions axis). The idea of using a model at the end of the lesson stems from the framework of competences by Mayer (2007: 178). Even though the exercise does not take long, it shows students how rather difficult scientific processes can be simplified.

7.4.2. Second lesson

In the following section, the template by Meyer (2010: 23-24) and the model of competences will be outlined again, this time for the second lesson, before each task will be described.

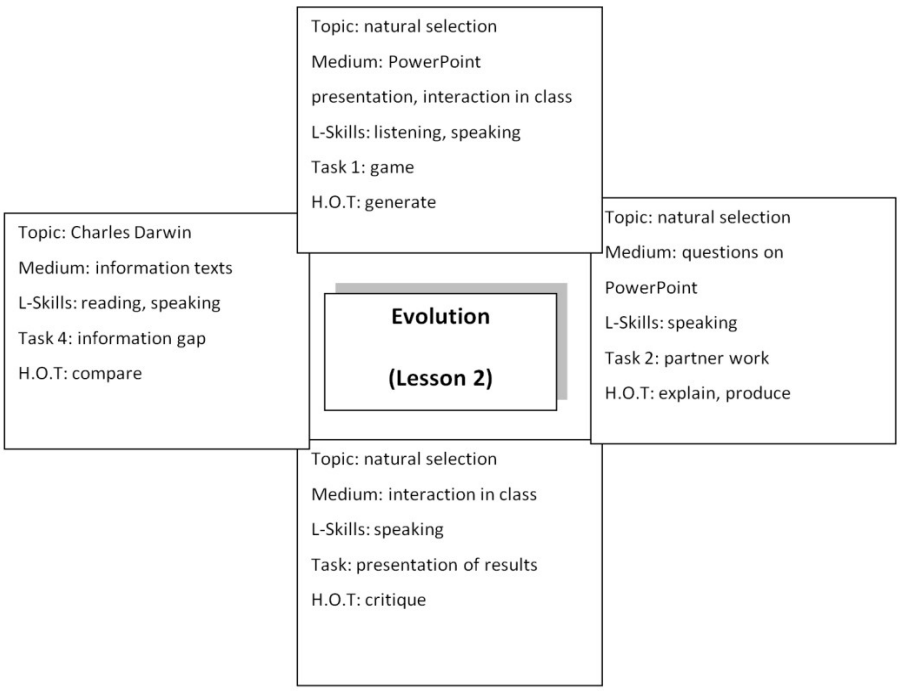

Figure 13: Lesson 2, template following Meyer's CLIL pyramid (2010: 23-24)

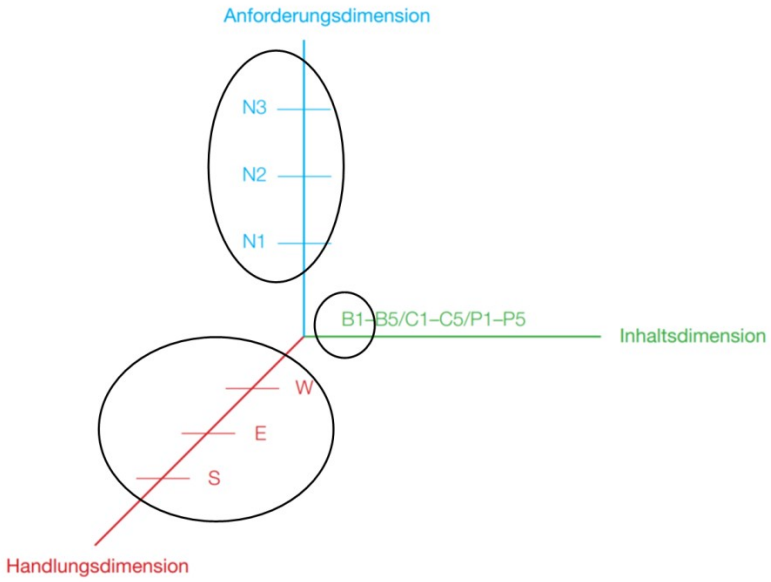

Figure 14: Model of competences (BIFIE 2011: 1-5): levels included in the second lesson's tasks encircled

Task 1: Natural selection game

The topic of natural selection was chosen as this concept is critical in allowing for the understanding of why fossils look different from organisms today and how changes in appearances and physiology developed over time, as explained in chapter 7.3. The medium of PowerPoint is suited best for the planned game, as instructions are easy to read from everywhere in the classroom and various environmental influences that play a role in the game can be simulated. Listening as well as speaking skills are practiced, as students must follow the instructions and should discuss changes they observe or assume to happen. The game itself can be seen as a simulated experiment focusing on the evolutionary development of imaginative paper animals called 'Selectis' that differ in terms of colour, size and beak forms. Various influences favour certain appearances and lead to the extinction of others amongst the animals, consequently having an impact on the overall composition of species on a fictitious planet. One example of such an influence would be predators eating all animals having colours visible in green grass. At the end of the game, students should try to explain what happened. Thereby, not only observation skills are needed but also the higher order thinking skill of hypothesizing what will happen next. One advantage of this task is that all students are involved equally throughout the entire task.

In the model of competences, all the tasks in this lesson belong to the category of 'the development and history of the earth and organisms' on the contents axis (B1) again. Concerning the requirements, this PowerPoint is rather teacher-centred (N1 on the requirements axis) as the teacher has to guide the students through the game. However, through this support, students can train the skill of implementing an experiment and

interpreting its findings (E on actions axis), even at such a yet relatively low level of biology skills. Students can test how animals' characteristics change over time and make suggestions on why these changes might happen.

Task 2: Natural selection - pair work

The topic of natural selection remained the basis of the CLIL pyramid for the following part of the lesson, as grasping such a relatively complex model in lower secondary education can be quite challenging and requires in depth analysis. The medium used was a PowerPoint slide with questions and a pair work activity. The first two questions dealt with the game, whilst the last question was a creative exercise, as shown below.

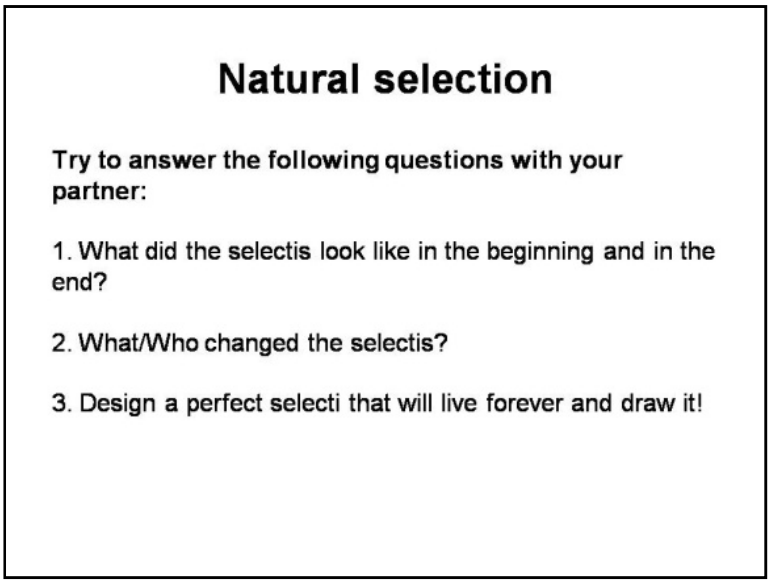

Figure 15: Questions accompanying pair work activity

For this task, students should discuss the questions with their partner and draw an animal that might live forever. In order to do this, students' speaking skills are required. As it is stated in the curriculum, learners' speaking abilities at an A2 level are still quite restricted to everyday life situations (Bundesministerium für Bildung 2016b: 4-5) and thus students should be allowed to use German words as well. In terms of higher order thinking skills, the first two questions should encourage students' explanation skills. The third question trains the higher order thinking skill of producing, meaning that students practice 'inventing a product' (Anderson & Krathwohl 2001: 68) by trying to take into account all kinds of selective factors that they became accustomed to over the course of the lesson.

The first two questions are still rather low on the 'dimension of requirements' axis (N1), as specific, correct answers are required that students should easily find by thinking back to the game. However, the last question is much more challenging and asks students to

apply the newly learnt concept on their own without any particular teacher guidance (N3). As already stated when describing the higher order thinking skills, the first two questions practise explanation skills (W on the requirements axis), the last question requires students to question, interpret and create their own product (S on the actions axis). Production tasks belong to the most advanced category in the model of competences (Anderson & Krathwohl 2001: 5), but the playful character of the exercise will probably motivate students rather than intimidate them and ease the task. This last question also includes crucial elements of the 'explorative learning' model by Mayer (2006 in Mayer & Ziemek 2006). Students should work independently and cooperate with their partner. Additionally, the task is 'problem-oriented' as no fixed solution exists and students must get active to find an animal that can live forever. Due to these features, even though the task will not take longer than 15 minutes, it can still be seen as an important explorative element of the lesson.

Task 3: Natural selection - class work

This task can be seen as the follow-up activity to the last one. Students should present their animals to the rest of the class with their colleagues trying to find reasons for why the presented animal might not live forever. The medium was changed to a classroom discussion in order to be able to guide the students through the task and to keep them interested. Similar to the last task, the focus should again be on speaking. Even though students might not have sufficient vocabulary to exclusively speak English, using a mix of languages seems to already be a good start for the learners' second CLIL lesson. In terms of higher order thinking skills, this task focuses on judging, in the sense that students have to think critically about the features of their colleagues' animals in order to reason why the animal might not live forever as a consequence of natural selection.

As the task is rather teacher-centred again (N1 on the requirements axis), possible difficulties or misunderstanding that developed during the previous task can be solved and corrected. The highest level of the actions axis (S) in this model addresses the need of students to practice thinking critically and argue scientifically and this is practiced through the task. Another model that was taken into account when designing this task was the didactic triplet (Kattmann et al. 1997: 4). Students might have a certain image in their head when thinking of immortal animals influenced by popular fantasy films or books. However, this activity should make them aware that being strong, tall or a superhero will not necessarily lead to higher survival rates in real life.

Task 4: Charles Darwin

After three tasks on natural selection, the last exercise designed for this lesson should deal with Charles Darwin and the development of his theses, as he was most likely one of the most influential natural scientists. This time, four different information texts and a grid with questions on Charles Darwin should serve as the medium for the task. Language skills that are needed for the task are reading and speaking skills. In order to find the answers to all of the questions, students must interview their colleagues who have different text parts. The higher order thinking skill used for this task is comparing, as students have to find other learners who have the information they still need.

According to the model of competences, students have to learn how to work with information from texts. This can be achieved through the reading and comparing of information texts (W on actions axis). In terms of requirements, the task does not demand extensive independent work (N1), as the instructions are clearly stated and should thus enable all students to finish the grid in the time provided. Therefore, the exercise is highly suitable for the end of the lesson, as all students will hopefully finish more or less on time. However, in case students need longer for the previous tasks, this activity can also be left out, as it is not essential to understand the main message of the lesson, namely understanding the principles of natural selection.

7.4.3. Scaffolding

Finding appropriate materials that could be used for a CLIL project in school books or on the internet was unfortunately much more difficult than expected, as most exercises available were either overly complex in terms of their biological content or not in English. The materials presented above were thus all created by myself and therefore, the usual process of choosing a text, analysing its vocabulary and grammar and then adapting it adequately, as proposed by Dale, van der Es & Tanner (2010: 55-58), could not be applied. Scaffolding had to take place during writing and designing the materials.

As dealing with topics that are not related to students' everyday lives and routines is still rather challenging at an A2 level (Bundesministerium für Bildung 2016b: 4-5), the chosen vocabulary and grammar structures had to primarily contain 'general vocabulary', instead of 'subject terminology' or 'academic words' (Dale, van der Es & Tanner 2010: 49). In cases where subject terminology was necessary, German translations were often inserted to facilitate students' understanding, except for instances where the meaning could already be guessed from the context. An example is given on the next page.

Internal mold: 1. Sand or minerals fill the shell

2. The shell decays (zersetzt sich)

3. The sand now looks like the shell

Figure 16: Extract from task 5, fossil booklet

Even though students are likely not familiar with the term 'internal mold', no translation was needed, as the explanations and the picture provided most likely support students enough in understanding the meaning. However, the word 'decays' was translated, as the term is essential in understanding this type of fossilization. Without decay, the sediments within the shell could not become visible. 4 more scaffolding techniques were used in this short text. First of all, the sentence length was kept to a minimum in order to avoid complex grammatical structures that might be overly challenging at this age. Secondly, solely active forms were included, as learners at the A2 level might not be that skilled in passive constructions yet. Thirdly, the information was divided into three main steps which makes it easier to think about each part of the process. Finally, the picture and the frame should facilitate students' understanding. The picture visualizes what an internal mold looks like, while the frame clearly sets this process apart from others and will thus probably help students to focus on this fossilization type in isolation. The same techniques were used for other elements of the fossil booklet. As the texts were all highly condensed, the 5% proportion of new words that is proposed by Dale, van der Es & Tanner (2010: 49) could not be taken into account.

In general, visualization played a crucial scaffolding role during materials' preparations. Especially the PowerPoint presentations in both lessons were highly useful in this respect to compensate for the students' relatively low level of biology specific vocabulary. For instance, the initial slide of the first Powerpoint presentation showed a bacterium, a clock and a human being to visualize what the lesson would be about.

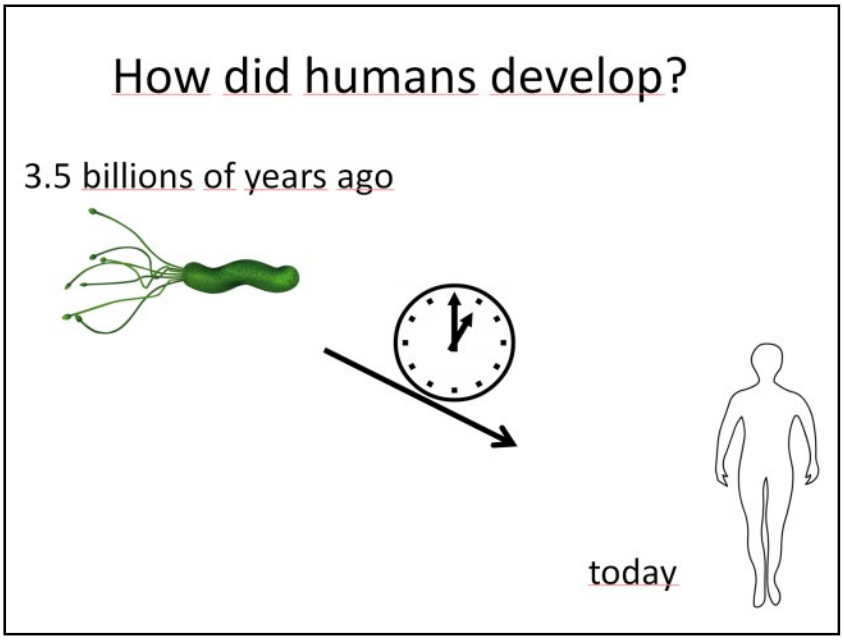

Figure 17: Extract from the initial PowerPoint presentation

Even though children might find it difficult to follow the spoken English explanations, the illustrations will certainly make it rather easy to understand the main idea of the lesson's topic. However, not only the medium of presentations was used for visualization, but also the video in the beginning of the first lesson and the drawings students created in the course of the second lesson. Despite the fact that the drawings should be produced by the students and not by the teacher in advance, they also facilitate the meaning making process during lessons. Not only other students might find it less difficult to follow their colleagues' presentations of the fictitious animals, but also the teacher can help more easily with vocabulary issues or grammar when provided with a drawing. Even though the German class might not have needed such extensive visual support, the number of pictures and illustrations remained the same in their lessons as well, as students might always appreciate visually attracting materials more than strongly text-based resources.

Moreover, 'output scaffolding' (Meyer 2010: 24) was needed for 3 activities. The first one was the listening comprehension in the beginning of the first lesson. As no video could be found that dealt with fossilization and was appropriate for students' current language level at the same time, the questions should have helped students to succeed in understanding the most important information included in the video. Just two options were given, as guiding the students through the task seemed more important in the students' first CLIL lesson than testing listening skills through a number of answers to choose from. The other two tasks were exercises 4 and 6 of the first lesson. Students should formulate hypotheses about fossils. However, learners in their third year of regular English education will most likely not have

dealt with conditional constructions yet. Therefore, a sample sentence for each task was written on the blackboard to support them in formulating correct sentences. The exact formulation was:

> Task 4: The bigger animals **might have caught** the smaller animals.
> Task 6: The shell **might become** an internal mold.

To conclude, besides vocabulary and grammar structures that needed scaffolding, visuals were created and support for the required output was given in order to facilitate students' understanding.

7.5. Lesson plans

The following lesson plans briefly outline each activity planned for the project and summarize the goals and skills described in the previous chapters. The approximate length of each activity, the used interaction formats and the materials needed are indicated as well.

Lesson plan 1

Timing	Activity	Interaction format	Materials	Language goals Biology goals Comments
3 min	Introduction -Introducing myself and the teaching project -Students prepare name tags	-Student-teacher interaction		
5 min	Filling in the questionnaire	-Indivi dual work	-Questionnaires	Comments: -Questionnaire was in German for both classes to avoid language-related differences -Students were reminded that the questionnaire was anonymous
7 min	PowerPoint presentation -Which connection can be drawn between bacteria and human beings? -Who is closer related to us? (game) - Writing down brief definition in students'	-Student-teacher interaction	-PowerPoint presentation -Students' exercise books	English: - Listening skills - Encourage speaking skills Biology: - Introduction to scientific

	exercise books			categorizations and relationships that differ from everyday beliefs - Compare and contrast characteristics of animals <u>Further goals / comments:</u> - Activate students - Icebreaker - Student-teacher interaction helps to identify the students' language level in CLIL class
5 min	<u>Video about fossilization</u> **-German class:** <u>https://www.youtube.com/watch?v=UsxIRM05dxw</u> Students briefly talk to their neighbours about how fossilization can be defined and write down definition with the help of the teacher **-CLIL class:** <u>https://www.youtube.com/watch?v=3rkGu0BItKM</u> Students receive a short multiple choice listening comprehension instead	-Individual work -Partner work	-Videos and projector -CLIL class: listening comprehension	<u>English:</u> - Train listening for specific information <u>Biology:</u> - Provide students with the input needed for working independently afterwards - Understand, interpret the process of fossilization <u>Further goals / comments:</u> - As finding an English video appropriate for a 7th grade was difficult, the MC questions should help students to understand the

				main aspects
20min	<u>Fossils booklet</u> 1) The process of fossilization: matching exercise 2) How do scientists interpret fossil finds?: short writing task 3) Fossilisation processes: matching exercise 4) Fossils today: applying newly learnt information	Independent work	-Fossils booklet - Pictures for exercise 1 -Pictures of footprints - Pictures of fossils and real fossils - Task photocopied from schoolbook for exercise 4 **CLIL class:** **-**Phrases as support for exercise 2 -Sample sentence as support for exercise 4	<u>English:</u> -Exercise 3&5: skimming and scanning -Exercise 4&6: formulating hypotheses and describing pictures <u>Biology:</u> - Exercises 3&5: input, compare - Exercise 4&6: stimulate students' ability to create scientific hypotheses <u>Further goals / comments:</u> - Students should be given the chance to work independently and at their own speed - Cooperate with others <u>Further goals/comments:</u> - output scaffolding needed for exercises 4&6
5 min	<u>Comparing answers in class</u>	Student-teacher interaction	Fossil booklet	<u>Further goals / comments:</u> -Time to briefly explain common

				language issues and answer questions
(5 min)	<u>Producing one's own fossil</u> -Students receive clay, plaster and shells -Teacher guides them in producing fossils -Fossils are put on the windowsill to dry until next lesson	Student-teacher-interaction	-Clay -Plaster -Shells -Paper towels	<u>English:</u> - Understand and usedescriptions and expressions of time <u>Biology:</u> - Understand and learn from models, summarize process <u>Further goals/comments:</u> - For fast students or in case one class finishes earlier than the other one!

Lesson plan 2

Timing	Activity	Interaction format	Materials	Language goals Biology goals Comments
5 min	Informal recapitulation from 1st lesson	Student-teacher interaction		
15 min	Natural selection game -Students receive small paper animals and follow the instructions -The PowerPoint presentation illustrates the changing conditions	Game	-PowerPoint -Paper animals	English: - Understand instructions and act accordingly - Fluency Biology: - Students should understand the main principles of natural selection - Implement and interpret an experiment Further goals/comments: -Highly interactive method involving all students
15 min	Reflection on game -Students try to answer the following questions with the person sitting next to them	Partner work	-PowerPoint - Students‘ exercise books	English: - Train communication skills Biology: - Understand and explain evolutional factors

	- What did the Selectis look like in the beginning and in the end? - Who/what changed them? - Draw an animal that will live forever!			- Apply all the learnt concepts and create a product - Linking everyday beliefs to scientific concepts <u>Further goals/comments:</u> - Students have to cooperate
10 min	<u>Comparison in class and presentation of students' animals</u> -Results for questions 1&2 are compared -5 volunteers are chosen to present their animals, the rest of the class tries to find ways in which the animal could die out	-Student-teacher interaction		<u>English:</u> - Train communication skills <u>Biology:</u> - Critically questioning immortality by means of evolutional factors
5 min	<u>Filling in the questionnaire</u>	-Individual work	-Questionnaires	<u>Comments:</u> - Questionnaire were in German for both classes again to avoid language-related differences -Students were reminded that the questionnaire was anonymous

(10 min)	<u>Information gap activity about Charles Darwin</u> -Students read their own texts -To answer the questions they have to ask their colleagues about the texts they read	-Individual work -Group work	-4 different texts about Charles Darwin -Questions	<u>English:</u> - Exchanging input - Reading skills <u>Biology:</u> - Information on Charles Darwin - Work with information texts <u>Further goals/comments:</u> - Task used in case one class or several students finish earlier

8. Design of the evaluation of the teaching project

8.1. Survey design

In order to avoid misunderstandings or inhibitions related to students' limited English knowledge, the questionnaire for both classes was written in German. The surveys before and after the project were highly similar with 4 items being related to students' gender, language background and previous grades and the rest dealing with students' attitudes towards the project and their regular biology lessons. The following table will present the individual items used in the first questionnaire, including an English translation and an indication in which class the question was asked. The original questionnaires can be found in the appendix. More detailed explanations of each question are given beneath the table.

Table 1: Items included in survey 1

Item	Class	German statement	English translation
1	both	Ich bin: ein Bub / ein Mädchen.	I am: a boy / a girl.
2	both	Mit meiner Familie spreche ich diese Sprache/n:	I use the following languages to communicate with my family:
3	both	*CLIL class*: Ich freue mich auf die Biostunden auf Englisch. *Control class*: Ich freue mich auf die Biostunden mit der neuen Lehrerin.	*CLIL class*: I am looking forward to the biology lessons in English. *Control class*: I am looking forward to the biology lessons with the new teacher
4	both	*CLIL class*: Ich kann mir vorstellen, dass sich mein Englisch durch die englischen Biostunden verbessern wird. *Control class*: Ich würde auch gerne wie unsere Nachbarklasse auf Englisch unterrichtet werden. Mein Englisch würde sich dadurch vielleicht verbessern.	*CLIL class*: I believe that I will improve my English in CLIL lessons. *Control class*: I would also like to be taught in English. I believe that this could improve my English.
5	both	*CLIL class*: Ich denke, dass ich gleich viel über das neue Thema lernen werde, obwohl ich auf Englisch unterrichtet werde. *Control class*: Ich denke, dass ich gleich viel über das neue Thema lernen würde, wenn ich auf Englisch unterrichtet werden würde	*CLIL class*: I think that I will learn as much as in regular lessons about the topic taught. *Control class*: I think that I would learn as much as in regular lessons, if I was taught in English.
6	both	Ich lerne Englisch vor allem, weil…	I mainly study English, because…

		…ich die Sprache mag …es wichtig ist um die Schularbeiten und Tests zu schaffen …mir der Englischunterricht gefällt …ich es für meinen späteren Beruf brauchen könnte	...I like the language ...it is important to succeed in tests ...I like the English lessons ...I could need it for my future job
7	both	Welche Note hattest du in deinem letzten Zeugnis in Englisch?	Which English grade did you have in your last annual report?
8	both	Welche Note hattest du in deinem letzten Zeugnis in Biologie?	Which biology grade did you have in your last annual report?
9a-f	both	Im Biologieunterricht… a) fühle ich mich manchmal überfordert b) interessiere ich mich meist für die Themen c)arbeite ich gerne mit d) habe ich Angst Fehler zu machen e) herrscht ein gutes Lernklima f) finde ich den Materialien leicht zu verstehen	In my biology lessons… a) I sometimes feel overwhelmed b) I am mostly interested in the topics c) I like to participate d) I am scared of making mistakes e) the atmosphere is pleasant f) the materials are easy to understand
10 **a-f**	clil	Im Englischunterricht... a)-f) wie in 9	In my English lessons... a)-f) as in 9

Items 3-5 were chosen in order to collect students' initial thoughts on the project concerning their enthusiasm for the project, their belief in language progress and their subject related learning through CLIL. Three emoticons, including a sad, a neutral and a happy face, were given, indicating how satisfied students were with the statements. Item 6 focused on the motivation for language learning of each student. From the 4 possibilities, answers 1 and 3 represented intrinsic motivational factors, while answers 2 and 4 represented extrinsic factors. In item 9, each subitem is related to Krashen's theory of second language acquisition and his hypotheses on how to increase learners' language progress. The first statement, 'I sometimes feel overwhelmed', fits to Krashen's 'input hypothesis' stating that students learn best when being adequately challenged. This is what he calls 'i+1' (1985: 79). Students feeling overwhelmed could thus not be as successful in language learning as others. The second statement, 'I am mostly interested in the topics', and the last subitem 'the materials are easy to understand' also reflects Krashen's input hypothesis, as according to him language can only be learned when students are provided with 'comprehensible input' that learners can progress (1985: 80). Students whose interest in evolution is arisen through CLIL and who do not face difficulties understanding the materials used might probably be better language learners. Subitems 3-5 dealing with students' willingness to participate, their fear of making mistakes

and their perceptions of the atmosphere in class correspond to Krashen's 'affective filter'. According to Krashen (1985: 81), anxiety in language learning situations leads to a blockage that will prevent students from succeeding in language learning. This means that students who eagerly participate, take risks and appreciate the learning climate will be more likely to acquire skills. The questionnaire for the CLIL class included one question more, dealing with students' perceptions of their regular English lessons, because comparing these results to the ones of the CLIL lessons after the project might be highly interesting as well. As the control class was taught exclusively in German, this question could be left out.

In most cases the items chosen for the survey after the teaching project remained the same with only minor changes in terms of formulations needed, such as in item 3 where students were no longer asked whether they were looking forward to the lessons, but rather how much they had enjoyed the lessons. In item 6 the possible answers about students' motivations were rewritten in order to guarantee that students did not tick the same boxes as in the first survey again, solely because they remembered the answers. The subitems of question 9 remained unchanged but were this time related to students' learning experiences during the project. By subsequently comparing these results to the ones form the first survey dealing with students' attitudes towards regular lessons, noticeable changes in learners' attitudes might occur, such as students' being more willing to participate in CLIL than in biology and English classes. In both classes, two items were added at the end of the second survey that gave students the possibility to write down positive and negative comments about the lessons. Even though open questions are more difficult to evaluate, they give students the possibility to comment on the project directly. The entire surveys 1 & 2 of both classes can be found in the appendix.

8.2. Hypotheses

The hypotheses partially result from empirical findings already mentioned in the theoretical part of this thesis and partially from my own assumptions, as will be explained below.

Hypothesis 1:

Students in both classes will enjoy the teaching project .

This hypothesis will be tested explicitly with the help of item 3. In the CLIL class these results would be in accordance with empirical studies already mentioned briefly in the literature review. Doiz, Lasagabaster and Sierra (2014: 13), for instance, showed that students appreciate the challenge of learning a subject through a foreign language and are thus highly motivated. Moreover, they found that especially first-year students enjoy the CLIL program

because of its variety in activities (2014: 127). Another study that supports students' enthusiasm for CLIL is the CLIL teaching project in computer sciences by Müller (2007: 69) showing that 95% of the students enjoyed her CLIL lessons. However, as my teaching project will include activities that are also new and challenging for the students from the control class, students in both classes might possibly prefer the CLIL project over regular lessons.

Hypothesis 2:

Students in the CLIL class and the control class will believe that a longer CLIL program in their class might improve their English skills. Their opinions will not change noticeably during the teaching project.

Even though Hüttner, Dalton-Puffer and Smit (2013: 275) could show that most CLIL students perceive themselves as progressing faster in English than their non-CLIL colleagues, results in this study might differ due to the brevity of the study. As the project will solely last for two hours, students in both classes might have similar attitudes towards language progress through CLIL and might not change their beliefs. Students will overall be quite convinced about the progress, as the fascination of the 'learn as you use, use as you learn' mentality (Mehisto, Marsh & Frigols 2008: 11) appears to be widely appreciated.

Hypothesis 3:

CLIL students and the control class' students will remain critical concerning the progress in biology through CLIL.

Even though CLIL students might rapidly adapt to the new approach, the first lessons might especially discourage them in learning the subject knowledge due to a lack of needed vocabulary, for example. Results that support this hypothesis can be found in Asomazo Nuñez's study (2015:120), for example. The researcher reports that some CLIL students criticised the lack of the presence of their mother tongues in CLIL, as they struggled with understanding certain classes and relating new information to their previous knowledge. In their opinion, certain concepts and terms in their mother tongue could ease the learning process.

Hypothesis 4:

Students' reasons for learning English will remain highly diverse in both groups over the duration of the project.

Several studies stress the increase in students' motivation in CLIL. However, most of them do not differentiate between intrinsic and extrinsic motivation. Lasagabaster's investigation (2011: 8) hints towards an increase in both motivational areas, as students' motivation in his

study increased in the category of ‘instrumental orientation', approximately equalling external motivation, and 'attitudes towards learning situation', linked to intrinsic motivation. Thereby, in my study, CLIL students’ motivation might not shift into a specific direction either. Furthermore, it must be taken into account that the brevity of the teaching project will possibly impede noteworthy trends.

Hypothesis 5:

CLIL students will appreciate the atmosphere during the CLIL project more than in their regular English or biology lessons. They will feel less fearful of making mistakes and will participate more voluntarily. Results will be similar in the control class.

These results in the CLIL class would be in line with Dalton-Puffer et al.’s findings (2009: 23), showing that students like the change in relationship between teachers and students in CLIL classes, as the language barrier leads to an increase in ‘diversity and equality’. In my lessons this might also be the case, as students will hopefully soon realize that their English skills are not assessed and that taking risks is appreciated. Thus, students will presumably like the atmosphere more than in their regular English or biology classes. Consequently, they will likely feel encouraged to participate and practice their skills. However, the control class will presumably also like the project as it is different from their usual everyday lessons and they might enjoy having a university student as their teacher.

Hypothesis 6: *The topic and the materials will be perceived as similarly positive by both classes. While the CLIL class will not feel more overwhelmed than usual, the control class will find the exercises slightly too easy.*

Researchers such as Adesope (2010: 207) provide evidence for the fact that people being surrounded by more than one language increase their cognitive skills. Even though such an increase is presumably strongly tied to initial difficult situations that train one’s skills, I believe that appropriate materials and preparations can also turn the first CLIL lessons into a rewarding instead of an overwhelming experience. This is also indicated in Müller’s study (2007: 71), showing that 81% of the students taking part in CLIL for the first time did not find the materials hard to understand. Additionally, Dalton-Puffer et al. (2009: 24) mention that students perceive CLIL lessons as better planned and prepared, which might presumably lead to better understanding. Due to the fact that exercises have to fit to students’ language level, they might not be overly challenging for the control class.

Hypothesis 7:

Correlations between students' gender and their attitudes towards CLIL will not occur.

Gender studies in CLIL are rather restricted and results vary noticeably. However, the general trend of students' attitudes towards language learning being levelled out in CLIL, as stated by Fontecha & Alonso (2014: 23), might also occur in my project. CLIL in biology might neither be associated exclusively with natural sciences nor with language learning by the participants. Therefore, results such as girls being more interested in languages and boys preferring natural sciences that are sometimes present in the EFL context (Fontecha & Alonso 2014: 23), might not occur.

Hypothesis 8:

Correlations between students' mother tongues or their grades and their attitudes towards CLIL will exist. Multilingual speakers will be more positive about CLIL. Students with high grades will also appreciate CLIL more.

In Austria CLIL is taught in foreign language contexts (Dalton-Puffer 2002: 12), as the majority of the students do not have the language used in CLIL lessons as their mother tongue. Therefore, it might be that students who do not have German as their first language or speak more than one language are more positive about CLIL. They are no longer the only ones struggling with the language in biology lessons, but rather have the same language barrier as their colleagues.

Mehisto, Marsh & Frigols (2008: 21) showed that students' grades do not change noticeably after being introduced to CLIL. Students who are motivated and talented acquire the best grades again. This might mean that those students who like the language and the subject also appreciate CLIL more than the others, and vice versa.

8.3. Data evaluation

For the data analysis, SPSS, one of the most popular programs for statistical evaluation in the social sciences (Muijs 2011: 78), was used. In order to find significant differences between students' answers before and after the CLIL project, t-tests were applied to questions 3-5 and 9a-f, as well as to question 10a-f in the first survey of the CLIL class. The t-test is especially suitable when the sample is relatively small (Malhotra 2010: 504), thus fitting into my project with 52 participants before the CLIL lessons and 53 afterwards. In addition, SPSS regression analyses were applied to identify significant correlations between students' attitudes towards CLIL and their gender, as well as their grades in English and biology and their mother tongues. While the answers students gave in questions 3-9 and 10 in the first questionnaire of

the CLIL class were used as the dependent variable, students' gender, grades and mother tongues were inserted as the independent variables in SPSS (Malhotra 2010: 568).

According to Malhorta (2010: 504), the significance level (abbreviated as p in the analysis below) should be set at 0.05, meaning that solely 5 per cent of the second survey's results are identical to the first one's answers, and thus a significant change can be detected. However, due to the highly restricted amount of time allotted for the project, I decided to also highlight tendencies up to a significance level of 0.1 in order to show developments that might possibly lead to significant results over the course of a longer and more regular CLIL course.

To visualize the results that were significant or show noteworthy tendencies towards significant developments, SPSS Excel doughnut diagrams will be used that demonstrate the change between students' answers before and after the project. The inner ring will thereby always show learners' results before the project and the outer ring will provide information about the results after the project. Exceptions where SPSS could not be applied include questions 6, as well as 10 and 11 after the project, as in all 3 cases no numbers could be assigned to the answers. Answers in question 6 were full sentences and in 10 and 11 students wrote their own comments. Thus, these questions will be analysed in a descriptive way.

9. Implementing the project

9.1. Description of the context and sample

Finding a school with two volunteering teachers teaching biology in the same year proved to be difficult, as most teachers were rather sceptical about an extra project in addition to the excursions and day trips they had planned themselves. Fortunately, two teachers from BG/BRG Perchtoldsdorf finally agreed to take part with their classes.

In BG/BRG Perchtoldsdorf students have to choose between a focus on languages or natural sciences after their second year. Thus, classes are always newly mixed at the beginning of the 7th year (www.bgperchtoldsdorf.at). The two 7th grades that participated in the teaching project were natural science classes. The teachers informed me that students in these classes were often less interested and skilled in languages. Nevertheless, they were quite certain that most students fulfilled the required A2 language level (Council of Europe 2001: 24). Even though we figured that their motivation for CLIL lessons would perhaps not be as high as in other classes, comparing two natural science classes would lead to more reliable results than comparing a language class with a natural science class, for example.

The following table includes relevant data about the students who took part in the project.

Table 2: Information about the study's sample

		CLIL class (3E)	German control class (3D)	Total
Sample size:	Survey 1	25	27	52
	Survey 2	26	27	53
Gender:	Survey 1	11 ♀ 14♂	13 ♀ 14♂	24♀ 28♂
	Survey 2	11 ♀ 15♂	13 ♀ 14♂	24♀ 29♂
Mother tongues:	Survey 1	25 German 1 Rumanian 1 Polish 1 Spanish 1 Japanese	25 German 2 Czech 1 Polish 1 Slovakian	50 German 2 Czech 1 Japanese 2 Polish 1 Rumanian 1 Spanish 1 Slovakian
	Survey 2	26 German 1 Rumanian 1 Polish 1 Spanish 1 Japanese 1 Russian 1 Ukrainian	25 German 2 Chinese 1 Polish 1 Slovakian	51 German 2 Chinese 1 Japanese 2 Polish 1 Rumanian 1 Spanish 1 Slovakian 1 Russian 1 Ukrainian
Grades English	Survey 1	1= 6 2= 12 3= 6 4= 1 5= 0	1= 7 2= 11 3= 3 4= 5 5= 1	1= 13 2= 23 3= 9 4= 6 5= 1
	Survey 2	1= 8 2= 10 3= 7 4= 1 5= 0	1= 7 2= 12 3= 3 4= 4 5= 1	1= 15 2= 22 3= 10 4= 5 5= 1
Grades Biology	Survey 1	1= 21 2= 3 3= 1 4= 0 5= 0	1= 18 2= 5 3= 1 4= 1 5= 0 (no answer= 2)	
	Survey 2	1= 22 2= 3 3= 1 4= 0 5= 0	1= 18 2= 5 3= 1 4= 1 5= 0 (no answer= 2)	
Administration times:	Survey 1	14/09/2016	13/09/2016	
	Survey 2	16/09/2016	14/09/2016	

In the survey 52 students participated altogether. While 27 students were part of the German control class, 25 students in the CLIL class participated in the first questionnaire and 26 in the following survey. As student numbers remained almost stable between the two surveys, the following graphs only show participants' gender and mother tongues from the second set of surveys.

The participants' gender was rather similarly distributed in both classes, as the diagrams show.

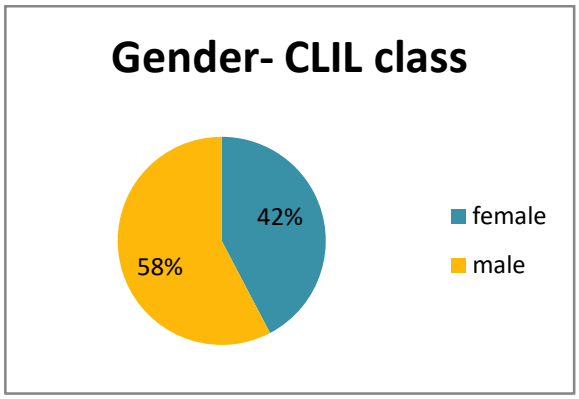

Figure 18: Distribution of male and female participants in the CLIL class

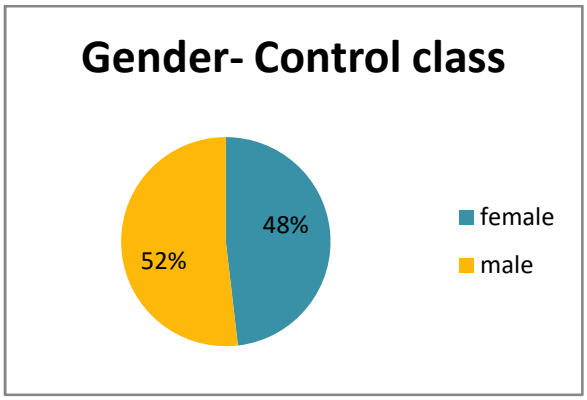

Figure 19: Distribution of male and female participants in the control class

The number of male participants was slightly higher in the CLIL class with 58% compared to 52% in the control class. Consequently, there were more female students in the control class (48%) than in the CLIL class (42%). However, both classes showed a slightly higher number of boys than girls overall.

Language-wise, both groups could be described as homogenous groups with almost all students being German native speakers. The following diagrams support this homogeneity.

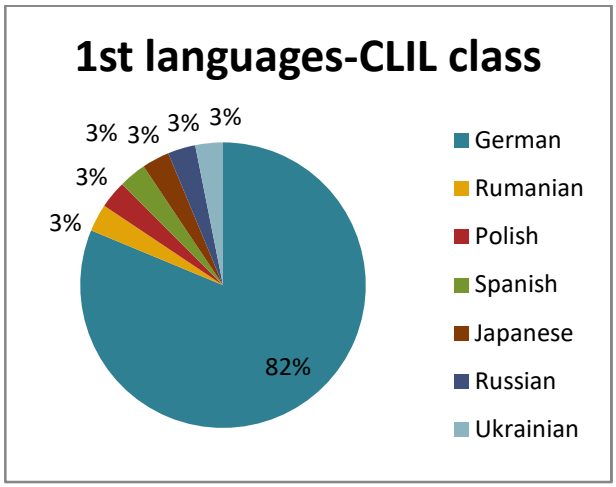

Figure 20: Distribution of mother tongues in the CLIL class

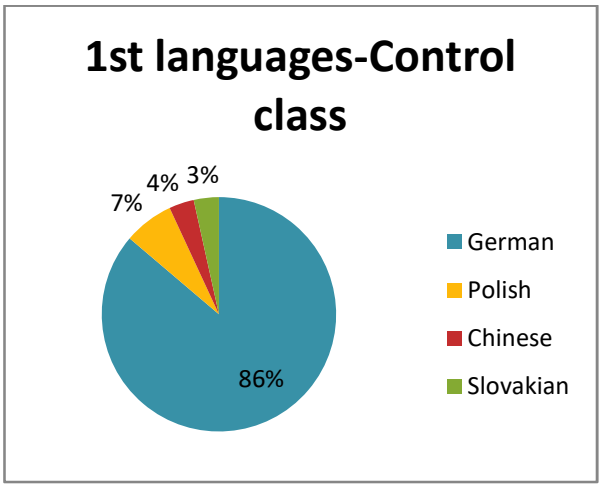

Figure 21: Distribution of mother tongues in the control class

All students indicated that they spoke German at home in the CLIL class, but 5 children also noted that they spoke another language or in one case even two other languages at home. In the control class, two children spoke Chinese as their first language and were not additionally fluent in German. While Chinese and Slovakian solely appeared as a mother tongue in the control class, Rumanian, Spanish, Japanese, Russian and Ukrainian were spoken exclusively in the CLIL class.

Students' English grades differed slightly between the two classes, as shown below.

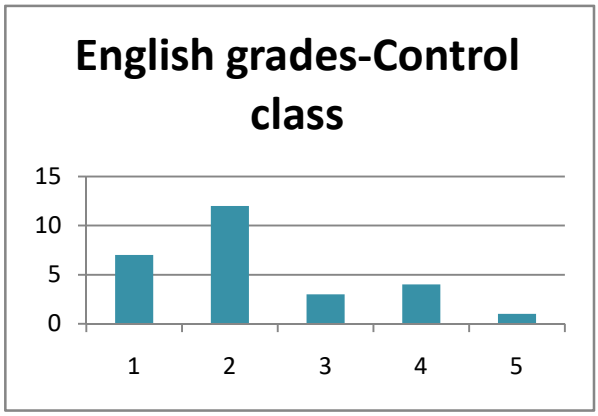

Figure 22: English grades of the control class

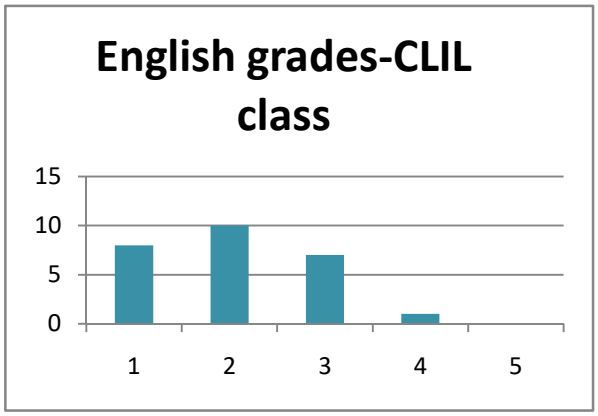

Figure 23: English grades of the CLIL class

While the number of students with an A, B or C in their latest school reports was comparably high, the control class showed fewer As and Cs, but more Ds and an E instead. Interestingly, the grades students indicated in their first and second survey differed in both classes, even though the number of students remained the same in 3E and there was only one more student in survey 2 in 3D. Reasons could be that students could not remember exactly which grade they had, as their last school report was 3 months ago. Conversely, perhaps some of the students did not take the survey seriously enough and ticked a wrong box intentionally. Nevertheless, one can see that overall English grades were better in the class chosen for the CLIL experiment.

Overall, the biology grades were also slightly better in the CLIL class than in the control class, even though the proportion of students with an A was noticeably high in both classes.

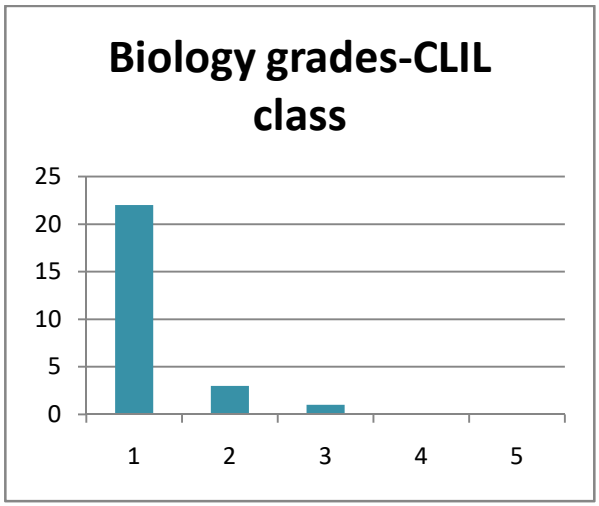

Figure 24: Biology grades of the CLIL class

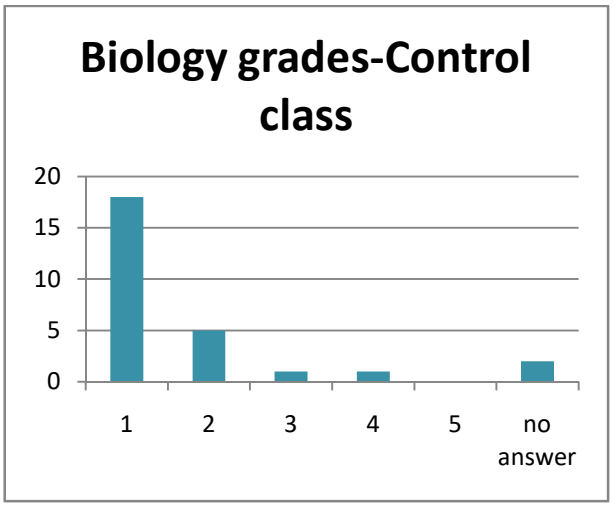

Figure 25: Biology grades of the control class in absolute numbers

In contrast to students' answers concerning their English grades, biology grades did not change between the two surveys. Two children did not mention their biology grades as they were new in the school and had not taken biology in the school they had attended previously.

9.2. Teacher/researcher field notes and class-teacher feedback

The following descriptions result from notes taken after every lesson taught over the course of the teaching project and should provide the reader with insights into the lessons from my perspective as a teacher.

9.2.1. Control class: 1st lesson (13/09/2016, 8.50-9.40)

The project started in the German control class 3E on the 13th of September, 2016 in the second lesson from 8.50 till 9.40. At the beginning, the children needed some time until they arrived in the biology classroom. Their regular biology teacher and I had prepared everything in advance, therefore the lesson could start immediately after all students had been seated. However, one could feel that it was only their second week and I was not their regular teacher. Especially some pupils in the back rows were quite talkative, while quarrels about the seating arrangement had to be solved before starting with the project. Finally, the teacher introduced me and I handed out the questionnaires. The questions seemed to be comprehensible and it remained relatively silent during the 10 minutes allocated for this task. There were only a few children who wanted to know whether they could write comments in addition to ticking the boxes. After the survey, the new topic was introduced with the help of the PowerPoint presentation. Even though the students' attention was already relatively high during the first slides, the pupils' participation increased noticeably when we played the guessing game on the slides. The exercise seemed to have an appropriate level of difficulty, as

almost all children started discussing the possible answers immediately and remained relatively silent when I told them the reasons for the correct answer. The video clip about the process of fossilization that followed the presentation also attracted students' attention and most of them wrote down key notes while watching the clip. However, discussing and writing down the definitions that were mentioned in the video afterwards needed more time than I would have expected, as the students' writing speeds differed noticeably. Because of this, I could not change the slides as long as some were still writing. Due to the fact that some of the fast students were already finished, the noise level increased and I was glad when I could finally introduce the fossil booklet and give them time to work at their own pace. Most students seemed to like autonomous tasks as well, as some wanted to start working immediately and I even heard one pupil saying to her friends that she liked such exercises most.

The fossil booklet exercises proved to be self-explanatory, as the children barely asked for help and I could observe that they were writing down correct answers. The individual exercises had different degrees of difficulty. Exercise 1 was possibly the most straightforward one, as the students had to match the pictures with the fossilization process. Therefore, the majority of the pupils started with this task, even though I had told them that it was not necessary to do the exercises in order. The process seemed to be clear to all children, as there were only two or three students who mixed up two out of the six pictures. In exercise 2 that dealt with the interpretations of animal tracks, the children wrote significantly more creative sentences than I could have imagined. One boy, for example, invented a story of a dinosaur highway that scientists found in Africa. Moreover, it was interesting to see that many children were convinced that their answers were the correct ones and tried to show their colleagues why their answers were incorrect. When I explained to them that answers in scientific research were never entirely undisputed and that various theories could exist for the same findings, many students became more interested in their colleagues' responses and started to write down their answers in addition to their own. For exercise 3, most students needed most time to answer the question. The task included matching the terms in their booklets with the pictures provided, but as most terms were entirely new to them, it took some time until they had grasped their full meaning and could match the pictures with the categories correctly. Nevertheless, my support was rarely needed, as the number of children working on that exercise was always rather high. Additionally, the collaborative support of their peers worked surprisingly well when taking into account that most children had only known each other for two weeks. The students who had already worked on the pictures for quite some time

explained to their colleagues what to do and what they had already discovered. The last exercise might have been slightly too challenging for some of the students. The pupils were required to apply the concepts from exercise 3, but as these concepts had not been discussed in class yet, students seemed to find it difficult to establish links between the theoretical concepts and the picture in exercise 4. Their answers were therefore rather short and the majority of the students used less than three possible ways of fossilization in their responses.

Even though all students worked quite continuously on their booklets, their pace differed noticeably again as it was already the case when copying the definitions from the PowerPoint slides in the beginning of the lesson. The students still had 25 minutes of the lesson left when the fossil booklets were handed out. The majority of the children was also able to finish the exercises in time without having to rush. However, five children asked me at the end of class whether they could still have time during the following lesson as their booklets were still not complete. Together with the teacher of the class, we finally agreed on giving them time to finish the exercises while comparing the booklets at the beginning of the following lesson. In general, I would not have thought that the PowerPoint presentation and the fossil booklet activities would require the entire lesson. In the same vein, I would not have imagined that there would therefore be no time for students to create their own fossils as planned in advance. However, the teacher told me afterwards that more exercises were barely possible in one lesson, as some time was always needed for administrative issues, especially in the beginning of the school year.

Two students in class did not speak German that well and I thus attempted to pay particular attention to their progress. Due to their lack of German skills, the classroom setting could be compared to the one in a CLIL classroom. During the first part of the lesson these two students remained rather silent and solely participated by raising their hands during the voting of the guessing game. As the students were all new to me, it was difficult to determine whether they were only shy or did not understand the questions that well. During the fossil booklet activities, I noticed that they had difficulties answering the questions, especially in the case of exercise 2 and 4, as these exercises required productive skills and no example sentences were given. Even though I offered them my support, I soon noticed that they talked more among each other when I was not standing close to them and that also other students would explain the answers to them in greater detail without me being present. This is to say, the two students facing conditions comparable to CLIL participated less than other students during classroom activities, needed more private time without a teacher being present and had to be frequently supported by their colleagues in order to finish the exercises.

However, overall, the students' regular teacher and I agreed that the lesson was successful as students had been introduced to the topic of evolution. Additionally, they had become familiar with the process of fossilization as well as with different types of fossilization. They had all worked autonomously and most of them could finish the tasks before the end of the lesson.

9.2.2. CLIL class: 1st lesson (14/09/2016, 9.55-10.45)

The first lesson in the CLIL class, 3D, took place on the 14th of September 2016 in the third lesson from 9.55 till 10.45 and started in a similar way to the one in the control class. Even though the lesson was in the students' own classroom and thus the lesson could start on time, their teacher had to take care of administrative issues before the actual teaching could begin. In addition, the projector did not work in the classroom, although the teacher had checked it the day before. For this reason, the CLIL session started with a ten minutes delay and without the prepared PowerPoint presentation. First of all, I introduced myself and told the children why I was there. This was done in German, as I did not want to overwhelm them with the new situation. When I told them that the following two lessons would be in English, several students looked rather intimidated and one boy even asked me why we could not talk in German instead. After assuring them that their English would not be assessed and using a mix of English and German was not only allowed but even desired, the students looked more content and there were no more doubtful questions. The questionnaire was also in German for this class as I did not want language barriers to have an effect on the results. Students finished it quite quickly, and there were only some who wanted to know whether the survey was anonymous or not

After this first part in German, the actual CLIL lesson started. As soon as I switched to English the children stopped talking and it became rather silent in the classroom. I drew a bacterium, an arrow and a human being on the blackboard and while explaining to them in quite easy words how the offspring of this bacterium might have changed over billions of years, many of the pupils became surprisingly talkative mixing English and German words to answer my questions and add information that they had heard about the process of evolution before. Even though it was difficult during the first few minutes to determine whether the vocabulary and structures I used were appropriate, their responses and especially their facial expressions made it relatively easy to adjust my English to their needs. Due to the technical problems with the projector I was forced to use the blackboard for all of my explanations, which entailed various advantages, as I could draw words on the board that children did not understand or write down difficult words. Thus, I am convinced that working on the

blackboard might be the better option in CLIL settings, even though it is impossible to say whether students from the German control class might have profited more from working on the blackboard as well. The only issue when using the blackboard was the guessing game that I had prepared on the slides. As I could not show them the tree of life or the pictures the game had to be left out and the introduction was thus noticeably shorter than in the German control class. However, as I was convinced that the CLIL students would need more time than the German class due to the language barrier, I decided to hand out the booklets earlier than planned.

Similar to the control students, the majority of the pupils in the CLIL class started to work on the first exercise as this one was apparently the easiest in the booklet. The matching worked out well and the number of students with the correct order was equally high as in the other class. Even though the children had been rather sceptical about using English in biology in the beginning of the lesson, they now always tried to talk to me in English when they wanted me to correct their order of the fossilization process, for example. As they were only in their 3rd year of regular, secondary school English education, I was surprised that the transition from being slightly intimidated to eagerly speaking English would be that fast. Moreover, I noticed that some became highly motivated in avoiding the use of German words, even though I had encouraged them to mix the languages to ease the talking process. They used gestures, pointed at items or even tried to paraphrase the words. This is an example of such a conversation with two boys working on the first exercise:

> Boy 1:This is correct or? (pointing at two pictures)
> Boy 2: But here is bigger and then little sand (making gestures that showed the thickness of the soil layer)
> Me: Yes you're right, the layer of soil (pointing at the picture) is thinner here, so this must have been later.
> Boy 1 to boy 2: Da hab ich Recht gehabt, das stimmt! (translation: I was right, that was correct)

However, amongst one another the students talked in German most of the time. As this was their first CLIL lesson, speaking in one's own language with one's peers can probably be considered as normal and understandable.

As especially exercises 2 and 4 had been difficult for the non-natives in the German class the day before, I had added phrases that students could use for writing their sentences in the booklet in the case of exercise 2 and 4. Nevertheless, these exercises proved to be more challenging for the students than expected. In the case of exercise 2 many children only matched the phrases with the pictures instead of formulating grammatically correct short

sentences. I would have liked to explain to them why they had to change the form of the verb, but as there were constantly students from other exercises who also needed support this was unfortunately not possible. Moreover, as the students focused primarily on matching the correct sentences instead of finding their own explanations, they did not reflect on the reasons why other colleagues might have interpreted the pictures differently, as most students in the German class did. To encourage such a discussion, it would have been better not to provide them with fixed phrases. However, this would have exceeded their language skills, as they lacked appropriate vocabulary and grammatical structures for the task.

Exercise 3 worked better than exercise 2, but the students faced problems in understanding the concepts in the booklet and thus the number of correct answers was significantly lower than in the control class. Even though I had tried to use as much scaffolding as needed to clarify the concepts, I noticed that most students did not have the needed skimming skills. In the case of the ‘external mold’, for example, I had provided the German translation 'Abdruck' in the information to ease the process of finding the correct picture. However, a noticeable number of children stopped reading the text when not understanding the first words. As soon as I had advised them to actively look for key words that were easier to understand in the paragraphs they managed to find the correct answers. So, similar to the second exercise, CLIL students needed more support and more time to reach the aims of the exercise compared to the German control class.

Due to the increased amount of time needed for exercises 1 to 3, many children left out the last exercise. Those who managed to do all four exercises found this one quite challenging as well. Even though there was a sample sentence provided, the amount of new words was still slightly too high to be able to finish the task correctly. Nevertheless, the children became quite eager at this point in terms of forming sentences and some proudly presented me their results.

As most of the children could not finish the booklet and comparing the results in the following lesson as planned in the control class would have taken too long, the biology teacher thankfully offered to let me continue the work on the fossil booklet after my two hours project. In this way, I had the time to try out the game that I had planned for the following lesson without having to rush. In total, there was only one girl who finished her booklet earlier in the CLIL class, while more than half of the German control class was able complete the exercises within the allocated time. Hence, in terms of subject-related learning outcomes, the CLIL class could not reach the level of the control class. However, one has to consider that this was the students’ first CLIL lesson and that they were not used to working

independently on English tasks. In addition, CLIL teachers who teach their students on a regular basis will face fewer difficulties in knowing the pupils' vocabulary, grammatical abilities and reading skills. Nevertheless, even experienced CLIL teachers who know their classes might struggle with creating appropriate materials on fossilisation for a 7th grade due to the complexity of the topic. As such, other topics might be more suitable for a CLIL lesson in lower secondary education.

9.2.3. Control class: 2nd lesson (14/09/2016, 7.55-8.45)

The second session in the control class also took place on the 14th of September 2016 within the first lesson from 7.55 till 8.45. This lesson was conducted in the students' classroom, thus we could start on time. At first we compared the fossil booklet together and the students who could not finish theirs had the time to fill in the missing information. The children were well-behaved and the participation of the majority was high, therefore the comparing took only 5 minutes. Afterwards, I introduced the selection game to them and even though I had been worried that they would find the game too childish, all of them were highly motivated. They quickly moved the tables, sat down on the floor and tried to stay quiet to listen for further instructions. In the meantime, I prepared the PowerPoint Presentation and handed out the paper animals, called 'Selectis'. During the game one could see that the children were having fun. They laughed several times, frequently participated and tried to be as fast as possible whenever they had to perform a task.

It took the students a while to calm down again after the game, but as soon as it was quiet again I could explain the questions that were on the last slide of the PowerPoint presentation and they worked eagerly in groups of two. The students had 15 minutes until we started to compare the answers. The first two questions dealt with observations made during the game and many children raised their hands as they wanted to tell me their answers. The last question, however, was noticeably more challenging. The students were unsure whether one could design an animal that could live forever and thus I chose three groups that should present their animals. The rest of the class should then try to find factors that could still lead to the extinction of these animals. Almost all the groups wanted to present their animals and as soon as the first group had finished their short presentation, the others became highly creative and started to think of scenarios that could lead to extinction. The more animals that were presented, the more students were convinced that finding an animal that would live forever was impossible. As all students were highly motivated and wanted to continue with the presentations, two more animals were analysed. After the game, I wanted them to describe the process of selection in general without focusing on the paper animals from the game. I

asked them several questions to find out whether they had understood the process of selection and their responses showed me that they could name all the crucial characteristics of Charles Darwin's selection which was the aim of the lesson. In the remaining 10 minutes, the students then filled in the second questionnaire. When I went out of the classroom I heard a group of four boys still talking about selection, thus the game must have truly aroused their interest. One might posit that the game will therefore probably stay in their memory for a longer period of time.

To conclude, the lesson was highly successful in terms of the subject-specific goal. Most students seemed to have understood the process of natural selection and the individual factors that can lead to a change in animals' development.

9.2.4. CLIL class: 2nd lesson (16/09/2016, 10.50-11.40)

The second CLIL session in 3D took place on the 16th of September, 2016 in the third lesson, from 10.50 till 11.40. When the lesson started, the biology teacher still had to finish some administrative issues again as the class was going on an excursion the following day. My teaching time then started 5 minutes after the bell had rung. As already explained the teacher had offered me to compare the results of the fossils booklet in a separate lesson, thus I started with the game immediately. This time I already knew their English level and hence adjusting my speed and vocabulary to their needs seemed easier than the first time. When I told the class that I had prepared a game, they appeared to be even more excited than the German control class and one boy said that he had never played a game in biology before. I used basic vocabulary, gestures and repetitions for explaining the game and giving them first instructions. Moving the tables and handing out the paper animals worked as well as in the other class and as soon as all pupils were on the floor I started the PowerPoint presentation. The story that I told them during the game did not require sophisticated vocabulary and so although the instructions were in English, the CLIL students seemed to understand the game as well as the other class. Moreover, the pictures and my gestures seemed to ease their understanding noticeably. They were as quick in finishing the tasks they had to perform with their paper animals as the German class and seemed to have even more fun than their German counterparts, as they laughed almost all the time. Sometimes it was difficult to keep the noise level down, but overall the game was highly successful.

After the game, the CLIL students were asked to answer the same questions that I had used in the control class, and to do so with their neighbours. The students worked eagerly in their teams, and even though I had told them that they could write down complex ideas and vocabulary in German as well, almost all of them wrote in English only. In the meantime, I

walked around and answered questions that were primarily related to vocabulary. Similar to the first lesson, the students tried to talk solely in English with me and used paraphrasing or new word creations to make themselves understood. One girl, for example, asked me if it was correct that the bird's *grow* changed over time, meaning the bird's size. It was also interesting that several students wanted to show me their sentences. Furthermore, one could feel that they were proud of their results. The comparing of the first three questions was faster than expected. The participation was as high as in the other class, even though some students had difficulties in expressing their ideas. However, I supported them with vocabulary and repeated their ideas slowly. IN this way, their colleagues were also encouraged to understand what they wanted to express. The fourth question was again the most challenging but also an exciting one. Even though I thought that there would be fewer students willing to present their animals than in the other class, the number of pupils volunteering was almost equally high. The students showed the rest of the class their pictures and explained to them why these animals could possibly live forever. It seemed as if their enthusiasm about their animals lowered their level of anxiety, as many students spoke more fluently than before. Some of the boys especially became increasingly talkative, vivid in their descriptions and used new vocabulary, such as 'explosion', 'meteorites' and 'acid rain'. As in the other class, due to time constraints, I had to finally interrupt the discussion as I wanted them to recapitulate the general principle of natural selection. However, this proved to be slightly more challenging in English, as the concept was rather complex and abstract. Thus, whenever I noticed that the explanations became overly difficult in English and the paraphrasing no longer helped, I included a German term as well. Hence, the students finally seemed to understand the concept, even though more time was needed than in the other class. Finally, the children had 8 minutes of the lesson left to fill in the questionnaire which all of them finished before the end of the lesson.

Overall, this lesson was significantly more successful than the first one. Even though students needed slightly longer to understand the generalizations that could be drawn from the game, they seemed to have grasped the content equally well as the control class. Moreover, as they participated more than in the first lesson and felt less intimidated, the students also profited from the session in terms of fluency.

9.2.5. Teachers' comments

As both teachers were rather short on time after the first lesson, I decided to prepare five quick questions that I could ask them while walking back to the staff room after the second lesson. The questions were partially based on the ones that the students were asked in the questionnaire to be able to compare the teachers' perspectives to the students' attitudes:

1) Was the participation of the children different from normal biology lessons?
2) How would you describe the classroom climate during the project and the extent to which it differed from the usual climate in your lessons?
3) Would you say that the materials for the project or the teaching in general was too challenging, appropriate or too simple for the students?
4) In terms of subject-related output: would you say that you normally teach more or less in an average biology lesson?

The first question was difficult for the teachers to answer as the classes were always newly formed after the second year and received other teachers in most subjects as well. Therefore, the majority of the students was new to the teachers and they had only taught them for two weeks. However, the teacher of the control class told me that she knew two of the students from the previous two years and that they had participated in a similar way as compared to in her own lessons. The teacher of the CLIL class named some students whose participation was particularly high during the project and told me that these students had behaved similarly in her previous lessons as well. Hence, both teachers could not see a significant difference between the participation rates during the project and the usual lessons.

The classroom climate was also described in comparable ways. The teacher of the control class found the climate relaxed and more experience-oriented. She explained that her lessons were normally more focused on texts and exercises in the books or on worksheets than on games or self-created booklets. The teacher of the CLIL class answered similarly. She also noted that the lessons were more relaxed and that the teaching style differed from her own as she also used frontal teaching more frequently.

The third question was the first one that was answered differently. While the teacher of the control class said that although the children had clearly liked the material, they could have been slightly more challenged, the teacher of the CLIL class responded that the material had had the right level. In her opinion, some of the exercises had been challenging, especially when taking the language barrier into account, but these difficulties had only encouraged the students to work more thoroughly. Both teachers added that the materials were designed in a highly appealing way and that especially the self-made paper animals for the game in the second lesson turned the lesson into a highly enjoyable one. However, the teacher of the control class mentioned that she could not imagine preparing such elaborate material for all

the lessons as she had to teach up to eight hours every day.

In the case of the last question. the responses differed slightly again. The teacher of the German class said that she often had to cover more information within 50 minutes due to the curriculum. However, she was convinced that the students also needed time to experience something new instead of reading texts or working on exercise sheets. Furthermore, she thought that students would remember these situations better than others. The teacher of the CLIL class found this question more difficult to answer. In her opinion, the amount of information covered in a lesson highly depended on the topic. As evolution was a new topic more input might have overwhelmed the students. She had the impression that the students had fully grasped the ideas behind the process of natural selection and this should be the goal of an introductory lesson like mine. Thus, for this lesson she found the input more than sufficient, but once the children were familiar with the topic, she would usually try to cover more in one session.

To conclude, according to the teachers, the children they knew participated eagerly in either class and the atmosphere in both situations was similarly described as relaxed. According to the teacher in the control class the lessons could have been even more demanding, while the teacher of the CLIL class found the material challenging enough, especially due to the language barrier. Finally, while the teacher in the control class claimed that she taught more in a normal lesson than during the project, the teacher of the CLIL class found the amount of input and output appropriate for the first lessons of a new topic. As every teacher probably has her own teaching style, it is hard to say whether the differences in their responses are relatable to the language or are simply the result of their individual teaching styles and perceptions. The students' self-perception might shed more light on the matter.

10. Results of the evaluation

The following chapter will now present the results gained over the course of the teaching project in BG/BRG Perchtoldsdorf. While the first section will show significant differences and tendencies that were calculated by the program SPSS in greater detail, the second section will briefly outline the non-significant results from the remaining survey questions. Afterwards, significant correlations between students' answers and their mother tongues, their gender and their grades in English and biology will be described. Finally, the last subsection will be used to report findings from questions 10 and 11 that could not be analysed with SPSS.

10.1. Significant results

When comparing the CLIL classes questionnaires prior to the project with the ones that were handed out at the end of the last session, several significant changes could be detected, as shown below.

10.1.1. Students‘ overall attitude towards the project

In question 3, differences between the students' initial answers and their responses after the project were statistically significant in the CLIL class (p=0.001), demonstrating that students were more positive about CLIL after the project. Even though many of them had been quite sceptical in the beginning, they indicated that they had enjoyed the CLIL lessons afterwards. The average thus changed from 2.28 to 2.8 out of 3 possible points. In the control class the shift towards a more positive attitude was not significant (p=0.17), even though the mean also rose from 2.77 to 2.93. This shows that students also appreciated the project slightly more than their regular lessons. Additionally, the German class' results indicate that they had a more positive attitude from the beginning onwards. Figures 26 and 27 visualize the results from question 3.

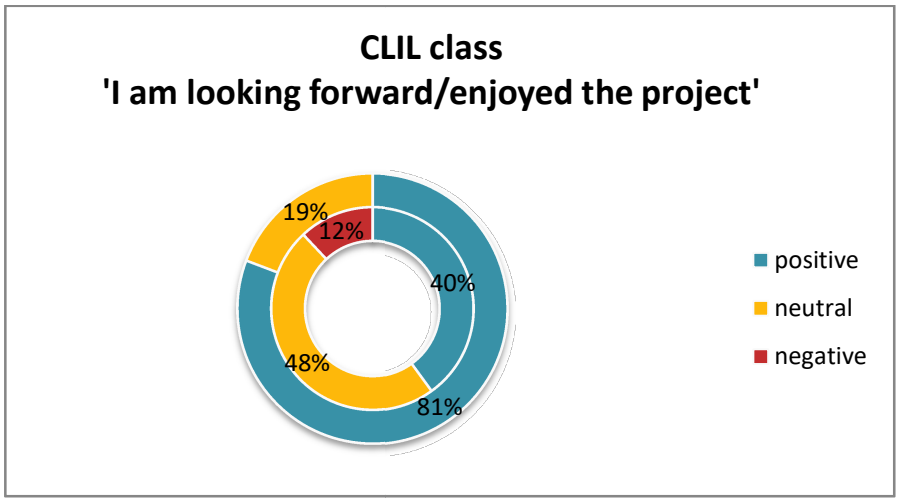

Figure 26: CLIL students' overall attitude towards the project (3)
inner ring = students' answers before the project
outer ring= students' answers after the project

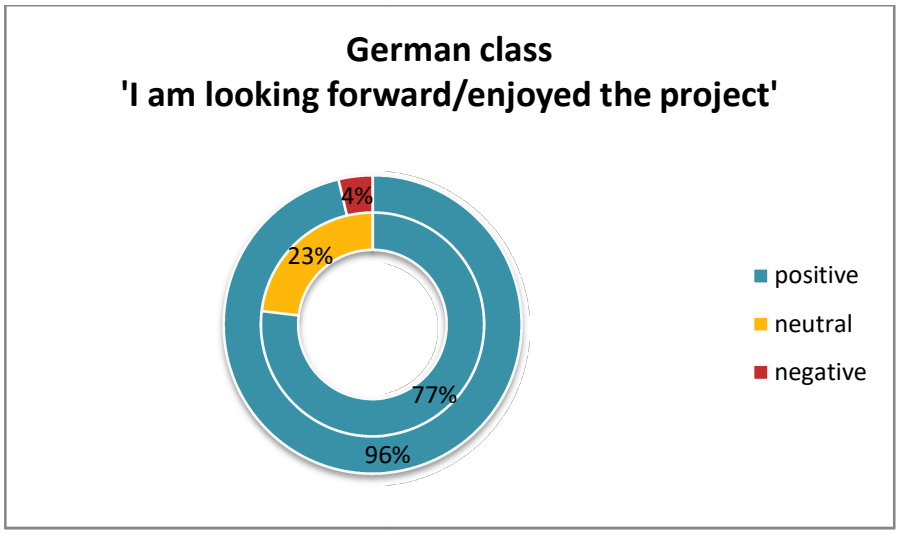

Figure 27: Control class students' overall attitude towards the project (3)
inner ring = students' answers before the project
outer ring= students' answers after the project

10.1.2. Degree to which students feel overwhelmed

In question 9a/10a, dealing with students feeling overwhelmed during the lessons, a significant difference (p= 0.003) between students' responses before and after the project could only be found in the control class. Even though the control class's usual biology lessons were already perceived as barely or never overwhelming in most cases, the pupils found the lessons during the teaching project even less challenging. The mean thus changed from 3.98 to 4.67 with 5 points equalling a complete lack of feeling anxious. In the CLIL class, the level of feeling overwhelmed remained similar to the students' usual biology lessons (p=0.92) and English lessons (p= 0.50). In their regular biology lessons, the mean was 4.20, while in their English classes it was 4.04. Students' anxiety during the teaching project was 4.23 on average. Visual comparisons between students' initial and final answers in the questionnaire are presented below. Interestingly, figure 30 shows that the number of students never feeling overwhelmed in CLIL lessons was considerably higher than in regular English lessons. However, the percentage of students feeling barely overwhelmed decreased and 4% of the students even felt overwhelmed very often, an answer that was never chosen in the English lessons' rating.

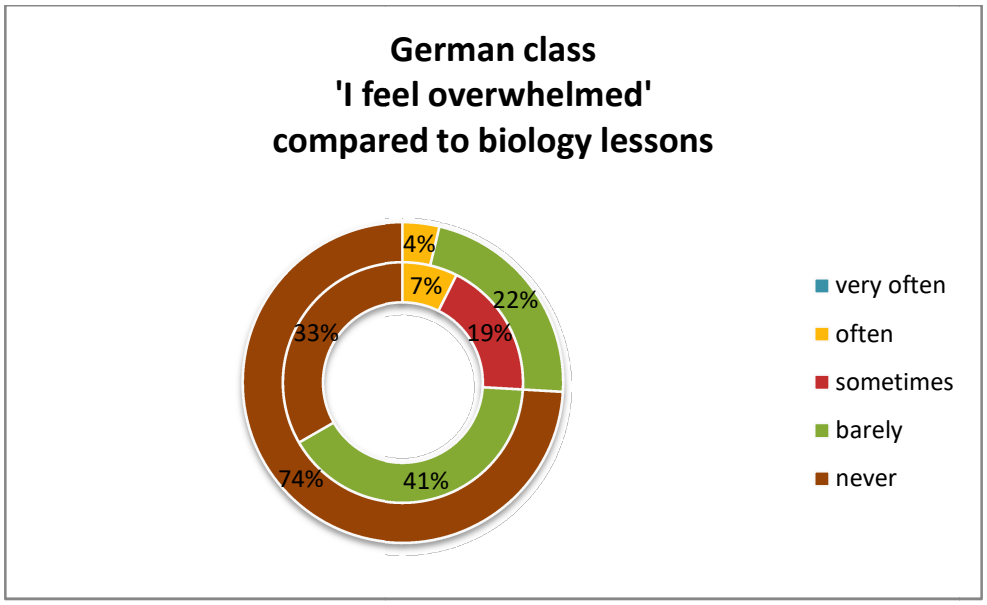

Figure 28: Degree of feeling overwhelmed: usual biology lessons compared to the project in control class (9a)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

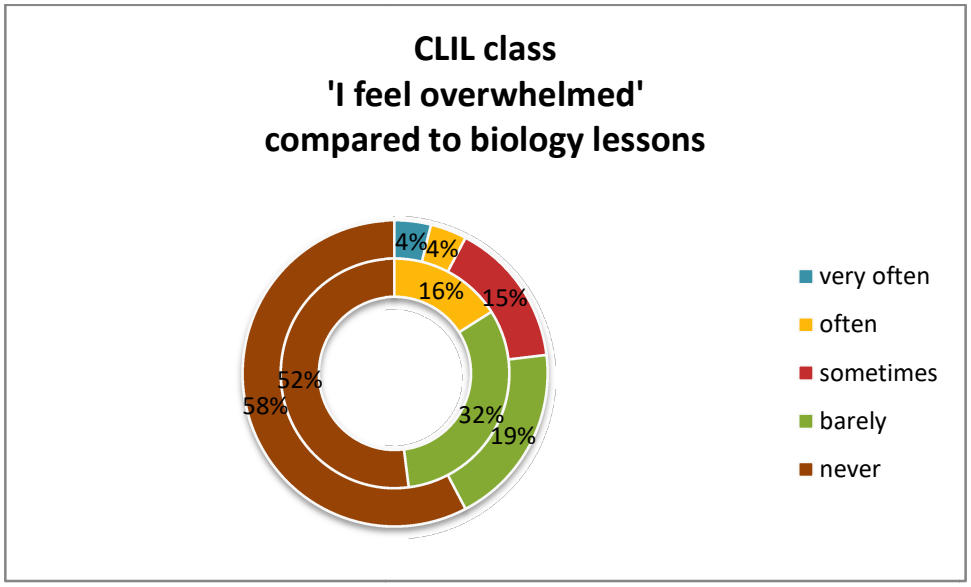

Figure 29: Degree of feeling overwhelmed: usual biology lessons compared to the project in CLIL class (9a)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

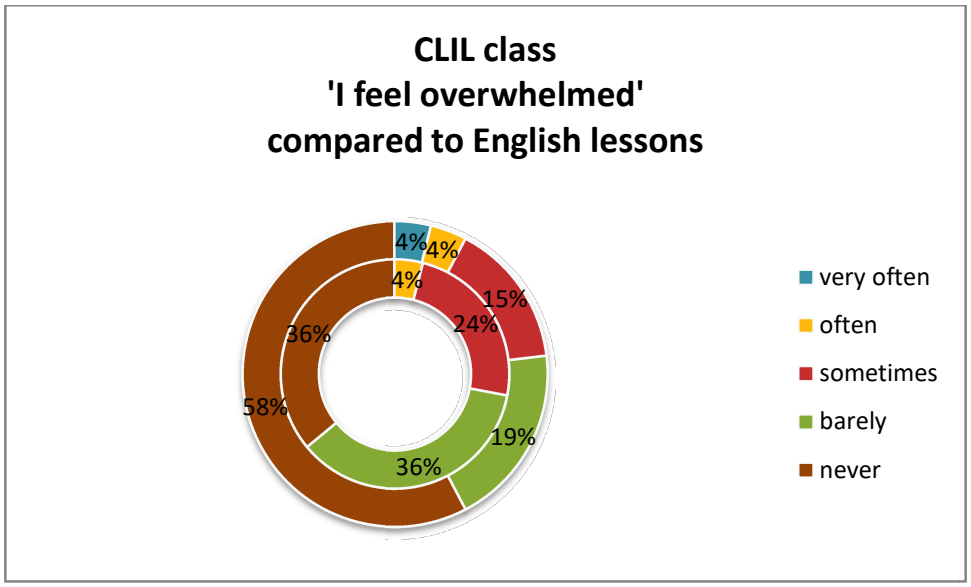

Figure 30: Degree of feeling overwhelmed: usual English lessons compared to the project in CLIL class (10a)
inner ring = students' answers before the project concerning their usual English lessons
outer ring= students' answers after the project concerning the project

10.1.3. Students' fear of making mistakes

In terms of students' fear of making mistakes (questions 9d/10d), a tendency towards less anxiety during the CLIL project than during regular English lessons could be found (p=0.08). The average, in the case of the English lessons, was 3.44, thus meaning that students sometimes felt anxious. The average of the CLIL lessons was 4.12, showing that students in CLIL lessons were barely afraid of making mistakes, even though the situation was entirely new to them. When comparing the CLIL students' level of anxiety in regular biology classes to their emotions in CLIL lessons, no significant tendencies in anxiety could be found (p=0.28). These results contrast with the control class' answers. In this class, the difference between students' anxiety in regular biology lessons and during the project was significant, with students feeling less anxious during the project (p= 0.04). While CLIL students felt more secure during the project than in their regular English lessons, students from the control class felt more comfortable than in their regular biology classes. The graphs show students' answers in relative numbers.

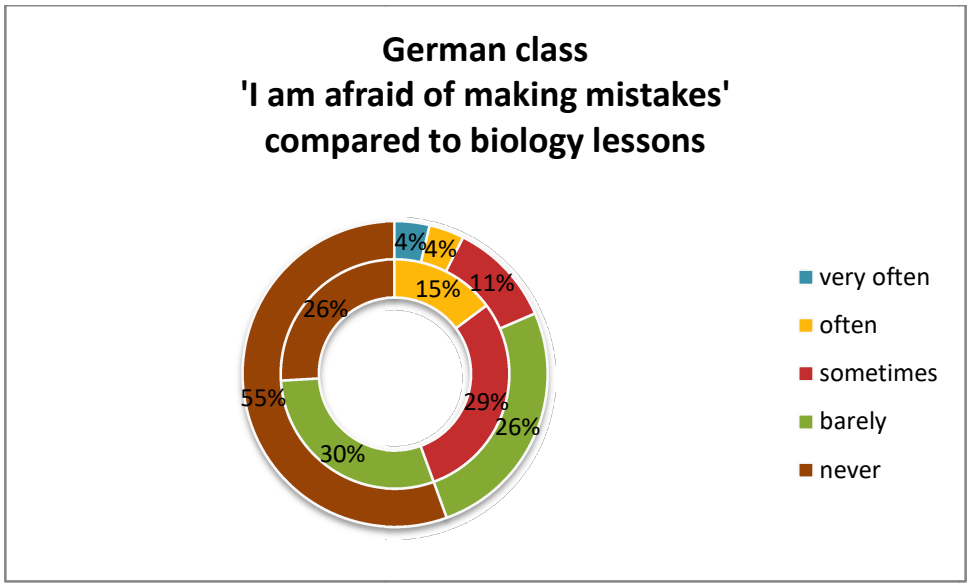

Figure 31: Degree of feeling afraid: usual biology lessons compared to the project in the control class (9d)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

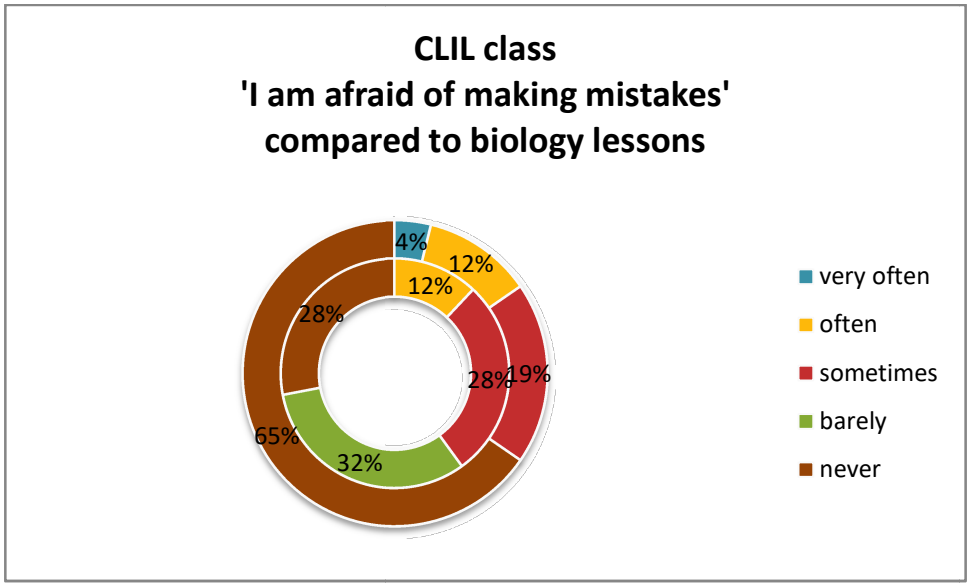

Figure 32: Degree of feeling afraid: usual biology lessons compared to the project in the CLIL class (9d)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

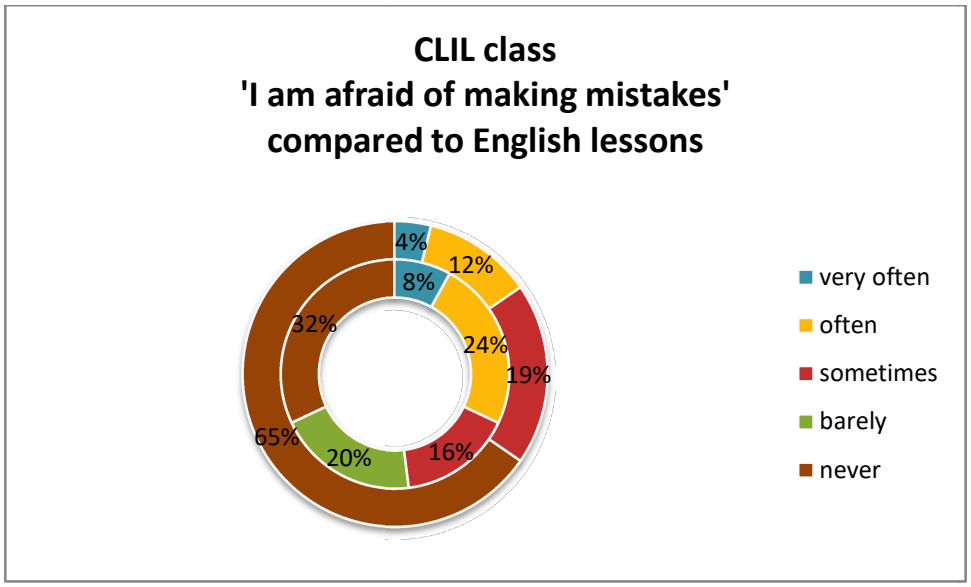

Figure 33: Degree of feeling afraid: usual English lessons compared to the project in the CLIL class (10d)
inner ring = students' answers before the project concerning their usual English lessons
outer ring= students' answers after the project concerning the project

10.1.4. Students' perception of the atmosphere in class

Question 9e/10e, addressing students' impression of the atmosphere in class during their usual lessons and the project, led to a highly significant result in the German class (p= 0.002). This shows that students found the atmosphere during the project more appealing than their regular biology lessons. While the mean was 2.24 in the initial survey, it rose to 1.57 during the project with 1 being the highest rating. In contrast, results in the CLIL class remained comparable to students' ratings of their biology classes (p= 0.68) and English classes (p= 0.90) with a slight shift towards a more positive perception of the atmosphere during the project in both cases. The mean was 1.88 in regular biology lessons and 1.80 in usual English lessons. The mean of the project was 1.77. Figures 34, 35 and 36 illustrate the results.

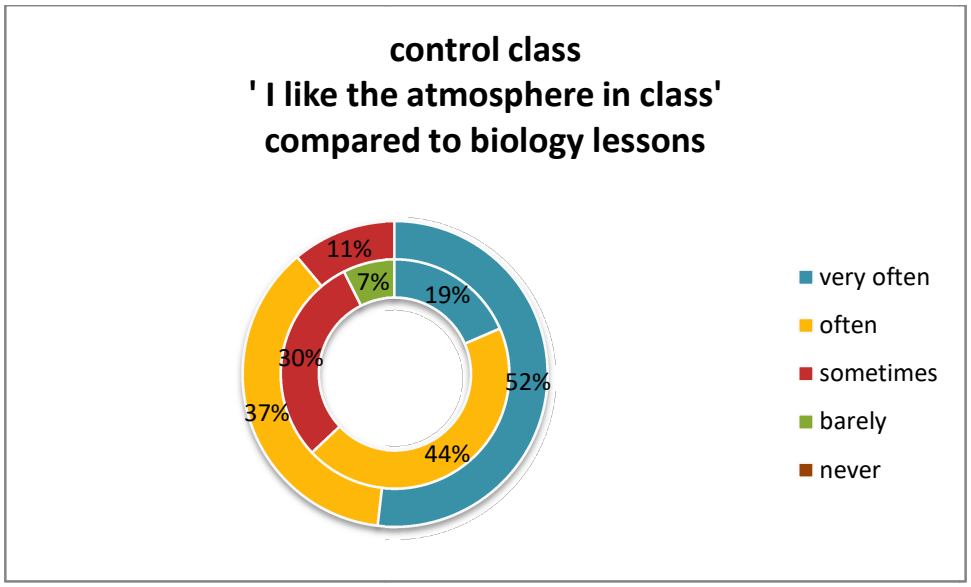

Figure 34: Impression of lessons' atmosphere: usual biology lessons compared to the project in the control class (9e)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

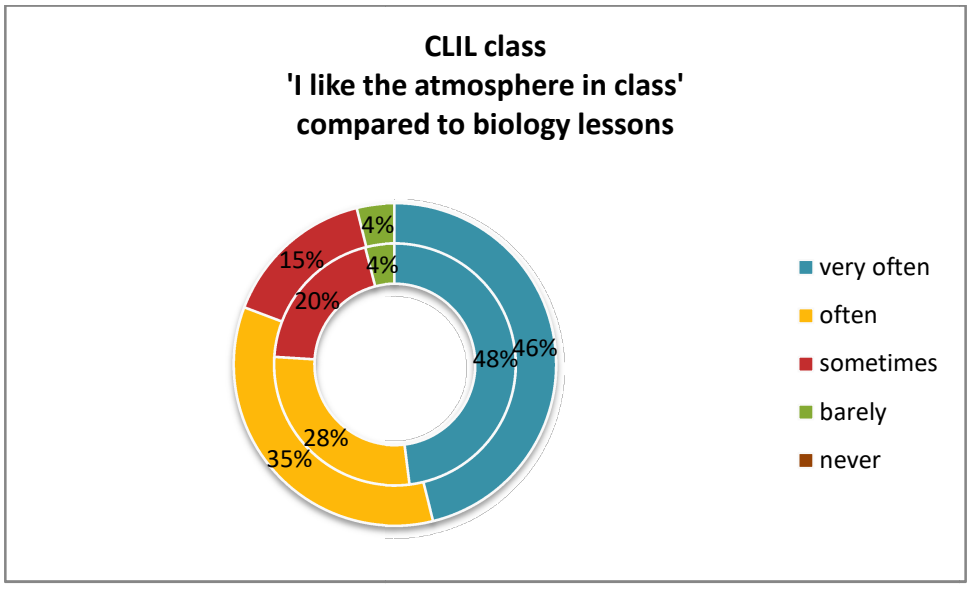

Figure 35: Impression of lessons' atmosphere: usual biology lessons compared to the project in the CLIL class (9e)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

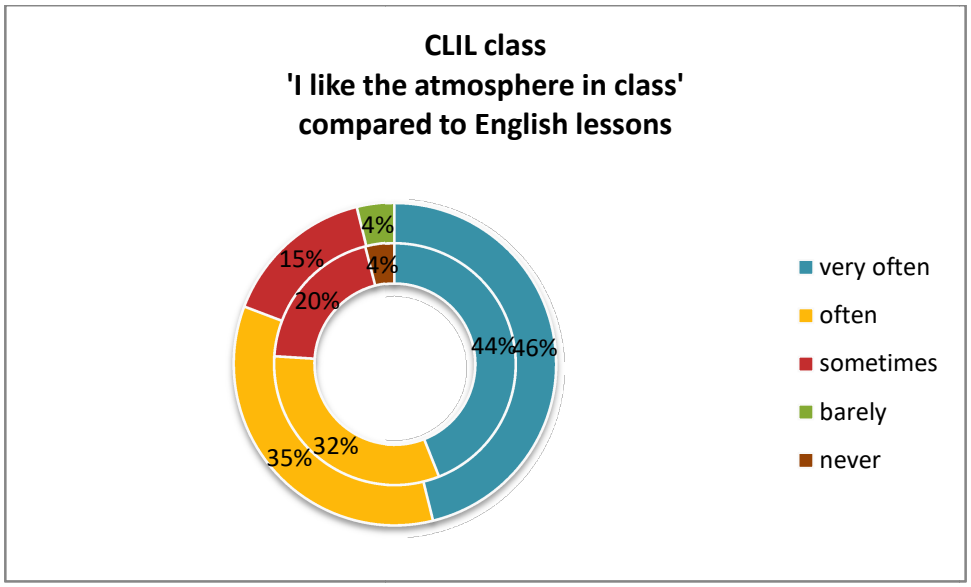

Figure 36: Impression of lessons' atmosphere: usual English lessons compared to the project in the CLIL class (10e)
inner ring = students' answers before the project concerning their usual English lessons
outer ring= students' answers after the project concerning the project

10.1.5. Students' perception of the materials

In addition, trends towards significant results were detected when examining pupils' perceptions of materials used in class (questions 9f/10f). In the CLIL class the significance level was p=0.1. The first survey displayed that CLIL students found the materials used in their regular English lessons fairly easy, as the mean of 2.20 out of 5 possible ratings with 1 being the highest rating showed. However, the ratio of students perceiving the CLIL materials as easy to understand was even higher with an average of 1.69. This significant trend could again only be found when comparing the CLIL lessons with the students' regular English lessons. The results of the students' regular biology lessons did not differ as noticeably from the ones of the CLIL lessons, as the mean solely shifted from 1.76 to a more positive 1.69 (p= 0.80). However, a significant tendency could be found when investigating the control class' perceptions (p= 0.10). The average was 2.0 in the case of students' regular biology classes, while the materials were rated with an average of 1.59 in the CLIL project. These results stress that students from the control class found the materials from the teaching project better to understand than the ones from their regular biology classes. In general, these outcomes show a similar trend as in the previous paragraph. While CLIL students rated the project's materials considerably higher than those from their English lessons, students from the control class understood the project substantially better than their regular biology class. Results are illustrated in graphs 37, 38 & 39.

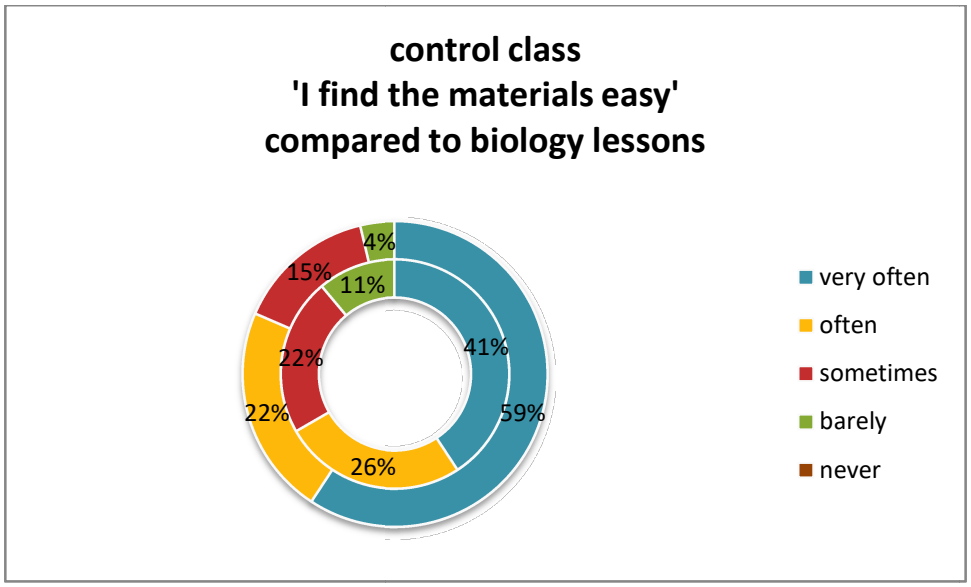

Figure 37: students' perception of the materials: usual biology lessons compared to the project in the control class (9f)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

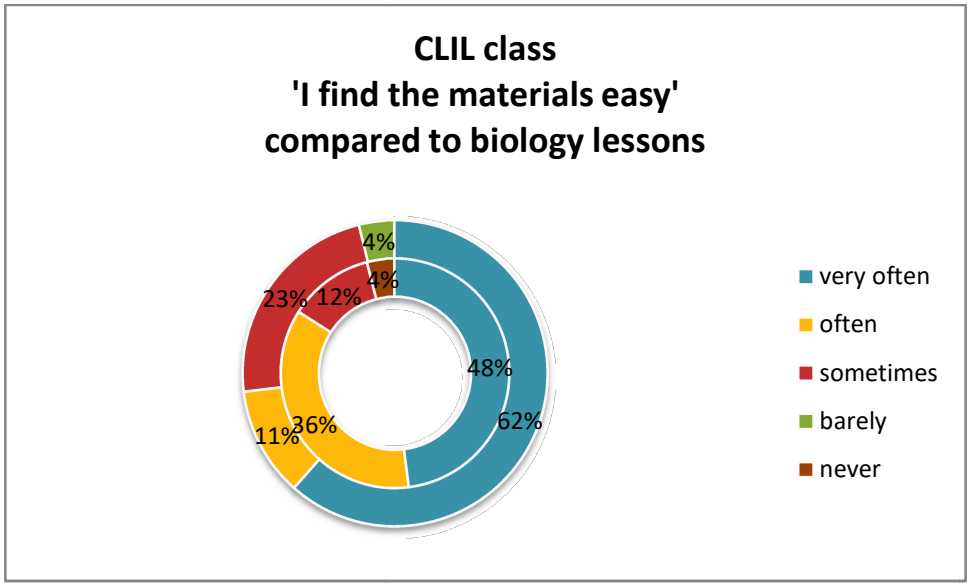

Figure 38: students' perceptions of the materials: usual biology lessons compared to the project in the CLIL class (9f)
inner ring = students' answers before the project concerning their usual biology lessons
outer ring= students' answers after the project concerning the project

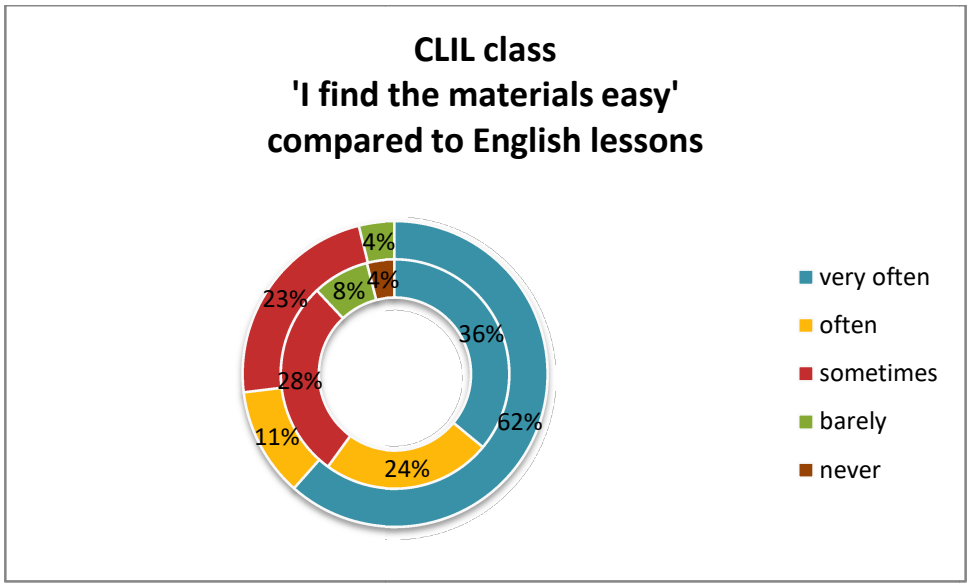

Figure 39: students' perceptions of the materials: usual English lessons compared to the project in the CLIL class (10f)
inner ring = students' answers before the project concerning their usual English lessons
outer ring= students' answers after the project concerning the project

10.2. Non-significant results

In questions 4, 5, 9b/10b and 9c/10c, no significant changes could be detected in either class. Nevertheless, the results will be of importance for the following discussion. Due to the lack of significant developments, tables showing the means of the questions will be used instead of more detailed charts as used in the previous section.

Questions 4 and 5 dealt with students' perceptions of progress concerning their English and biology skills through CLIL in order to investigate whether the CLIL students perceived CLIL as more effective after experiencing it themselves. In both surveys of the CLIL class and the control class, the answers remained quite sceptical and means clearly remained below the 3 points level equalling being entirely convinced of the progress through CLIL. In the CLIL class the average rate in question 4 was 2.28 in the beginning and 2.35 after the project. In question 5 means were similar with 2.24 before and 2.35 after the CLIL lessons. In the control class, results also remained fairly unchanged. In question 4 the average was 1.85 before and 1.7 after the project. In question 5 students' responses were 1.72 in the first and 1.80 in the second questionnaire, as shown in table 3.

Table 3: Means of questions 4 & 5 before and after the project (CLIL class vs. control class)

	CLIL class		Control class	
	before	**after**	**before**	**after**
Q4: English progress through CLIL	2.28	1.85	1.85	1.70
Q5: biology progress through CLIL	2.24	2.35	1.72	1.80

In questions 9/10b students were asked about their interests in the topics. Question 9/10c addressed their willingness to participate. In the first survey they rated their regular biology lessons, in the second the project. Question 10 was only part of the CLIL students' first survey and was formulated identically to question 9 but required students to describe their interest and participation in terms of their regular English lessons. In all of these questions students' results concerning the project were slightly better in both classes than in their regular lessons. In question 9b dealing with students' interest in the topics the mean changed from 2.00 to 1.85, with 1 being the highest rate this time. A comparably positive development could be observed in the control class with a shift from 2.07 to 1.75. Results in 9c, 10b and 10c showed similar minor shifts, as outlined in the table below.

Table 4: Means of questions 9/10b & 9/10c before and after the project(CLIL class vs. control class)

	CLIL class		Control class	
	before	**after**	**before**	**after**
9b: interest in the topic (biology class vs. project)	2.00	1.85	2.07	1.75
9c: students' participation (biology class vs. project)	1.88	1.77	2.19	1.80
10b: interest in the topic (English class vs. project)	2.16	1.84	---	---
10c: students' participation (English class vs. project)	1.80	1.77	---	---

10.3. Correlations between results and students' L1s, gender and grades

10.3.1. Languages

When investigating the data of the CLIL class students having German as their only L1 in isolation from the ones of their colleagues with other L1s, significance rates differed. First of all, analyses with SPSS showed that German students had enjoyed the CLIL lessons significantly more than they would have thought in the initial survey ($p= 0.004$). Students with L1s such as Polish, Russian or Spanish in addition to German did not change their view

on CLIL that strongly with a significance level of solely p= 0.21. Another significant trend was found in question 10d dealing with students' fear of making mistakes. Learners speaking solely German at home were significantly less afraid of making mistakes during the project than in their regular English lessons (p= 0.07). In comparison to this, students with other or multiple L1s did not show significant changes (p= 0.48). Overall, none of the multilingual speakers' results was significant or showed significant trends.

In the control class, significant tendencies could also solely be found in the sample of monolingual speakers. However, different questions showed significant trends. First of all, question 9a showed that German students from the control class felt significantly less overwhelmed during the project than during usual biology lessons (p= 0.001). Moreover, they seemed to feel less afraid (p= 0.06), as the significance level in question 9d shows, and preferred the atmosphere during the project more (p= 0.002). Lastly, monolingual German L1 speakers found the materials easier than in regular biology lessons (p= 0.09).

10.3.2. Gender

Both female and male students' answers concerning the extent to which they had enjoyed the CLIL project were statistically significant, with a significance level of p= 0.02 regarding the boys and p= 0.01 in the case of the girls. This quite clearly demonstrates that both groups liked the project. However, results of questions 9c, 10d and 10f differed noticeably between the two groups. Question 9c showed that girls from the CLIL class tended to participate more willingly during the project than in their regular biology classes (p= 0.06). On the other hand, boys were shown to be considerably less afraid of making mistakes in CLIL than in their regular English lessons (p= 0.07). In addition, results of question 10f showed tendencies towards female students finding the materials used during the CLIL project substantially easier to understand than in their English classes (p= 0.10).

In the German class, several answers were significant regarding gender as well. Both boys and girls were significantly less overwhelmed during the project than during their usual biology lessons, as can be seen by the significance rate of 0.03 in the case of male participants, and 0.04 in the case of female students. Another question that was significant in both groups was 9e, dealing with the classroom atmosphere. Boys (p= 0.03) and girls (p= 0.004) perceived the atmosphere during the project as more positive than usually. Additionally, boys from the control class were noticeably less afraid of making mistakes during the project (p= 0.05) and found the materials significantly easier to understand (p= 0.01).

10.3.3. Grades

In the initial survey, correlations between answers to questions and the CLIL students' English grades were rather rare except for question 3, dealing with the students' positive or negative attitudes towards the CLIL project before it had started (p= 0.06). CLIL students who had received the grade B in English at the end of the previous term were most looking forward to the lessons. Out of three possible points, the average in this group was 2.58. Another question that correlated with CLIL students' grades in the initial survey was 9a (p=0.04) asking students about their feelings of being overwhelmed in English lessons. Students with Ds and Bs perceived themselves as being least overwhelmed in regular biology lessons. When analysing students' English grades and their answers after the project, only question 5 was statistically significant. Children with As in English were most convinced that further CLIL lessons would not have a negative effect on their progress in biology.

In the control class several answers in the initial survey were significant. Question 4 addressing control students' perception of improving English through a possible CLIL project and question 9c focusing on students' participation in their usual biology lessons were significant with p= 0.02 in 4 and p= 0.04 in 9c. Students with Cs thought that CLIL could support their English most, whereas students with Bs in their last report most frequently indicated that they liked to participate in class. Moreover, question 9e dealing with students' perception of the atmosphere in class showed a tendency towards significance with p= 0.09. Students with As appreciated the atmosphere in regular biology lessons most. In the questionnaire after the two lessons, significance levels were different. Control students' interest in the topics and their willingness to participate (questions 9b and 9c) were significant with p= 0.03 and p= 0.02. In both cases, students with As felt most positive about the project. They were more interested and liked to participate more often.

Correlations between the questions and students' biology grades in the CLIL class exclusively existed previously to the project. In question 9a results were significant (p=0.02). It could be shown that students with Cs and As felt less overwhelmed than those with B's in their regular biology lessons. Question 10b including information about students' interest in the topics of their English lessons was also significant (p=0.01), showing that students with Cs in biology were most interest followed by students with Bs in their end of school report.

In the control class tendencies towards significant correlations before the project were found in questions 3 (p= 0.08) and 9b (p= 0.06) dealing with the degree to which students were looking forward to the project and their interest in the topics of regular biology lessons. In both cases, learners with As in their last final report were most positive about the two

questions. After the project questions 9b, 9c and 9e were significant. The significance level of p= 0.001 in question 9b shows that students with As were not solely more interested in the topics of regular lessons, but also of the project. The significance in 9c (p= 0.004) demonstrates that students with the best grades liked to participate more during the project. For 9e a significance level of 0.05 was calculated. Interestingly, the evaluation here shows that learners with Ds or As liked the atmosphere most. However, it must be noted that there was solely one student who had a D in biology in the last report and consequently the value of such results is highly limited.

10.4. Qualitative findings

Question 6 dealing with students' different types of motivations for learning English could not be analysed with SPSS, as numbers could not be assigned to the individual answers. Consequently, the total number of extrinsic and intrinsic responses was counted manually for both classes before and after the project. Students could tick more than one answer. Prior to the lessons, 22 answers of the CLIL students were intrinsic and 27 answers were extrinsic. The intrinsic responses were related to students' general interest in English or in the English classes, the extrinsic answers dealt with students' wish to succeed in their English exams and to have better job opportunities in the future. These results remained almost unchanged over the project as 23 answers were intrinsic after the project and 26 answers were extrinsic. However, it was rather surprising that students' answers in the control class underwent major changes. Prior to the project, half of the answers were intrinsic and the other half was extrinsic with 23 responses each. After the lessons, the number of extrinsic answers rose to 32, while the intrinsic replies decreased to 17. Therefore, even though these students did not encounter CLIL lessons, their motivations changed.

Questions 10 and 11 after the project could also not be analysed with SPSS as students were given space to write personal comments about aspects they had appreciated and parts they had not enjoyed during the project. In both classes, all students except for one filled in positive comments that were fairly similar among the CLIL and the control students. The most pronounced concordance between the two classes was their positive comments concerning the natural selection game. 13 students in the CLIL class mentioned that they had liked the game and 11 did so in the control class. Moreover, there were two students in each class who appreciated the interactive and innovative parts of the lessons, as well as the playful character of some of the tasks. In both classes, students also highlighted the autonomous exercises of the project, even though the number of students in the control class commenting on this aspect was twice as high as in the CLIL class with 4 answers. However, there were

also some clear differences between the answers, including for instance the fossil booklets. In the control class 7 students mentioned the fossil booklet in their positive comments, while no CLIL students listed this task. In contrast, a high number of CLIL students focused on language-related advantages of the project. While 7 children mentioned that they had liked using English in biology, 4 students commented more specifically on the newly learnt vocabulary. One of these students mentioned the relevance for his future profession, another student pointed out that the vocabulary had been comprehensible, even though it had been fairly difficult. Another student highlighted that she had learnt as much as she would have had in a regular biology lesson. In brief, positive responses were high in both classes and the majority of all students seemed to have enjoyed the game in the second lesson most. Differences occurred primarily in the case of the fossil booklet that only control students perceived as noticeably positive. CLIL students commented more noticeably on the positive language aspects of the project.

Besides these comments, 5 students in the German class and 7 in the CLIL class also mentioned aspects that could be improved. Even though there were some positive comments on the fossil booklet in the control class, three students also mentioned that they had not liked this task. Similar results could be found in the CLIL class. Additionally, two CLIL students mentioned that they had not been a fan of the topic ‘evolution’ in general. In the CLIL class two students added that they had not enjoyed mixing English and biology.

11. Discussion

This section serves the purpose of analysing the results presented in the previous chapter according to the hypotheses described in chapter 8.2. In order to support my arguments elements from the CLIL literature, my own experiences during the teaching project and the interviews with the two biology teachers will be taken into account as well.

The first hypothesis, saying that students in both classes will enjoy the teaching project, appeared to be true, due to the fact that both groups showed means close to the maximum number of points. Interestingly, results were solely significant in the CLIL class as students from this class had been quite sceptical about the project, whereas the majority of the control class was looking forward to the following two lessons right from the start. These results also fit with my own impressions described in the field notes. Even though I had not expected students to feel intimidated by using English in class, I repeatedly had to convince the CLIL students that their English was not assessed and that they could take risks and try out new structures. Asomazo Nuñez's results (2015: 115) show that this scepticism is not primarily linked to the students' young age and their relatively low English level, but occurs in other age groups as well. In his study Mexican university students also reported that they had been looking forward to CLIL, but had felt nervous and slightly scared in the beginning. With this being said, I believe that it is of high importance that teachers focus on developing a noticeably relaxed and supporting atmosphere during the first lessons, as students might feel more concerned about the use of a new language in class than one might expect. However, it is fascinating that the majority of the students ticked the smiling emoticon in the end, signaling that they had highly enjoyed the project. This rapid adaption to the new situation could be linked to the adequate challenge that Coyle, Hood & Marsh (2010: 29) view as crucial for students to enjoy a lesson. However, as students in the control class also highly appreciated the project, the enthusiasm might also mainly stem from the change in methodology that was not restricted to the CLIL class, but used in both classes. The lessons' interactivity and especially the game were named as most enjoyable in the surveys of both classes after the project. This might show that it is not primarily the language that led to a highly positive learning experience in both classes, but the different methodology that students appreciated most. Even though the methodology is certainly not restrictively bound to CLIL, activating students and providing them with 'multimodal input' (Dale & Tanner 2012: 15), for instance, are parts of CLIL's philosophy. As Mehisto, Marsh & Frigols (2008: 27) rightfully claim 'CLIL cannot be separated from standard good practice'. Therefore, by using interactive methods students in both classes could be fascinated which stresses the

importance of communicative and activating methods not solely in CLIL but in regular lessons as well.

Hypothesis 2, dealing with students' belief in improving their English skills with the help of CLIL, could not be verified, as students in both classes were rather sceptical about the idea of improving language skills through CLIL and did not change their opinion throughout the project. In this respect, the study deviates from results by Hüttner, Dalton-Puffer and Smit (2013: 275) which clearly showed that students are convinced of improving their English through CLIL. One of the major reasons for this dissimilarity is presumably the noticeable time difference. While Hüttner, Dalton-Puffer and Smit (2013: 273) interviewed 20 students who had experienced CLIL for one to almost five years, the students in my study only knew CLIL from the project. So, students might not yet have noticed benefits related to their language learning progress. Interestingly, students who took part in the CLIL project were slightly more positive from the beginning onwards, with a mean of 2.28 compared to 1.85 in the control class. Even though this difference might have various reasons, the most plausible explanation for me is that students in the CLIL class knew that they would be part of the CLIL project and thus thought that they should not criticize the project too much in the initial questionnaire. One of the indicators for this belief is that several students asked me during the survey whether it was anonymous or not, thus some were clearly afraid of their answers having an influence on the lessons.

Hypothesis 3 could be verified and showed that students remained rather neutral concerning their progress in biology through CLIL. Results are again mostly rooted in the restricted time frame of the project, as students would probably have needed more time to evaluate the progress in biology that is possible through CLIL lessons. In general, CLIL students were slightly more positive about their improvement of content knowledge through CLIL than the German class. Reasons could again be linked to them knowing that they would be part of the project, as explained above.

In hypothesis 4, results mirrored the hypothesized statement, as students' reasons for being motivated to learn English were fairly diverse. In the first survey the number of extrinsic and intrinsic motivational responses was relatively balanced in both classes. However, while CLIL students' responses remained almost constant over the project, the number of extrinsic responses concerning students' motivations for studying English in school increased noticeably. Unfortunately, an explanation for this change is challenging to find, as the control class did not have the project's lessons in English and thus there is no variable that could have changed their motivation during the project.

According to hypothesis 5, CLIL students would like the atmosphere in CLIL lessons more than in their regular lessons, they would participate more willingly and would feel less afraid of making mistakes. This hypothesis could partially be verified, as a significant tendency towards less fear in CLIL than in regular English lessons could be found. This result is also in line with CLIL handbooks that often stress CLIL's support in learning English as the setting encourages students to make mistakes and be creative (e.g. Dale & Tanner 2012: 13). However, it was surprising that students from the control class were also significantly less scared of making mistakes, and additionally found the atmosphere noticeably more appealing than in their regular lessons. The main reason for these seemingly contradictive results could again be related to the partial use of a more activating methodology in the control class. Even though results in a control class should normally remain unchanged, the use of the same project as in the CLIL class inevitably led to an increase in active and autonomous exercises compared to students' regular lessons. Thus, the control class might have enjoyed the atmosphere more during the project because of the methodology. In addition, as I was not their usual teacher, they were certainly aware of the fact that these lessons would not be assessed as strictly as normally and this might have resulted in a significant decrease of students' fear of making mistakes. The reason why changes in the CLIL class were less significant than in the control class could be the language barrier that students always had to overcome. Nevertheless, even though CLIL students' results were not as significant as in the control class they still seem to show that the CLIL project was successful. In the second survey the atmosphere during the project received 1.77 points on average on a scale from 5-1 with 1 being the highest rating. The mean of students' willingness to participate was 1.8. and students' fear of making mistakes was solely 4.12 on average after the project, meaning that they were barely afraid. In brief, lower secondary students appear to profit from CLIL from the first lesson onwards, even though results were not highly significant. They became increasingly unafraid of mistakes, found the atmosphere similarly pleasing as their usual lessons, and also liked to participate. These results seem to become even more remarkable when taking into account that learners' language level was only A2 according to the CEFR (Council of Europe 2001: 24), meaning that their English was still restricted to 'simple terms' and 'areas of most immediate relevance'. The high significances of the control class appear to support the success of an interactive methodology further.

Results related to hypothesis 6 match the assumed outcomes. In both classes, students perceived the topics in their regular classes as similarly interesting as compared to the ones during the project, with a mean of 1.85 in the CLIL class and 1.76 in the German class with 1

being the highest rating again. These responses are highly gratifying, as the language barrier seemed to have no negative influence on students' interest, even though topics in CLIL are usually much more specialized than in students' English classes (Dale & Tanner 2012: 11) and therefore possibly more difficult to understand. One of the reasons why CLIL students enjoyed the topic despite the language barrier was presumably the materials chosen and designed for the course. As also noted by the students' regular teachers who had observed the lessons, the classes seemed to have strongly appreciated the self-made and creative materials. Even though teachers could possibly design such materials for everyday lessons as well, the language barrier and the lack of materials available forces CLIL teachers in particular to be more creative and to design innovative tasks. This was not only reported by authors of CLIL handbooks, such as Mehisto, Marsh & Frigols (2008: 22), but also correlates with my experiences when preparing the teaching project. In order to suit the students' language and content needs, time had to be invested to create supportive tasks. Until now, I have always thought that having to design one's own materials can be seen as a quite negative feature of CLIL, however after experiencing the students' enthusiasm for creative exercises that deviate from their regular lessons, I believe that this might strongly contribute to students' fascination of CLIL. Concerning the students' ratings of the materials' level of difficulty, it was noteworthy that the control class perceived the project's materials as significantly easier than their biology materials and felt less overwhelmed, while this was not the case in the CLIL class. These findings are in line with the control class' teacher who claimed that her class could have dealt with more challenging materials. However, using other materials might not have been possible, because more difficult exercises and terms would have presumably been overwhelming for the CLIL learners. Unfortunately, this might serve as an indication that the level of regular German biology lessons cannot be maintained in CLIL. Regardless, CLIL students learn a foreign language in addition to biological content which might compensate for the reduced content knowledge. Surprisingly, CLIL students found the materials considerably better to understand than in their regular English lessons. This might further support the idea that CLIL offers a substantial opportunity for language learners to practice the language without feeling stressed about new and overwhelming texts, vocabulary and listening exercises. To conclude, the topics and the materials in CLIL seem to support students in language learning without feeling as overwhelmed as in their English lessons. CLIL teachers are required to use new methods and be creative to compensate for the language barrier. Due to these innovative materials even students without a high level of foreign language literacy were interested in the topic. The only disadvantage seems to be the

slightly reduced level of biological content due to the additional focus on languages.

Even though no correlations between students' gender and their attitudes towards CLIL had been hypothesized, some significant results were found in the boys and the girls group that seemingly reinforce the idea of CLIL having a levelling effect on gender-related phenomena in students' attitudes towards subjects, as stated by Fontecha & Alonso (2014: 23). While boys showed a tendency towards being less afraid of making mistakes in CLIL than in English, girls dared to participate more than in usual biology lessons and found the materials easier than in their English classes. Thus, it might be that both groups felt encouraged because of the fusion of a subject in which they feel confident and another subject in which they might usually feel less secure because of stereotypes linked to language classes and natural sciences. However, results from the German class contradict these findings. Even though the control class did not experience a mix of language and content, several results were significant as well. This indicates that also in the control class both, girls and boys, were in favour of the project, even though natural sciences are subjects that boys often appreciate more than girls (Fontecha & Alonso 2014: 23). Therefore, the levelling effect cannot be argued to stem from the CLIL context, but could only perhaps be related to the new situation and the change in methodology per se.

As opposed to my expectations, learners with another or more first languages did not show significantly positive attitudinal changes. However, exclusively German speakers of both classes seemed to be more enthusiastic about the project than about their usual lessons. In the CLIL class students with German as their only L1 enjoyed the project significantly more than thought in the beginning and were noticeably less afraid of making mistakes. Although the same trends could be found in multilingual speakers' answers, they were less pronounced. Interestingly, similar results were found in the control class with significant changes again being restricted to German speakers. These students felt noticeably less scared, less overwhelmed, appreciated the atmosphere more and found the materials easier compared to their usual biology classes. Particularly, in this class, I had realized while teaching that non-native German speakers remained more passive during interactive tasks as they lacked communication strategies. This lack of interaction skills might have been the main reason for the different perceptions between German and multilingual or non-German native speakers. Even though CLIL students should have used English for interactions, they often switched to German. Learners from other language backgrounds might thus have struggled due to their limited German skills again. It can be anticipated that the use of English in CLIL lessons would rapidly increase over time and therefore students with other mother tongues might soon

no longer face disadvantages due to German terms. However, especially in lower classes, CLIL teachers should be aware that students who do not have the same first language as most of the others might need as much support as in regular classes in the beginning, as German still plays a major role in class.

The second part of hypothesis 8, dealing with correlations between CLIL students' grades and their attitudes towards the project, could also not be confirmed in the study. In contrast to the hypothesis, the influence of students' grades on their answers concerning the CLIL project was lower than in their answers concerning their regular biology and English lessons. While 4 answers correlated significantly with grades before the project, solely question 5 dealing with students' perception of their biology progress in CLIL correlated after the CLIL lessons. In the control class, the number of questions correlating with students' grades remained unchanged, even though some of the questions that showed significant tendencies changed. A possible explanation could be that the CLIL project encouraged all students quite equally due to the language change and the involved new challenges. All students had to overcome these new barriers without some of them having advantages because of their previous knowledge or skills they usually apply in regular lessons.

12. Conclusion

This study investigated Austrian lower secondary students' perceptions of CLIL in the course of a two lesson teaching project on 'evolution'. By teaching the same project in another class in German, possible differences in attitudes and learning experiences due to the approach used could be examined.

One of the most problematic aspects of the study was the limited time frame. As I had wanted the project to take place without breaks in order to give students the feeling of being in a CLIL course, weeks had to be found where both classes did not have any other projects or excursions. Additionally, both teachers told me that they had to follow the syllabus and thus time for a university project was quite restricted. Even though we finally agreed on a two hour project in every class in the second week of September, a much longer time span would have presumably been more beneficial. The project was new to all children and thus they might have been noticeably more enthusiastic about the lessons than they would have been after getting used to the methodology. Nevertheless, the two hour project also led to noteworthy results as it mirrored students' initial interest in CLIL without them yet being influenced by tests or grades.

Moreover, the project might have been more realistic if the students' usual teacher had

taught the project instead of me. I noticed a change in students' behaviour in both classes when I came into the classroom and introduced myself. While the children from the control class became livelier and presumably believed that a university student's project would be less strict than usual biology lessons, the students in the CLIL class seemed to be slightly intimidated by having a new teacher and being taught in English. As the class appeared to have a close relationship to their regular biology teacher, they might have acted differently with her being the teacher of their first CLIL lesson. However, different teachers in each class might also have distorted the results. Ideally, two classes with the same teacher should have been chosen for the project. Unfortunately, as there was no such suitable biology teacher in BG/BRG Perchtoldsdorf and other schools were not willing to participat**e,** this proved to be infeasible. Functioning as the teacher myself during the project in both classes therefore seemed to be the most reliable alternative.

Another limitation was the relatively small number of participants. Even though including more classes, possibly also from different schools, might have had an impact on the study, such an extensive investigation would have gone beyond the scope of this diploma thesis. In order to guarantee that results were nevertheless comparable and relevant, the chosen classes were quite similar in terms of the number of students, gender and their grades in English and biology.

My research, experiences from the teaching project and the evaluation of the data all helped me to gain major insights into students' learning experiences of CLIL. In my opinion, one of the most critical findings of this study was the success of CLIL's didactic models focusing on interactive and communicative methods. As students from both classes highly enjoyed the project and named the same interactive methods as their favourite parts of the lessons, these methods might be the primary reason for the noticeable increase in CLIL students' motivation that Doiz et al. (2014: 214-16) and several other authors detected in their studies. Certainly, Dale & Tanner (2012: 11) might also be right in claiming that the motivational rise stems from students' perception of CLIL as being more efficient than regular lessons. However, as derived from the questionnaires, teachers' comments and my own observations while teaching, students seemed to be primarily enthusiastic about the active and autonomous exercises during the project and saw language learning more as a useful by-product. Even though I had known models such as the '4C's framework' created by Coyle, Hood & Marsh (2010) or the CLIL pyramid by Meyer (2010), I had never been entirely convinced of their benefits. However, the students' enthusiasm showed me that the detailed planning and working with the models was worth the effort. Possibly, learners'

reactions to the tasks might have been different in higher classes, as also Lasagabaster & Doiz (2016: 121) stress that CLIL students from lower grades appreciate active tasks more than higher grade students, but the methodology was highly successful for this age level.

In addition, the brevity with which students overcame the language barrier and their scepticism towards CLIL was stunning and must be noted as one of the most surprising results of the study. As described in the field notes, students became highly eager to talk in English within the two hour project and seemed to enjoy the lessons comparably to the control class, even though their English was still quite restricted regarding their current level of A2. As the survey's results display, there was a strong tendency of students feeling less scared of making mistakes during the project than in their regular English lessons. Even though learners remained critical about their language progress through CLIL, especially this reduced anxiety level, as also claimed by Krashen (1985: 81), will most likely support them noticeably in language learning in the long run.

In general, the language barrier did not have any negative impact on the students. The fact that CLIL students' answers in questions 9a-f were all at least slightly more positive than their responses in the first survey shows that students even at such a young age do not feel overly influenced by the use of a foreign language in another subject than English in school. CLIL students did not feel more overwhelmed during the project than in their regular lessons. They were similarly interested in the topics and were as willing to participate as in their regular English or biology classes. Moreover, they enjoyed the atmosphere during CLIL and found the materials still easy to understand. Taking into account that these had been the students' first two CLIL lessons, these results seem to stress CLIL's success. In addition to that, the language barrier even appears to have several advantages. As noted in the discussion section, teachers have to become more creative and are forced to think more closely about the teaching materials in order to guarantee that students will understand the lessons. Regular lessons could be as creative as CLIL lessons, but due to the high number of suitable materials that already exist, teachers presumably tend to think less about the appropriateness and user-friendliness of the tasks. Additionally, even though the survey questions did not show a noticeably positive impact on multilingual learners in either class, changing to a language that poses a challenge to all the students might lead to a better integration of non-German speakers once learners no longer make use of German as frequently as in the lessons during the project and become used to making themselves understood in English. However, due to the relatively small number of multilingual children this study's results might not be fully adequate and more substantial quantitative investigations would be needed.

Concerning students' learning progress in biology, observations and survey's results were less positive. Students' lack of vocabulary and language structures in English had led to a slight decrease in biological input during my preparations. The control class' teacher noted that her students could have been more challenged, while the significant results in question 9a showing that students almost never felt overwhelmed support her view. These results could therefore indicate a decrease in overachievers in biology in the CLIL class, similar as in Seikkulo-Leino's study (2007: 334-335). If teachers want to maintain the level in CLIL, they probably have to create highly effective materials and scaffolding methods, which might not be possible during the preparation time provided in schools.

Besides this disadvantage of CLIL, the approach seems to be highly successful as the positive experiences during the project and the enthusiastic feedback in the questionnaires showed. Nevertheless, the lack of teacher training and materials that were discussed in chapters 4.1 and 4.2 must be stressed once more at this point. Even I, as a future English and biology teacher with sufficient knowledge in both subjects, perceived the preparation of materials and the teaching in class as quite challenging. Scaffolding, providing students with vocabulary they needed and supporting them during conversational and interactive tasks proved to be more stressful than in the control class. Teachers who struggle with their own English skills or are not highly literate in the subject taught through CLIL might soon feel overwhelmed. Consequently, the CLIL lessons will also presumably no longer be as enjoyable and beneficial for the students. Therefore, studies and handbooks stressing the lack of teachers or materials, such as the ones by Bernabé Moliner (2013: 200) or Meyer (2010: 11) should not be ignored. Schools deciding to offer CLIL should make an effort to provide teachers willing to teach CLIL with a sound training and teachers must be willing to invest significantly more time in preparing tasks.

To conclude, the analysed project supports the enthusiasm for CLIL that seems to be currently spreading all over Europe. CLIL encourages students to practice their English via interactive, meaningful and communicative tasks that are perceived as highly enjoyable and let students overcome their anxiety of making mistakes. As the language does not impede on the atmosphere, students' participation or interest in the topic taught, it appears to be a perfect complement to students' regular English lessons that focus more strongly on form. Even though CLIL appears to be a highly beneficial approach, more extensive training for future CLIL teachers, extra preparation times and the development of suitable materials are still needed in order to guarantee that students profit from the approach.

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14. Figures and tables

15. Appendix

Content:

ABSTRACT

The enthusiasm for Content and Language Integrated Learning (CLIL) in Europe has risen steadily in recent decades, resulting in a vast number of different CLIL programs offered in mainstream education. However, even though CLIL is often claimed to have a strong positive impact on students' motivation, language learning success and cognitive development, studies focusing on actual students' perceptions are rather limited. Therefore, this thesis aims to examine Austrian lower secondary students' attitudes and learning experiences over the course of a CLIL project on evolution in biology. Two 7th grade classes participated; one was taught in English and the other in German. Surveys handed out before and after the 2 lessons should help to investigate students' thoughts on CLIL in comparison to their regular lessons. Results reveal students' significant enthusiasm for the approach, especially concerning its activating and communicative methodology. Even though students' English was restricted to an A2 level, the CLIL project was rated higher than their regular biology or English lessons in all feedback questions. However, in order to maintain the quality of CLIL, teacher training and support must be further expanded. Insights gained from the project might be especially relevant for CLIL teachers and researchers working on the improvement of this rapidly expanding approach.

ZUSAMMENFASSUNG

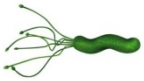
Die Begeisterung für das Konzept 'Content and Language Integrated Learning' (kurz CLIL) hat in Europa in den letzten Jahrzehnten stetig zugenommen. Heutzutage gibt es diverse Formen von CLIL die in öffentlichen Schulen praktiziert werden. Obwohl CLIL oftmals als besonders motivierend, effektiv und anregend dargestellt wird, ist die Anzahl der Studien die sich mit der tatsächlichen Sichtweise der SchülerInnen beschäftigt relativ gering. Aus diesem Grund versucht diese Diplomarbeit die Erfahrungen und Einstellungen von SchülerInnen zu CLIL mittels eines Projektes zum Thema ‚Evolution' im Biologieunterricht zu erforschen. Zwei Klassen der 7. Schulstufe nahmen an der Studie teil, in der einen wurde auf Deutsch und in der anderen auf Englisch unterrichtet. Ergebnisse zeigen die Begeisterung der SchülerInnen für CLIL, vor allem für die aktivierenden und kommunikativen Methoden des Konzepts. Obwohl das Englisch der SchülerInnen sich auf A2 beschränkte, schnitt CLIL in allen Feedbackfragen besser ab als der reguläre Unterricht. Um die Qualität von CLIL jedoch aufrecht erhalten zu können, bedarf es grundlegender Trainingsprogramme und Unterstützung der Lehrenden. Eindrücke die durch diese Arbeit gewonnen wurden könnten vor allem für CLIL LehrerInnen und Forscher die an der Verbesserung von CLIL arbeiten relevant sein.

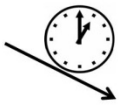
Materials lesson 1: CLIL class

Powerpoint presentation

How did humans develop?

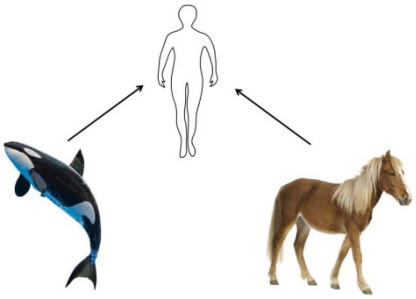
3.5 billions of years ago





today

Who is closer related to me?



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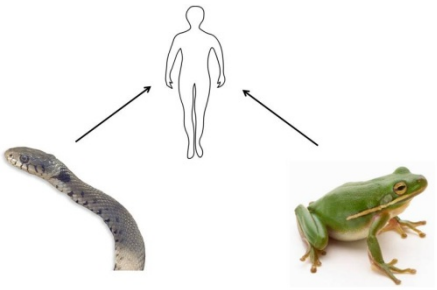
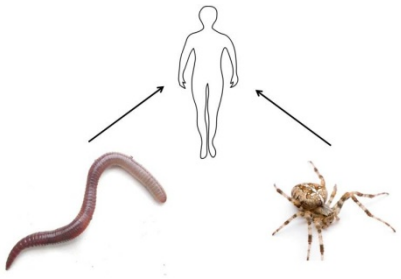
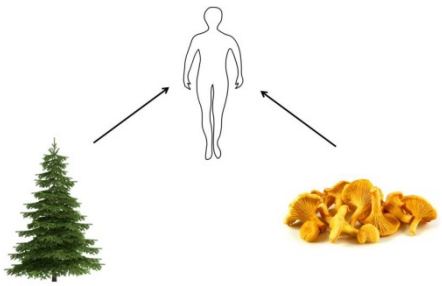


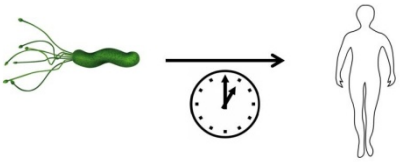
Who is closer related to me?



Who is closer related to me?



Evolution



= the development of organisms over time.

Evolutionary tree

= shows the relationships between animals, plants and fungi

Why do we know who is closer related to us?

https://www.youtube.com/watch?v=3rkGu0BItKM

Listening comprehension

Tick the right answer:

1) Fossils are:

□ stone remains (Überreste) of animals or plants *or* □ living animals

2) What is usually only left?

□ the body hair *or* □ the skeleton

3) But sometimes a whole animal can also become a fossil like:

□ a frozen mammoth *or* □ a burnt bird

4) What covers the dinosaur?

□ sediment *or* □ only water

5) How does the fossil come to the earth's surface (Erdoberfläche)?

□ through earthquakes *or* □ through rain

Fossil booklet exercises

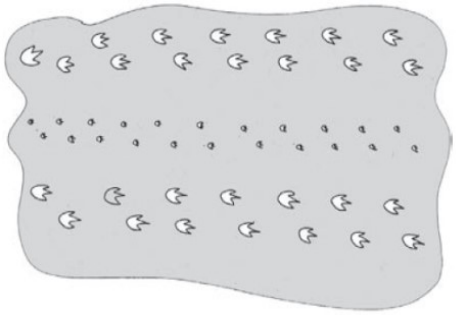
1) How is a fossil created? Put the pictures next to the correct description.

	An animal dies. Its body sinks to the sea floor.
	The flesh of the animal decays (verwest) or is eaten by other animals.
	Now only the skeleton is left. Sand covers the skeleton. The bones can no longer decay.
	Many layers (Lagen) of sand are above the skeleton. Minerals (Mineralstoffe) get into the bones of the animal and sclerotize (verhärten) the bones.
	The skeleton comes closer to the surface (Oberfläche) again, because of an earthquake .
	In mines (Bergwerken) close to rivers or in the mountains skeletons appear again.

2) Scientists (Wissenschaftler) found these animal tracks. What could the animals have done? Write 3 sentences to every picture. Start every sentence with:

The animals could have…….

Example: The animals could have played together.

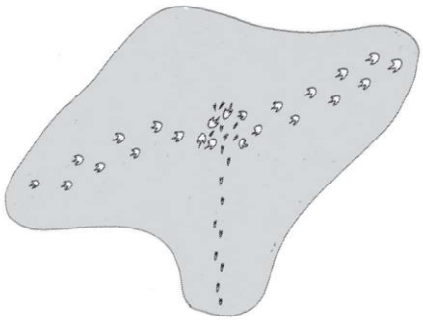


Picture 1:

1._____

2._____

3. _____



Picture 2:

1._____

2._____

3. _____

3) 1: Read the texts on how fossils are created. 2: Look at the fossils on the table, to which text do they fit? Write down your answers in the box.

I**nternal mold:** 1. Sand or minerals fill the shell

2. The shell decays (zersetzt sich)

3. The sand now looks like the shell

External mold: The animal no longer exists, but there is an impression (Abdruck) on the rock.

Carbonization: Chemical processes, pressure (Druck) and heat turn the plants and animals into black fossils. The black colour comes from the carbon (Kohle) that is in the fossil.

Inclusion: Animals or plants are surrounded (umgeben) by ice, salt or amber (Bernstein) and become fossils.

Name of the fossil	Which process was it?

4) Open your book on page 5 and look at the picture! Which things could become fossils over time and why?

_____

_____

_____

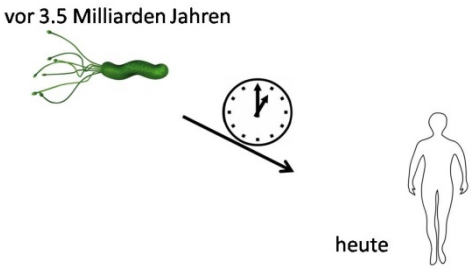
_____

_____

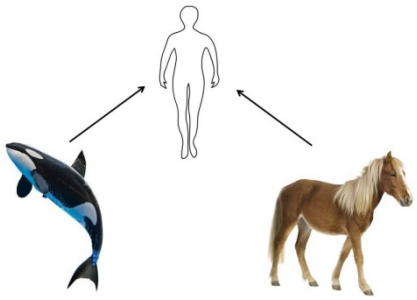
Materials lesson 1: German class

Powerpoint presentation (German version)

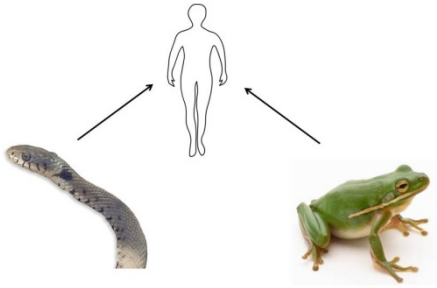
Wie entstand der Mensch?



Wer ist mit mir näher verwandt?



Wer ist mit mir näher verwandt?



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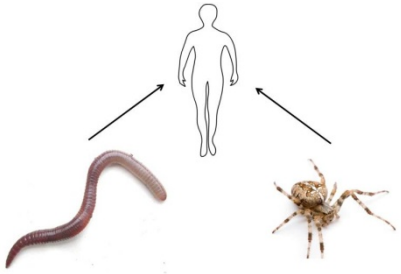
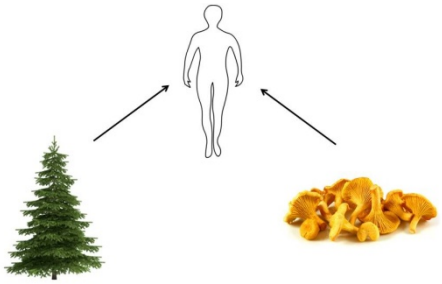
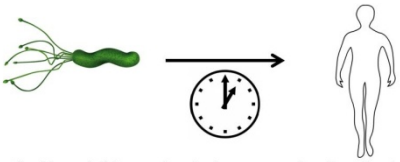


Wer ist mit mir näher verwandt?



Evolution



= die Entwicklung der Lebewesen im Laufe der Zeit

Phylogenetischer Baum

= zeigt die Verwandtschaftsbeziehungen zwischen Tieren, Pflanzen und Pilzen

Warum wissen die Wissenschaftler wie welche Tiere entstanden sind?

https://www.youtube.com/watch?v=UsxlRM05dxw

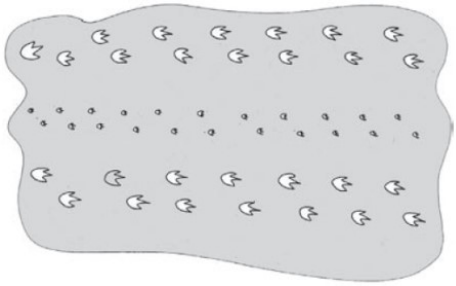
Fossil booklet (German version)

1) Wie entsteht ein Fossil? Klebe die Bilder passend zur Beschreibung auf.

	Ein Tier stirbt. Manchmal wird der Körper von einer Flutwelle weggeschwemmt und landet am Grunde des Gewässers.
	Das Tier liegt am Meeresboden und sein Fleisch verwest oder wird von Tieren gefressen.
	Schlamm und Sand schließen das verbliebene Skelett luftdicht ein. Jetzt können Knochen, Zähne und Krallen nicht mehr verwesen.
	Über dem Skelett bilden sich mit der Zeit viele dicke Schichten. Mineralstoffe aus dem Schlamm dringen in die vielen winzigen Poren des Skeletts ein und das Skelett verhärtet sich.
	Das Skelett gelangt immer mehr an die Oberfläche, z.B. durch Verschiebungen der Erdplatten.
	In Bergwerken, Steinbrüchen, an Flussufern und im Gebirge kommen die Fossilien nach Jahrmillionen wieder zum Vorschein.

2) Wenn die Forscher nur die Spuren von einstigen Lebewesen entdecken, nennt man diese auch Fossilien. Schaut man sich die Fährte der Tiere genau an, kann man mit viel Glück etwas über ihre Lebensweise erfahren. Hier siehst Du zwei Fährtenplatten, auf denen Saurier ihre Spuren hinterlassen haben. Überlege, was die Saurier da gerade getan haben könnten! Schreibe mindestens 3 Vermutungen pro Bild auf.

Bild 1:

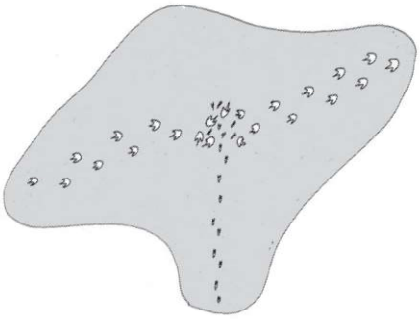


1._____

2._____

3. _____

Bild 2:



1._____

2._____

3. _____

3) Ein Fossil kann auf unterschiedliche Arten entstehen. Lies dir die Kurztexte genau durch und ordne dann die Fossilienfunde zu. Achtung es können auch mehrere Funde zu einer Beschreibung gehören:

Ein **Steinkern** entsteht, wenn nach Auflösung des Tieres seine Körperhülle noch eine Zeit lang erhalten bleibt. Sie füllt sich nach und nach mit sich versteinerndem Schlamm. Löst sich nun auch die restliche Hülle auf, bleibt der Steinkern zurück.

Ein **Abdruck** entsteht wenn ein Organismus ganz aufgelöst wird und im entstandenen Hohlraum der Abdruck seiner Körperoberfläche erhalten bleibt. Abdrücke sind z.B. Kriechspuren von Tieren oder auch die Nerven von Blättern.

Fossile Pflanzenreste sind meistens durch die sogenannte **Inkohlung** entstanden. Das heißt, dass durch verschiedene chemische Vorgänge, Druck und Wärme Pflanzenreste in Kohle umgewandelt und haltbar gemacht worden sind.

Eine besondere Form der Erhaltung ist der Einschluss in Bernstein, Salz oder Eis. Bei dieser Form bleibt die organische Substanz des Körpers bestehen und man kann sogar noch die DNA der Tiere untersuchen.

Name des Fossils	Welcher Prozess hat stattgefunden?

4) Schlage dein Buch auf Seite 5 auf und überlege dir welche Gegenstände Fossilien werden könnten. Schreibe sie auf und begründe wie sie zu Fossilien werden könnten.

_____

_____

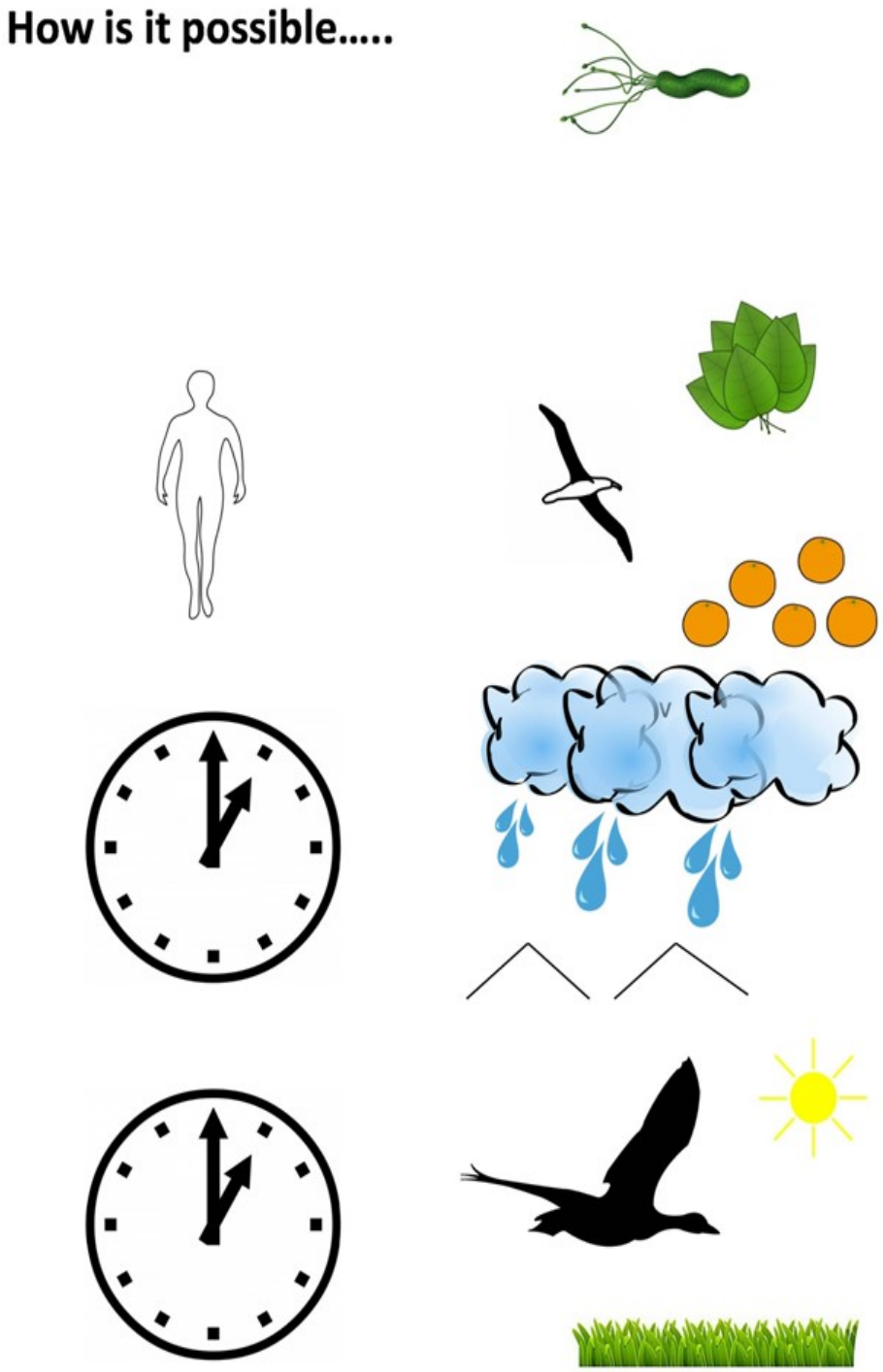
_____

_____

_____

Materials lesson 2: CLIL class

Powerpoint presentation for 'Selecti' game



Natural selection

Try to answer the following questions with your partner:

1. What did the selectis look like in the beginning and in the end?

2. What/Who changed the selectis?

3. Design a perfect selecti that will live forever and draw it!

THE END

Charles Darwin exercise

Text A

Charles Darwin was born on the 12th of February 1882 in England. He hated school, especially learning Latin, but his hobbies were reading and studying nature. He had a famous grandfather called Erasmus, who was an inventor (Erfinder) and who was interested in nature too. Charles Darwin went to Scotland to study medicine. His father wanted him to become a priest. Finally, a friend invited him to travel around the world on a ship called ‘the Beagle’. He thought he would be away for two years, but he was away for five years!

Text B

Everywhere Charles Darwin went he collected animals and plants. He also collected rocks and fossils. He wrote lots of notes and made lots of drawings. After he came back to England, he continued to study plants and animals. Darwin thought about how these animals and plants were linked (zusammengehören) and he really had great ideas. But Darwin was worried about showing people these ideas, because he thought many people would find them silly or would become angry. But finally he published the text "The Origin of the Species" in 1859.

Text C

Before Darwin was born, most people in England thought that animals were not related (verwandt). They thought that God had made all animals and that they would never change.

But Charles Darwin believed that animals were related and could change. 3 of his theories were:

1. Animals are all different and some live longer because of variations (angeborene Eigenschaften) that are useful in their environment (Umgebung).
2. Animals that live longer also have more time for having babies.
3. Over time animals without the useful variations die out, while the others have bigger and bigger families.

Text D

Today Charles Darwin is seen as one of the most important scientists (Wissenschaftler) of all time. He was the first one who found out that all animals and plants are related (verwandt). This means that all animals, plants and fungi (Pilze) are one big family with millions of cousins, aunts, uncles and grandparents. Scientists all over the world are still using his theories today. Charles Darwin died at the age of 73 and was buried (begraben) in London, in the famous church 'Westminster Abbey'.

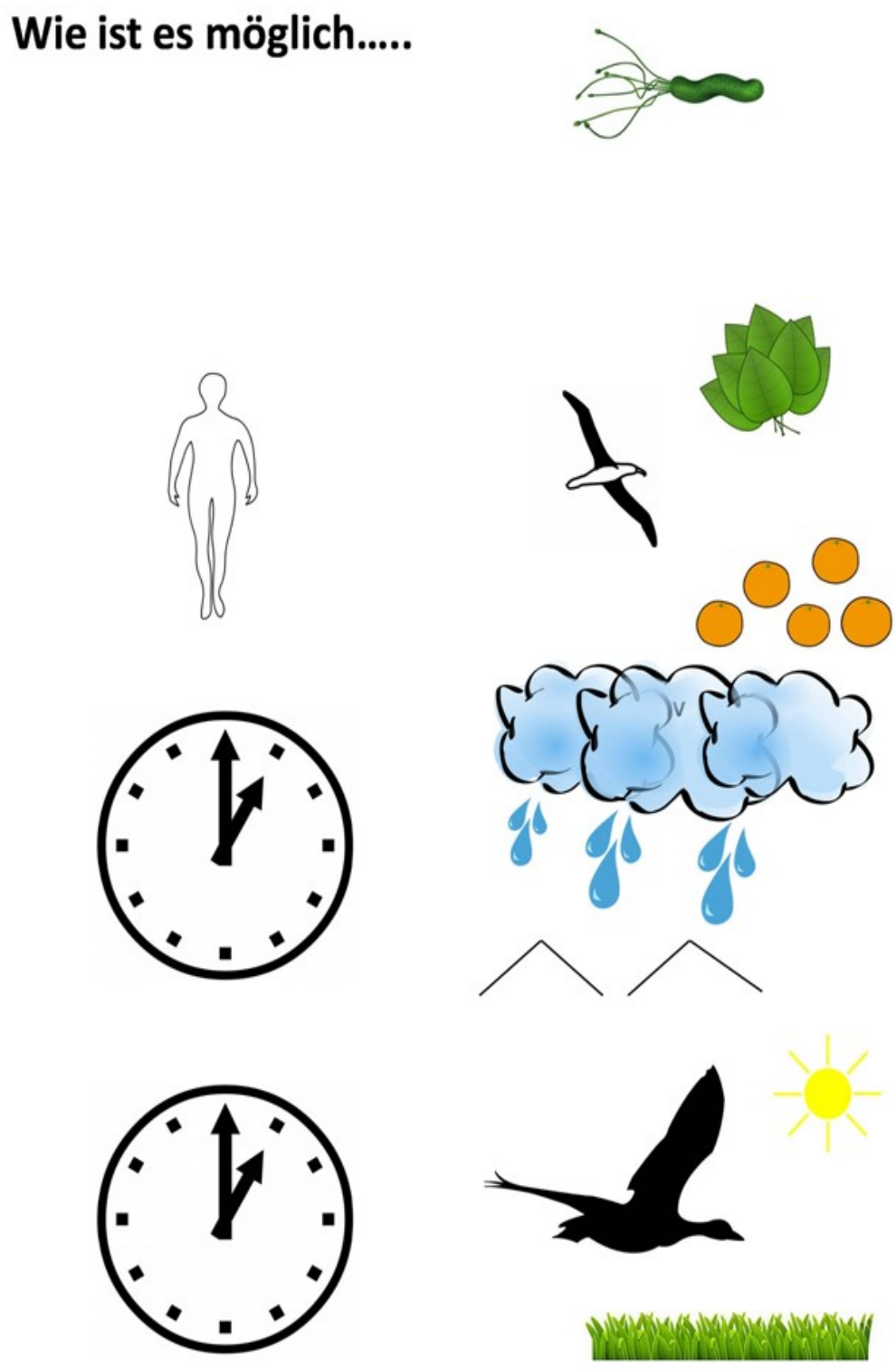
Answer the questions with the help of your text and your friends' texts!

CHARLES DARWIN

1) For how long was Darwin on a ship?	
2) Why was Darwin scared of showing people his ideas?	
3) Why is Darwin seen as one of the most important scientists (Wissenschaftler) of all time?	
4) What were Darwin's hobbies?	
5) What did people think about animals before Darwin was born?	
6) What were 3 of Darwin's main theories?	
7) What did Darwin collect during his voyage (Reise)?	
8) How old was Darwin when he died?	

Materials lesson 2: German class

Powerpoint presentation for 'Selecti game' (German version)



Natürliche Selektion

Schreibe die Fragen in dein Heft und versuche sie mit deinem Sitznachbarn zu beantworten:

1. Wie haben die Selektis am Anfang und am Ende ausgeschaut?
2. Was und wer hat sie verändert?
3. Versuche ein Selekti zu malen, das niemals aussterben wird! Gibt es so eines überhaupt?

ENDE

Charles Darwin exercise (German version)

Text A

Charles Darwin wurde am 12. Februar 1882 in England geboren. Er mochte die Schule nicht wirklich, besonders das Lateinlernen war für ihn eine Qual. Er las jedoch überaus gerne und beobachtete Prozesse in der Natur. Diese Vorliebe könnte er von seinem berühmten Großvater Erasmus Darwin gehabt haben, der durch einige Erfindungen Bekanntheit erlangte und ebenfalls viele Naturstudien machte. Charles Darwin durchlief eine sehr außergewöhnliche Ausbildung. Obwohl sein Vater wollte, dass er Pfarrer wird, ging er nach Schottland um Medizin zu studieren. Als ihn ein Freund dazu einlud mit einem Schiff namens ‚Beagle' um die Welt zu segeln, sagte er jedoch zu und wurde kein Arzt. Als das Schiff ablegte glaubte man, dass die Gruppe an Wissenschaftlern in spätestens 2 Jahren wieder nach Hause kommen würde, dies war jedoch nicht der Fall. Erst nach 5 Jahren erreichte die Beagle wieder England.

Text B

An allen Orten die Charles Darwin besuchte sammelte er Tiere und Pflanzen, sowie auch Gesteinsstücke und Fossilien. Zu jedem dieser Stücke schrieb er sich genaue Notizen auf und machte Zeichnungen. Dieser Tätigkeit ging er auch noch nach, als er wieder in England war. Darwin kam bald die Idee, dass Ähnlichkeiten die er bei den Tieren und Pflanzen erkennen konnte daher stammen könnten, dass zwischen ihnen Zusammenhänge herrschten. Darwin

traute sich jedoch nicht diese Überlegungen laut auszusprechen, da er Angst hatte andere Leute würden ihm nicht glauben oder ihn sogar für seine Gedanken bestrafen. Nach einigen Jahren veröffentlichte er aber schließlich doch den Text "The Origin of the Species" im Jahr 1859, in dem er seine Gedanken zu Zusammenhängen zwischen einzelnen Tier- und Pflanzengruppen beschrieb.

Text C

Bevor Darwin lebte glaubten die meisten Leute in England, dass Tiere nicht verwandt wären. Sie waren der Überzeugung, dass Gott alle Tiere erschaffen hatte und sie sich nie verändern würden. Charles Darwins Ideen standen im klaren Kontrast zu diesem Glauben. Seine drei Haupttheorien besagten:

1. Organismen sind alle verschieden und aufgrund ihrer unterschiedlichen Anpassungsfähigkeit überleben manche länger als andere.
2. Jene Tiere die länger leben können sich auch öfter fortpflanzen und haben daher mehr Nachwuchs.
3. Über längere Zeit gesehen sterben jene Tiere mit nachteiligen Eigenschaften irgendwann aus, während jene mit Eigenschaften die nützlich sind immer mehr Kinder haben und die Überhand gewinnen.

Text D

Heute wird Charles Darwin als einer der wichtigsten Naturwissenschaftler aller Zeiten gefeiert, da er als Erster herausfand, dass Pflanzen und Tiergruppen alle untereinander verwandt sind und sich auseinander entwickelt haben. Das bedeutet, dass alle Tiere, Pflanzen und Pilze als eine große Familie gesehen werden können die aus Millionen von Cousins und Cousinen, Onkeln und Tanten und Großeltern besteht. Heutzutage werden noch immer weite Teile dieser Theorie als richtig angesehen. Charles Darwin starb im Alter von 73 Jahren und wurde in London, in der berühmten Westminster Abbey begraben.

CHARLES DARWIN

1) Wie lang reiste Darwin mit der Beagle?	
2) Warum verbreitete Darwin nicht sofort seine neuen Erkenntnisse?	
3) Warum ist Darwin heute noch so berühmt?	
4) Womit beschäftigte sich Darwin schon in jungen Jahren gerne?	
5) Welche Thesen bezüglich der Entstehung der Arten waren vorherrschend vor Darwins Theorie?	
6) Was beinhalten Darwins drei Haupttheorien?	
7) Was sammelte Darwin während seiner Reise?	
8) Wie alt wurde Charles Darwin?	

Surveys 1 and 2 (CLIL class)

Fragebogen 1 (3D)

Danke, dass du teilnimmst! Egal was du ankreuzt, jede deiner Antworten ist wichtig und richtig ☺

1. Ich bin: □ ein Mädchen □ ein Bub

2. Mit meiner Familie spreche ich diese Sprache/n: _____

3. Ich freue mich auf die Biostunden auf Englisch.

□ □ □

☹ 😐 ☺

4. Ich kann mir vorstellen, dass sich mein Englisch durch die englischen Bistunden verbessern wird.

□ □ □

☹ 😐 ☺

5. Ich denke, dass ich gleich viel über das neue Thema lernen werde, obwohl ich auf Englisch unterrichtet werde.

□ □ □

☹ 😐 ☺

6. Kreuze **maximal 2 Kästchen** an!
Ich lerne Englisch vor allem, weil:

□ ich die Sprache mag.

□ es wichtig ist um die Schularbeiten und Tests zu schaffen.

□ mir der Englischunterricht in der Schule gefällt.

□ ich es für meinen späteren Beruf brauchen könnte.

7. In Englisch hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

8. In Biologie hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

9. Kreuze an wie du dich einschätzt (5= trifft nicht zu; 1= trifft völlig zu)

<u>a) Im Biologieunterricht…</u>

fühle ich mich manchmal überfordert.

5 4 3 2 1

interessiere ich mich meistens für die Themen.

5 4 3 2 1

arbeite ich gerne mit.

5 4 3 2 1

habe ich Angst Fehler zu machen.

5 4 3 2 1

herrscht ein gutes Lernklima.

5 4 3 2 1

finde ich die Unterrichtsmaterialien meistens leicht zu verstehen.

5 4 3 2 1

<u>b) Im Englischunterricht…</u>

fühle ich mich manchmal überfordert.

5 4 3 2 1

interessiere ich mich meistens für die Themen.

5 4 3 2 1

arbeite ich gerne mit.

5 4 3 2 1

habe ich Angst Fehler zu machen.

5 4 3 2 1

herrscht ein gutes Lernklima.

5 4 3 2 1

finde ich die Unterrichtsmaterialien meistens leicht zu verstehen.

5 4 3 2 1

Fragebogen 2 (3D)

Danke, dass du teilnimmst! Egal was du ankreuzt, jede deiner Antworten ist wichtig und richtig ☺

1. Ich bin: □ ein Mädchen □ ein Bub

2. Mit meiner Familie spreche ich diese Sprache/n: _____

3. Die Biostunden auf Englisch haben mir Spaß gemacht.

□ □ □

☹ 😐 ☺

4. Ich denke, dass sich mein Englisch verbessern würde, wenn ich weiterhin Biostunden auf Englisch hätte.

□ □ □

☹ 😐 ☺

5. Ich denke, dass ich gleich viel in Biologie lernen würde, wenn ich weiterhin Biostunden auf Englisch hätte.

□ □ □

☹ 😐 ☺

6. Kreuze **maximal 2 Kästchen** an!
Ich versuche hauptsächlich Englisch zu lernen, weil:

□ ich sonst keine positiven Noten bekomme.

□ mir die englische Sprache Spaß macht.

□ ich es später für meine Arbeit brauchen könnte.

□ ich den Englischunterricht in den normalen Stunden und/oder in Biologie lustig finde.

7. In Englisch hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

8. In Biologie hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

9. Kreuze an wie du dich einschätzt (1= trifft nicht zu; 5= trifft völlig zu)

<u>Im Biologieunterricht auf Englisch…</u>

habe ich mich manchmal überfordert gefühlt.

5 4 3 2 1

habe ich mich für das Thema interessiert.

5 4 3 2 1

habe ich gerne mitgearbeitet.

5 4 3 2 1

hatte ich Angst Fehler zu machen.

5 4 3 2 1

herrschte ein gutes Lernklima.

5 4 3 2 1

habe ich die Unterrichtsmaterialien meist leicht zu verstehen gefunden.

5 4 3 2 1

10. Das hat mir am meisten an den Biostunden auf Englisch gefallen:

_____

_____

11. Das hat mir weniger gefallen:

_____

_____

Surveys 1 and 2 (German class)

Fragebogen 1 (3E)

Danke, dass du teilnimmst! Egal was du ankreuzt, jede deiner Antworten ist wichtig und richtig ☺

1. Ich bin: □ ein Mädchen □ ein Bub

2. Mit meiner Familie spreche ich diese Sprache/n: _____

3. Ich freue mich auf die Biostunden mit der neuen Lehrerin.

□	□	□
☹	😐	☺

4. Ich würde auch gerne wie unsere Nachbarklasse auf Englisch unterrichtet werden. Mein Englisch würde sich dadurch vielleicht verbessern.

□	□	□
☹	😐	☺

5. Ich denke, dass ich gleich viel über das neue Thema lernen würde, wenn ich auf Englisch unterrichtet werden würde.

□	□	□
☹	😐	☺

6. Kreuze **maximal 2 Kästchen** an!
Ich lerne Englisch vor allem, weil:

□ ich die Sprache mag.

□ es wichtig ist um die Schularbeiten und Tests zu schaffen.

□ mir der Englischunterricht in der Schule gefällt.

□ ich es für meinen späteren Beruf brauchen könnte.

7. In Englisch hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

8. In Biologie hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

9. Kreuze an wie du dich einschätzt (1= trifft nicht zu; 5= trifft völlig zu)

<u>Im Biologieunterricht…</u>

fühle ich mich manchmal überfordert.

5 4 3 2 1

interessiere ich mich meistens für die Themen.

5 4 3 2 1

arbeite ich gerne mit.

5 4 3 2 1

habe ich Angst Fehler zu machen.

5 4 3 2 1

herrscht ein gutes Lernklima.

5 4 3 2 1

finde ich die Unterrichtsmaterialien leicht zu verstehen.

5 4 3 2 1

Fragebogen 2 (3E)

Danke, dass du teilnimmst! Egal was du ankreuzt, jede deiner Antworten ist wichtig und richtig ☺

1. Ich bin: □ ein Mädchen □ ein Bub

2. Mit meiner Familie spreche ich diese Sprache/n: _____

3. Die Biostunden zum Thema Evolution haben mir Spaß gemacht.

□ □ □

☹ 😐 ☺

4. Ich hätte die Stunden lieber auf Englisch gehabt, dann hätte ich mein Englisch verbessern können.

□ □ □

☹ 😐 ☺

5. Wären die Stunden auf Englisch gewesen, hätte ich sicher gleich viel gelernt.

□ □ □

☹ 😐 ☺

6. Kreuze **maximal 2 Kästchen** an!

Ich versuche hauptsächlich Englisch zu lernen, weil:

□ ich sonst keine positiven Noten bekomme.

□ mir die englische Sprache Spaß macht.

□ ich es später für meine Arbeit brauchen könnte.

□ ich den Englischunterricht lustig finde.

7. In Englisch hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

8. In Biologie hatte ich im letzten Zeugnis die Note:

□ 5 □ 4 □ 3 □ 2 □ 1

9. Kreuze an wie du dich einschätzt (1= trifft nicht zu; 5= trifft völlig zu)

Im Biologieunterricht der letzten Wochen…

habe ich mich manchmal überfordert gefühlt.

5 4 3 2 1

habe ich mich für das Thema interessiert.

5 4 3 2 1

habe ich gerne mitgearbeitet.

5 4 3 2 1

hatte ich Angst Fehler zu machen.

5 4 3 2 1

herrschte ein gutes Lernklima.

5 4 3 2 1

habe ich die Unterrichtsmaterialien leicht zu verstehen gefunden.

5 4 3 2 1

10. Das hat mir am meisten an den Biostunden der letzten Wochen gefallen:

_____

_____

11. Das hat mir weniger gefallen:

_____

_____

SPSS results

Results CLIL class

Question 3: "I am looking forward to the biology lessons in English." (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
3	1,00	25	2,2800	,67823	,13565
	2,00	26	2,8077	,40192	,07882

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
3	Varianzen sind gleich	10,286	,002	-3,396	49	,001	-,52769	,15538	-,83995	-,21543
	Varianzen sind nicht gleich			-3,364	38,708	,002	-,52769	,15689	-,84510	-,21029

Question 4: "I believe that I can improve my English in CLIL lessons." (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
4	1,00	25	2,2800	,54160	,10832
	2,00	26	2,3462	,68948	,13522

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
4	Varianzen sind gleich	3,070	,086	-,380	49	,706	-,06615	,17408	-,41598	,28367
	Varianzen sind nicht gleich			-,382	47,154	,704	-,06615	,17326	-,41467	,28236

Question 5: "I think that I will learn as much as in regular lessons about the topic taught." (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
5	1,00	25	2,2400	,59722	,11944
	2,00	26	2,3462	,68948	,13522

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
5	Varianzen sind gleich	1,694	,199	-,587	49	,560	-,10615	,18093	-,46975	,25745
	Varianzen sind nicht gleich			-,588	48,485	,559	-,10615	,18042	-,46881	,25651

Question 9a: “I sometimes feel overwhelmed.” (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9a	1,00	25	4,20	1,080	,216
	2,00	26	4,23	1,107	,217

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9a	Varianzen sind gleich	,093	,762	-,100	49	,920	-,031	,306	-,646	,585
	Varianzen sind nicht gleich			-,100	48,988	,920	-,031	,306	-,646	,585

Question 9b: “I am mostly interested in the topics.” (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9b	1,00	25	2,00	,764	,153
	2,00	26	1,85	,967	,190

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9b	Varianzen sind gleich	1,901	,174	,629	49	,532	,154	,245	-,338	,646
	Varianzen sind nicht gleich			,632	47,244	,531	,154	,244	-,336	,644

Question 9c:“I like to participate.” (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9c	1,00	25	1,88	1,166	,233
	2,00	26	1,77	,951	,187

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9c	Varianzen sind gleich	,009	,927	,372	49	,711	,111	,297	-,487	,709
	Varianzen sind nicht gleich			,371	46,325	,712	,111	,299	-,490	,712

Question 9d: “I am scared of making mistakes.” (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9d	1,00	25	3,76	1,012	,202
	2,00	26	4,12	1,306	,256

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9d	Varianzen sind gleich	4,123	,048	-1,083	49	,284	-,355	,328	-1,015	,304
	Varianzen sind nicht gleich			-1,089	46,905	,282	-,355	,326	-1,012	,301

Question 9e: “The atmosphere is pleasant.” (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9e	1,00	25	1,88	1,013	,203
	2,00	26	1,77	,863	,169

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9e	Varianzen sind gleich	,171	,681	,421	49	,676	,111	,263	-,418	,640
	Varianzen sind nicht gleich			,420	47,138	,677	,111	,264	-,420	,642

Question 9f: “The materials are easy to understand. (biology lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
9f	1,00	25	1,76	,970	,194
	2,00	26	1,69	,970	,190

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
9f	Varianzen sind gleich	,673	,416	,249	49	,804	,068	,272	-,478	,614
	Varianzen sind nicht gleich			,249	48,925	,804	,068	,272	-,478	,614

Question 10a: “I sometimes feel overwhelmed.” (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9a	1,00	25	4,0400	,88882	,17776
	2,00	26	4,2308	1,10662	,21703

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9a	Varianzen sind gleich	1,404	,242	-,677	49	,502	-,19077	,28175	-,75697	,37543
	Varianzen sind nicht gleich			-,680	47,518	,500	-,19077	,28054	-,75497	,37343

Question 10b: “I am mostly interested in the topics.” (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9b	1,00	25	2,1600	1,10604	,22121
	2,00	26	1,8462	,96715	,18967

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9b	Varianzen sind gleich	,204	,653	1,080	49	,285	,31385	,29062	-,27017	,89786
	Varianzen sind nicht gleich			1,077	47,575	,287	,31385	,29139	-,27217	,89987

Question 10c: “I like to participate.” (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9c	1,00	25	1,8000	1,11803	,22361
	2,00	26	1,7692	,95111	,18653

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9c	Varianzen sind gleich	,194	,661	,106	49	,916	,03077	,29026	-,55253	,61407
	Varianzen sind nicht gleich			,106	47,119	,916	,03077	,29119	-,55499	,61653

Question 10d: “I am scared of making mistakes.“ (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9d	1,00	25	3,4400	1,38684	,27737
	2,00	26	4,1154	1,30620	,25617

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9d	Varianzen sind gleich	,161	,690	-1,791	49	,079	-,67538	,37711	-1,43322	,08245
	Varianzen sind nicht gleich			-1,789	48,517	,080	-,67538	,37756	-1,43432	,08355

Question 10e: “The atmosphere is pleasant“ (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9e	1,00	25	1,8000	,91287	,18257
	2,00	26	1,7692	,86291	,16923

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9e	Varianzen sind gleich	,195	,661	,124	49	,902	,03077	,24866	-,46894	,53048
	Varianzen sind nicht gleich			,124	48,551	,902	,03077	,24894	-,46962	,53116

Question 10f: “The materials are easy to understand.” (English lessons vs. CLIL)

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9f	1,00	25	2,2000	1,15470	,23094
	2,00	26	1,6923	,97033	,19030

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9f	Varianzen sind gleich	,534	,468	1,702	49	,095	,50769	,29821	-,09159	1,10697
	Varianzen sind nicht gleich			1,697	46,899	,096	,50769	,29924	-,09434	1,10973

Correlations CLIL class

Correlations between exclusively German speaking students and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
3	1,00	21	2,2857	,64365	,14046
	2,00	20	2,8000	,41039	,09177
4	1,00	21	2,3333	,57735	,12599
	2,00	20	2,3000	,73270	,16384
5	1,00	21	2,1905	,60159	,13128
	2,00	20	2,2500	,71635	,16018
9a	1,00	21	4,29	1,056	,230
	2,00	20	4,35	,933	,209
9b	1,00	21	1,81	,602	,131
	2,00	20	1,65	,745	,167
9c	1,00	21	1,62	,740	,161
	2,00	20	1,70	,865	,193
9d	1,00	21	3,95	,973	,212
	2,00	20	4,35	1,226	,274
9e	1,00	21	1,67	,966	,211
	2,00	20	1,60	,754	,169
9f	1,00	21	1,62	,740	,161
	2,00	20	1,65	,875	,196

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
3	Varianzen sind gleich	6,241	,017	-3,033	39	,004	-,51429	,16956	-,85725	-,17133
	Varianzen sind nicht gleich			-3,065	34,166	,004	-,51429	,16778	-,85519	-,17338
4	Varianzen sind gleich	1,696	,201	,162	39	,872	,03333	,20547	-,38227	,44894
	Varianzen sind nicht gleich			,161	36,117	,873	,03333	,20668	-,38578	,45245
5	Varianzen sind gleich	1,425	,240	-,289	39	,774	-,05952	,20621	-,47662	,35757
	Varianzen sind nicht gleich			-,287	37,166	,775	-,05952	,20710	-,47909	,36004
9a	Varianzen sind gleich	,042	,839	-,206	39	,838	-,064	,312	-,695	,566
	Varianzen sind nicht gleich			-,207	38,794	,837	-,064	,311	-,693	,565
9b	Varianzen sind gleich	2,897	,097	,756	39	,454	,160	,211	-,267	,586
	Varianzen sind nicht gleich			,752	36,535	,457	,160	,212	-,270	,590
9c	Varianzen sind gleich	1,321	,257	-,323	39	,749	-,081	,251	-,588	,427
	Varianzen sind nicht gleich			-,321	37,447	,750	-,081	,252	-,591	,429
9d	Varianzen sind gleich	1,345	,253	-1,153	39	,256	-,398	,345	-1,095	,300
	Varianzen sind nicht gleich			-1,147	36,253	,259	-,398	,347	-1,101	,306
9e	Varianzen sind gleich	,056	,814	,245	39	,807	,067	,272	-,483	,616
	Varianzen sind nicht gleich			,247	37,581	,806	,067	,270	-,480	,613
9f	Varianzen sind gleich	1,534	,223	-,123	39	,903	-,031	,253	-,542	,480
	Varianzen sind nicht gleich			-,122	37,270	,904	-,031	,254	-,545	,483

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9a	1,00	21	4,0476	,97346	,21243
	2,00	20	4,3500	,93330	,20869
EC_9b	1,00	21	2,0952	1,09109	,23810
	2,00	20	1,6500	,74516	,16662
EC_9c	1,00	21	1,6667	,91287	,19920
	2,00	20	1,7000	,86450	,19331
EC_9d	1,00	21	3,5714	1,43427	,31298
	2,00	20	4,3500	1,22582	,27410
EC_9e	1,00	21	1,5714	,74642	,16288
	2,00	20	1,6000	,75394	,16859
EC_9f	1,00	21	2,0476	1,07127	,23377
	2,00	20	1,6500	,87509	,19568

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9a	Varianzen sind gleich	,056	,813	-1,014	39	,317	-,30238	,29810	-,90535	,30059
	Varianzen sind nicht gleich			-1,015	38,998	,316	-,30238	,29779	-,90471	,29995
EC_9b	Varianzen sind gleich	,154	,697	1,518	39	,137	,44524	,29326	-,14794	1,03842
	Varianzen sind nicht gleich			1,532	35,439	,134	,44524	,29061	-,14446	1,03494
EC_9c	Varianzen sind gleich	,004	,951	-,120	39	,905	-,03333	,27796	-,59556	,52889
	Varianzen sind nicht gleich			-,120	38,999	,905	-,03333	,27758	-,59479	,52813
EC_9d	Varianzen sind gleich	1,721	,197	-1,864	39	,070	-,77857	,41767	-1,62338	,06624
	Varianzen sind nicht gleich			-1,871	38,564	,069	-,77857	,41604	-1,62040	,06326
EC_9e	Varianzen sind gleich	,004	,947	-,122	39	,904	-,02857	,23436	-,50261	,44546
	Varianzen sind nicht gleich			-,122	38,860	,904	-,02857	,23442	-,50278	,44564
EC_9f	Varianzen sind gleich	,960	,333	1,298	39	,202	,39762	,30638	-,22210	1,01734
	Varianzen sind nicht gleich			1,304	38,137	,200	,39762	,30486	-,21946	1,01470

Correlations between multilingual students and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
3	1,00	4	2,2500	,95743	,47871
	2,00	6	2,8333	,40825	,16667
4	1,00	4	2,0000	,00000	,00000
	2,00	6	2,5000	,54772	,22361
5	1,00	4	2,5000	,57735	,28868
	2,00	6	2,6667	,51640	,21082
9a	1,00	4	3,75	1,258	,629
	2,00	6	3,83	1,602	,654
9b	1,00	4	3,00	,816	,408
	2,00	6	2,50	1,378	,563
9c	1,00	4	3,25	2,062	1,031
	2,00	6	2,00	1,265	,516
9d	1,00	4	2,75	,500	,250
	2,00	6	3,33	1,366	,558
9e	1,00	4	3,00	,000	,000
	2,00	6	2,33	1,033	,422
9f	1,00	4	2,50	1,732	,866
	2,00	6	1,83	1,329	,543

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
3	Varianzen sind gleich	4,919	,057	-1,350	8	,214	-,58333	,43201	-1,57955	,41288
	Varianzen sind nicht gleich			-1,151	3,738	,318	-,58333	,50690	-2,03041	,86374
4	Varianzen sind gleich	.	.	-1,789	8	,111	-,50000	,27951	-1,14455	,14455
	Varianzen sind nicht gleich			-2,236	5,000	,076	-,50000	,22361	-1,07480	,07480
5	Varianzen sind gleich	,400	,545	-,478	8	,645	-,16667	,34861	-,97056	,63723
	Varianzen sind nicht gleich			-,466	6,025	,657	-,16667	,35746	-1,04046	,70713
9a	Varianzen sind gleich	,416	,537	-,087	8	,933	-,083	,957	-2,290	2,123
	Varianzen sind nicht gleich			-,092	7,637	,929	-,083	,908	-2,194	2,027
9b	Varianzen sind gleich	1,067	,332	,646	8	,536	,500	,774	-1,285	2,285
	Varianzen sind nicht gleich			,719	7,969	,493	,500	,695	-1,104	2,104
9c	Varianzen sind gleich	4,320	,071	1,202	8	,264	1,250	1,040	-1,147	3,647
	Varianzen sind nicht gleich			1,084	4,524	,333	1,250	1,153	-1,810	4,310
9d	Varianzen sind gleich	4,923	,057	-,805	8	,444	-,583	,725	-2,254	1,088
	Varianzen sind nicht gleich			-,954	6,756	,373	-,583	,611	-2,039	,873
9e	Varianzen sind gleich	6,817	,031	1,265	8	,242	,667	,527	-,549	1,882
	Varianzen sind nicht gleich			1,581	5,000	,175	,667	,422	-,417	1,751
9f	Varianzen sind gleich	,089	,773	,692	8	,509	,667	,964	-1,556	2,889
	Varianzen sind nicht gleich			,652	5,325	,541	,667	1,022	-1,913	3,246

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9a	1,00	4	4,0000	,00000	,00000
	2,00	6	3,8333	1,60208	,65405
EC_9b	1,00	4	2,5000	1,29099	,64550
	2,00	6	2,5000	1,37840	,56273
EC_9c	1,00	4	2,5000	1,91485	,95743
	2,00	6	2,0000	1,26491	,51640
EC_9d	1,00	4	2,7500	,95743	,47871
	2,00	6	3,3333	1,36626	,55777
EC_9e	1,00	4	3,0000	,81650	,40825
	2,00	6	2,3333	1,03280	,42164
EC_9f	1,00	4	3,0000	1,41421	,70711
	2,00	6	1,8333	1,32916	,54263

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9a	Varianzen sind gleich	7,411	,026	,204	8	,844	,16667	,81756	-1,71863	2,05196
	Varianzen sind nicht gleich			,255	5,000	,809	,16667	,65405	-1,51462	1,84795
EC_9b	Varianzen sind gleich	,000	1,000	,000	8	1,000	,00000	,86903	-2,00398	2,00398
	Varianzen sind nicht gleich			,000	6,901	1,000	,00000	,85635	-2,03084	2,03084
EC_9c	Varianzen sind gleich	1,200	,305	,503	8	,629	,50000	,99478	-1,79396	2,79396
	Varianzen sind nicht gleich			,460	4,758	,666	,50000	1,08781	-2,33968	3,33968
EC_9d	Varianzen sind gleich	1,032	,339	-,735	8	,483	-,58333	,79331	-2,41271	1,24604
	Varianzen sind nicht gleich			-,794	7,918	,451	-,58333	,73504	-2,28138	1,11471
EC_9e	Varianzen sind gleich	,548	,480	1,079	8	,312	,66667	,61802	-,75848	2,09182
	Varianzen sind nicht gleich			1,136	7,615	,290	,66667	,58689	-,69872	2,03205
EC_9f	Varianzen sind gleich	,069	,799	1,327	8	,221	1,16667	,87896	-,86022	3,19355
	Varianzen sind nicht gleich			1,309	6,269	,236	1,16667	,89132	-,99180	3,32513

Correlations between boys and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
3	1,00	14	2,0714	,73005	,19511
	2,00	15	2,6667	,48795	,12599
4	1,00	14	2,2143	,57893	,15473
	2,00	15	2,2000	,67612	,17457
5	1,00	14	2,2143	,69929	,18689
	2,00	15	2,2667	,79881	,20625
9a	1,00	14	3,71	1,204	,322
	2,00	15	4,07	1,033	,267
9b	1,00	14	2,07	,829	,221
	2,00	15	2,07	1,033	,267
9c	1,00	14	2,21	1,424	,381
	2,00	15	2,27	,961	,248
9d	1,00	14	3,57	1,016	,272
	2,00	15	4,00	1,363	,352
9e	1,00	14	2,14	1,167	,312
	2,00	15	2,07	,961	,248
9f	1,00	14	1,79	1,188	,318
	2,00	15	2,00	1,069	,276

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
3	Varianzen sind gleich	,432	,516	-2,598	27	,015	-,59524	,22910	-1,06531	-,12517
	Varianzen sind nicht gleich			-2,563	22,473	,018	-,59524	,23225	-1,07632	-,11416
4	Varianzen sind gleich	,379	,543	,061	27	,952	,01429	,23456	-,46699	,49557
	Varianzen sind nicht gleich			,061	26,815	,952	,01429	,23327	-,46451	,49308
5	Varianzen sind gleich	,770	,388	-,187	27	,853	-,05238	,27965	-,62618	,52142
	Varianzen sind nicht gleich			-,188	26,899	,852	-,05238	,27833	-,62357	,51881
9a	Varianzen sind gleich	,256	,617	-,848	27	,404	-,352	,416	-1,205	,501
	Varianzen sind nicht gleich			-,843	25,719	,407	-,352	,418	-1,212	,507
9b	Varianzen sind gleich	,141	,710	,014	27	,989	,005	,349	-,712	,722
	Varianzen sind nicht gleich			,014	26,432	,989	,005	,347	-,707	,717
9c	Varianzen sind gleich	1,716	,201	-,117	27	,908	-,052	,448	-,972	,867
	Varianzen sind nicht gleich			-,115	22,611	,909	-,052	,454	-,993	,888
9d	Varianzen sind gleich	3,047	,092	-,954	27	,348	-,429	,449	-1,350	,493
	Varianzen sind nicht gleich			-,964	25,793	,344	-,429	,445	-1,343	,485
9e	Varianzen sind gleich	,367	,550	,192	27	,849	,076	,396	-,736	,889
	Varianzen sind nicht gleich			,191	25,264	,850	,076	,399	-,744	,897
9f	Varianzen sind gleich	,024	,877	-,511	27	,613	-,214	,419	-1,074	,646
	Varianzen sind nicht gleich			-,509	26,184	,615	-,214	,421	-1,079	,650

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9a	1,00	14	3,8571	,77033	,20588
	2,00	15	4,0667	1,03280	,26667
EC_9b	1,00	14	2,5714	1,08941	,29116
	2,00	15	2,0667	1,03280	,26667
EC_9c	1,00	14	2,1429	1,16732	,31198
	2,00	15	2,2667	,96115	,24817
EC_9d	1,00	14	3,1429	1,35062	,36097
	2,00	15	4,0000	1,36277	,35187
EC_9e	1,00	14	2,0714	,99725	,26653
	2,00	15	2,0667	,96115	,24817
EC_9f	1,00	14	2,4286	1,22250	,32673
	2,00	15	2,0000	1,06904	,27603

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9a	Varianzen sind gleich	2,177	,152	-,616	27	,543	-,20952	,34034	-,90785	,48881
	Varianzen sind nicht gleich			-,622	25,794	,539	-,20952	,33689	-,90229	,48324
EC_9b	Varianzen sind gleich	,821	,373	1,281	27	,211	,50476	,39407	-,30380	1,31332
	Varianzen sind nicht gleich			1,278	26,586	,212	,50476	,39482	-,30593	1,31546
EC_9c	Varianzen sind gleich	,135	,716	-,313	27	,757	-,12381	,39592	-,93617	,68855
	Varianzen sind nicht gleich			-,311	25,264	,759	-,12381	,39865	-,94440	,69678
EC_9d	Varianzen sind gleich	,029	,867	-1,700	27	,101	-,85714	,50425	-1,89178	,17750
	Varianzen sind nicht gleich			-1,700	26,895	,101	-,85714	,50409	-1,89164	,17736
EC_9e	Varianzen sind gleich	,061	,807	,013	27	,990	,00476	,36370	-,74148	,75100
	Varianzen sind nicht gleich			,013	26,687	,990	,00476	,36417	-,74287	,75240
EC_9f	Varianzen sind gleich	,104	,750	1,007	27	,323	,42857	,42568	-,44485	1,30200
	Varianzen sind nicht gleich			1,002	25,919	,326	,42857	,42772	-,45074	1,30789

Correlations between girls and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
3	1,00	11	2,5455	,52223	,15746
	2,00	11	3,0000	,00000	,00000
4	1,00	11	2,3636	,50452	,15212
	2,00	11	2,5455	,68755	,20730
5	1,00	11	2,2727	,46710	,14084
	2,00	11	2,4545	,52223	,15746
9a	1,00	11	4,82	,405	,122
	2,00	11	4,45	1,214	,366
9b	1,00	11	1,91	,701	,211
	2,00	11	1,55	,820	,247
9c	1,00	11	1,45	,522	,157
	2,00	11	1,09	,302	,091
9d	1,00	11	4,00	1,000	,302
	2,00	11	4,27	1,272	,384
9e	1,00	11	1,55	,688	,207
	2,00	11	1,36	,505	,152
9f	1,00	11	1,73	,647	,195
	2,00	11	1,27	,647	,195

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
3	Varianzen sind gleich	1200,000	,000	-2,887	20	,009	-,45455	,15746	-,78300	-,12609
	Varianzen sind nicht gleich			-2,887	10,000	,016	-,45455	,15746	-,80539	-,10370
4	Varianzen sind gleich	1,192	,288	-,707	20	,488	-,18182	,25713	-,71818	,35455
	Varianzen sind nicht gleich			-,707	18,349	,488	-,18182	,25713	-,72129	,35766
5	Varianzen sind gleich	2,286	,146	-,861	20	,400	-,18182	,21125	-,62249	,25885
	Varianzen sind nicht gleich			-,861	19,756	,400	-,18182	,21125	-,62283	,25920
9a	Varianzen sind gleich	3,195	,089	,943	20	,357	,364	,386	-,441	1,168
	Varianzen sind nicht gleich			,943	12,195	,364	,364	,386	-,475	1,203
9b	Varianzen sind gleich	1,192	,288	1,118	20	,277	,364	,325	-,315	1,042
	Varianzen sind nicht gleich			1,118	19,523	,277	,364	,325	-,316	1,043
9c	Varianzen sind gleich	19,048	,000	2,000	20	,059	,364	,182	-,016	,743
	Varianzen sind nicht gleich			2,000	16,000	,063	,364	,182	-,022	,749
9d	Varianzen sind gleich	1,493	,236	-,559	20	,582	-,273	,488	-1,290	,745
	Varianzen sind nicht gleich			-,559	18,944	,583	-,273	,488	-1,294	,749
9e	Varianzen sind gleich	1,882	,185	,707	20	,488	,182	,257	-,355	,718
	Varianzen sind nicht gleich			,707	18,349	,488	,182	,257	-,358	,721
9f	Varianzen sind gleich	,243	,628	1,648	20	,115	,455	,276	-,121	1,030
	Varianzen sind nicht gleich			1,648	20,000	,115	,455	,276	-,121	1,030

Gruppenstatistiken

	Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
EC_9a	1,00	11	4,2727	1,00905	,30424
	2,00	11	4,4545	1,21356	,36590
EC_9b	1,00	11	1,6364	,92442	,27872
	2,00	11	1,5455	,82020	,24730
EC_9c	1,00	11	1,3636	,92442	,27872
	2,00	11	1,0909	,30151	,09091
EC_9d	1,00	11	3,8182	1,40130	,42251
	2,00	11	4,2727	1,27208	,38355
EC_9e	1,00	11	1,4545	,68755	,20730
	2,00	11	1,3636	,50452	,15212
EC_9f	1,00	11	1,9091	1,04447	,31492
	2,00	11	1,2727	,64667	,19498

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
EC_9a	Varianzen sind gleich	,000	1,000	-,382	20	,706	-,18182	,47586	-1,17445	,81082
	Varianzen sind nicht gleich			-,382	19,355	,707	-,18182	,47586	-1,17658	,81294
EC_9b	Varianzen sind gleich	,000	1,000	,244	20	,810	,09091	,37262	-,68636	,86817
	Varianzen sind nicht gleich			,244	19,721	,810	,09091	,37262	-,68706	,86888
EC_9c	Varianzen sind gleich	3,863	,063	,930	20	,363	,27273	,29317	-,33882	,88428
	Varianzen sind nicht gleich			,930	12,104	,370	,27273	,29317	-,36543	,91089
EC_9d	Varianzen sind gleich	,082	,778	-,797	20	,435	-,45455	,57063	-1,64486	,73577
	Varianzen sind nicht gleich			-,797	19,816	,435	-,45455	,57063	-1,64557	,73648
EC_9e	Varianzen sind gleich	1,192	,288	,354	20	,727	,09091	,25713	-,44545	,62727
	Varianzen sind nicht gleich			,354	18,349	,728	,09091	,25713	-,44857	,63038
EC_9f	Varianzen sind gleich	2,951	,101	1,718	20	,101	,63636	,37039	-,13626	1,40899
	Varianzen sind nicht gleich			1,718	16,684	,104	,63636	,37039	-,14622	1,41895

Correlations between students' English grades and questions 3-5, 9a-f, 10a-f before the project started

Deskriptive Statistiken

	Grades English	Mittelwert	Standardabweichung	N
3	1,00	2,1667	,75277	6
	2,00	2,5833	,66856	12
	3,00	2,0000	,00000	6
	4,00	1,0000	.	1
	Gesamt	2,2800	,67823	25
4	1,00	2,3333	,51640	6
	2,00	2,2500	,62158	12
	3,00	2,3333	,51640	6
	4,00	2,0000	.	1
	Gesamt	2,2800	,54160	25
5	1,00	2,1667	,40825	6
	2,00	2,1667	,57735	12
	3,00	2,5000	,83666	6
	4,00	2,0000	.	1
	Gesamt	2,2400	,59722	25
9a	1,00	3,50	1,225	6
	2,00	4,75	,452	12
	3,00	3,67	1,366	6
	4,00	5,00	.	1
	Gesamt	4,20	1,080	25

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
Grades_English	3	3,290[a]	3	1,097	2,972	,055
	4	,123[b]	3	,041	,125	,944
	5	,560[c]	3	,187	,490	,693
	9a	8,917[d]	3	2,972	3,271	,041
	9b	1,500[e]	3	,500	,840	,487
	9c	2,307[f]	3	,769	,532	,665
	9d	,810[g]	3	,270	,239	,868
	9e	,390[h]	3	,130	,113	,952
	9f	1,477[i]	3	,492	,490	,693
	EC_9a	3,210[j]	3	1,070	1,427	,263
	EC_9b	5,027[k]	3	1,676	1,446	,258
	EC_9c	4,167[l]	3	1,389	1,129	,360
	EC_9d	7,160[m]	3	2,387	1,285	,305
	EC_9e	,500[n]	3	,167	,179	,909
	EC_9f	3,667[o]	3	1,222	,906	,455

Correlations between students' English grades and questions 3-5, 9a-f, 10a-f after the project

Deskriptive Statistiken

	Grades English	Mittelwert	Standardabweichung	N
3	1,00	2,7500	,46291	8
	2,00	2,8000	,42164	10
	3,00	2,8571	,37796	7
	4,00	3,0000	.	1
	Gesamt	2,8077	,40192	26
4	1,00	2,6250	,51755	8
	2,00	2,3000	,82327	10
	3,00	2,1429	,69007	7
	4,00	2,0000	.	1
	Gesamt	2,3462	,68948	26
5	1,00	2,6250	,51755	8
	2,00	2,5000	,52705	10
	3,00	2,0000	,81650	7
	4,00	1,0000	.	1
	Gesamt	2,3462	,68948	26

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
Grades_English	3	,081[a]	3	,027	,151	,928
	4	1,052[b]	3	,351	,713	,555
	5	3,510[c]	3	1,170	3,073	,049
	9a	2,158[d]	3	,719	,556	,649
	9b	1,270[e]	3	,423	,421	,740
	9c	,158[f]	3	,053	,052	,984
	9d	,922[g]	3	,307	,162	,921
	9e	,212[h]	3	,071	,084	,968
	9f	,510[i]	3	,170	,162	,921
	EC_9a	2,158[d]	3	,719	,556	,649
	EC_9b	1,270[e]	3	,423	,421	,740
	EC_9c	,158[f]	3	,053	,052	,984
	EC_9d	,922[g]	3	,307	,162	,921
	EC_9e	,212[h]	3	,071	,084	,968
	EC_9f	,510[i]	3	,170	,162	,921

Correlations between students' biology grades and questions 3-5, 9a-f, 10a-f before the project started

Deskriptive Statistiken

	Grades Biology	Mittelwert	Standardabweichung	N
3	1,00	2,2381	,70034	21
	2,00	2,3333	,57735	3
	3,00	3,0000	.	1
	Gesamt	2,2800	,67823	25
4	1,00	2,2857	,56061	21
	2,00	2,0000	,00000	3
	3,00	3,0000	.	1
	Gesamt	2,2800	,54160	25
5	1,00	2,1905	,60159	21
	2,00	2,6667	,57735	3
	3,00	2,0000	.	1
	Gesamt	2,2400	,59722	25
9a	1,00	4,38	,921	21
	2,00	2,67	1,155	3
	3,00	5,00	.	1
	Gesamt	4,20	1,080	25
EC_9b	1,00	1,9524	,97346	21
	2,00	2,6667	,57735	3
	3,00	5,0000	.	1
	Gesamt	2,1600	1,10604	25

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
Grades_English	3	,564[a]	2	,282	,592	,562
	4	,754[b]	2	,377	1,320	,287
	5	,655[c]	2	,328	,912	,416
	9a	8,381[d]	2	4,190	4,699	,020
	9b	,381[e]	2	,190	,308	,738
	9c	2,735[f]	2	1,368	1,006	,382
	9d	3,322[g]	2	1,661	1,721	,202
	9e	,069[h]	2	,034	,031	,970
	9f	3,322[i]	2	1,661	1,899	,173
	EC_9a	1,150[j]	2	,575	,711	,502
	EC_9b	9,741[k]	2	4,870	5,462	,012
	EC_9c	2,667[l]	2	1,333	1,073	,359
	EC_9d	,922[m]	2	,461	,224	,801
	EC_9e	,762[n]	2	,381	,436	,652
	EC_9f	1,524[o]	2	,762	,550	,585

Correlations between students' biology grades and questions 3-5, 9a-f, 10a-f after the project

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
Korrigiertes Modell	3	,099[a]	2	,050	,289	,752
	4	,794[b]	2	,397	,823	,452
	5	,445[c]	2	,223	,448	,645
	9a	3,176[d]	2	1,588	1,331	,284
	9b	,794[e]	2	,397	,404	,672
	9c	1,176[f]	2	,588	,631	,541
	9d	1,396[g]	2	,698	,389	,682
	9e	3,176[h]	2	1,588	2,366	,116
	9f	3,554[i]	2	1,777	2,045	,152
	EC_9a	3,176[d]	2	1,588	1,331	,284
	EC_9b	,794[e]	2	,397	,404	,672
	EC_9c	1,176[f]	2	,588	,631	,541
	EC_9d	1,396[g]	2	,698	,389	,682
	EC_9e	3,176[h]	2	1,588	2,366	,116
	EC_9f	3,554[i]	2	1,777	2,045	,152

Results German class

Question 3: "I am looking forward to the biology lessons with the new teacher." (biology lessons vs. project)

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-3	1,00	26	2,7692	,42967	,08427
	2,00	27	2,9259	,38490	,07407

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-3	Varianzen sind gleich	6,565	,013	-1,400	51	,168	-,15670	,11196	-,38146	,06807
	Varianzen sind nicht gleich			-1,397	49,909	,169	-,15670	,11219	-,38205	,06866

Question 4: "I would also like to be taught in English. I believe that this could improve my English." (biology lessons vs. project)

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-4	1,00	27	1,8519	,66238	,12747
	2,00	27	1,7037	,72403	,13934

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-4	Varianzen sind gleich	1,347	,251	,784	52	,436	,14815	,18885	-,23081	,52711
	Varianzen sind nicht gleich			,784	51,594	,436	,14815	,18885	-,23088	,52718

Question 5: "I think that I would learn as much as in regular lessons, if I was taught in English." (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-5	1,00	27	1,7222	,68407	,13165
	2,00	27	1,7963	,68303	,13145

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-5	Varianzen sind gleich	,133	,716	-,398	52	,692	-,07407	,18604	-,44739	,29924
	Varianzen sind nicht gleich			-,398	52,000	,692	-,07407	,18604	-,44739	,29924

Question 9a: "I sometimes feel overwhelmed." (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9a	1,00	27	3,9815	,90385	,17395
	2,00	27	4,6667	,67937	,13074

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9a	Varianzen sind gleich	1,247	,269	-3,149	52	,003	-,68519	,21760	-1,12184	-,24853
	Varianzen sind nicht gleich			-3,149	48,270	,003	-,68519	,21760	-1,12264	-,24773

Question 9b: "I am mostly interested in the topics". (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9b	1,00	27	2,0741	,95780	,18433
	2,00	27	1,7593	1,15501	,22228

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9b	Varianzen sind gleich	,720	,400	1,090	52	,281	,31481	,28877	-,26464	,89427
	Varianzen sind nicht gleich			1,090	50,278	,281	,31481	,28877	-,26511	,89474

Question 9c: “I like to participate.“ (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9c	1,00	27	2,1852	1,11068	,21375
	2,00	27	1,7963	1,11165	,21394

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9c	Varianzen sind gleich	,083	,774	1,286	52	,204	,38889	,30242	-,21796	,99574
	Varianzen sind nicht gleich			1,286	52,000	,204	,38889	,30242	-,21796	,99574

Question 9d: “I am scared of making mistakes.” (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9d	1,00	27	3,6481	1,01730	,19578
	2,00	27	4,2407	1,06852	,20564

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9d	Varianzen sind gleich	,035	,853	-2,087	52	,042	-,59259	,28393	-1,16234	-,02285
	Varianzen sind nicht gleich			-2,087	51,875	,042	-,59259	,28393	-1,16237	-,02281

Question 9e: “The atmosphere is pleasant.” (biology lessons vs. project)

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9e	1,00	27	2,2407	,84774	,16315
	2,00	27	1,5741	,66076	,12716

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9e	Varianzen sind gleich	,522	,473	3,223	52	,002	,66667	,20685	,25159	1,08175
	Varianzen sind nicht gleich			3,223	49,075	,002	,66667	,20685	,25100	1,08234

Question 9f: “The materials are easy to understand.“ (biology lessons vs. project)

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9f	1,00	27	2,0185	1,04220	,20057
	2,00	27	1,5926	,83248	,16021

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9f	Varianzen sind gleich	,873	,354	1,659	52	,103	,42593	,25670	-,08919	,94104
	Varianzen sind nicht gleich			1,659	49,579	,103	,42593	,25670	-,08979	,94164

Correlations German class

Correlations between exclusively German speaking students and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9a	1,00	23	4,0217	,91052	,18986
	2,00	23	4,7826	,42174	,08794
G-9b	1,00	23	2,0870	1,04067	,21700
	2,00	23	1,6304	1,18913	,24795
G-9c	1,00	23	2,0000	1,08711	,22668
	2,00	23	1,6739	1,06182	,22141
G-9d	1,00	23	3,7609	1,02102	,21290
	2,00	23	4,3261	,99554	,20759
G-9e	1,00	23	2,1957	,88855	,18528
	2,00	23	1,4565	,61999	,12928
G-9f	1,00	23	1,8478	,89741	,18712
	2,00	23	1,4348	,71198	,14846
G-3	1,00	22	2,7727	,42893	,09145
	2,00	23	2,9130	,41703	,08696
G-4	1,00	23	1,8696	,62554	,13043
	2,00	23	1,6957	,70290	,14657
G-5	1,00	23	1,6739	,59560	,12419
	2,00	23	1,7174	,61839	,12894

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9a	Varianzen sind gleich	4,389	,042	-3,636	44	,001	-,76087	,20923	-1,18255	-,33919
	Varianzen sind nicht gleich			-3,636	31,024	,001	-,76087	,20923	-1,18759	-,33415
G-9b	Varianzen sind gleich	,006	,938	1,386	44	,173	,45652	,32949	-,20753	1,12057
	Varianzen sind nicht gleich			1,386	43,240	,173	,45652	,32949	-,20786	1,12090
G-9c	Varianzen sind gleich	,001	,979	1,029	44	,309	,32609	,31687	-,31251	,96469
	Varianzen sind nicht gleich			1,029	43,976	,309	,32609	,31687	-,31252	,96470
G-9d	Varianzen sind gleich	,311	,580	-1,901	44	,064	-,56522	,29735	-1,16449	,03405
	Varianzen sind nicht gleich			-1,901	43,972	,064	-,56522	,29735	-1,16450	,03406
G-9e	Varianzen sind gleich	1,173	,285	3,272	44	,002	,73913	,22592	,28382	1,19444
	Varianzen sind nicht gleich			3,272	39,317	,002	,73913	,22592	,28228	1,19598
G-9f	Varianzen sind gleich	1,633	,208	1,729	44	,091	,41304	,23886	-,06835	,89444
	Varianzen sind nicht gleich			1,729	41,836	,091	,41304	,23886	-,06905	,89514
G-3	Varianzen sind gleich	3,809	,058	-1,113	43	,272	-,14032	,12611	-,39464	,11401
	Varianzen sind nicht gleich			-1,112	42,768	,272	-,14032	,12619	-,39485	,11421
G-4	Varianzen sind gleich	1,829	,183	,886	44	,380	,17391	,19620	-,22150	,56933
	Varianzen sind nicht gleich			,886	43,415	,380	,17391	,19620	-,22165	,56948
G-5	Varianzen sind gleich	,012	,912	-,243	44	,809	-,04348	,17903	-,40428	,31732
	Varianzen sind nicht gleich			-,243	43,938	,809	-,04348	,17903	-,40430	,31734

Correlations between multilingual students and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9a	1,00	4	3,7500	,95743	,47871
	2,00	3	4,6667	,57735	,33333
G-9b	1,00	4	2,0000	,00000	,00000
	2,00	3	2,3333	,57735	,33333
G-9c	1,00	4	3,2500	,50000	,25000
	2,00	3	2,3333	1,52753	,88192
G-9d	1,00	4	3,0000	,81650	,40825
	2,00	3	4,0000	1,73205	1,00000
G-9e	1,00	4	2,5000	,57735	,28868
	2,00	3	2,0000	,00000	,00000
G-9f	1,00	4	3,0000	1,41421	,70711
	2,00	3	2,3333	1,15470	,66667
G-3	1,00	4	2,7500	,50000	,25000
	2,00	3	3,0000	,00000	,00000
G-4	1,00	4	1,7500	,95743	,47871
	2,00	3	1,6667	1,15470	,66667
G-5	1,00	4	2,0000	1,15470	,57735
	2,00	3	2,0000	1,00000	,57735

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9a	Varianzen sind gleich	1,394	,291	-1,452	5	,206	-,91667	,63136	-2,53962	,70629
	Varianzen sind nicht gleich			-1,571	4,890	,178	-,91667	,58333	-2,42637	,59304
G-9b	Varianzen sind gleich	22,857	,005	-1,195	5	,286	-,33333	,27889	-1,05023	,38357
	Varianzen sind nicht gleich			-1,000	2,000	,423	-,33333	,33333	-1,76755	1,10088
G-9c	Varianzen sind gleich	4,037	,101	1,153	5	,301	,91667	,79495	-1,12682	2,96015
	Varianzen sind nicht gleich			1,000	2,324	,410	,91667	,91667	-2,54425	4,37759
G-9d	Varianzen sind gleich	3,571	,117	-1,035	5	,348	-1,00000	,96609	-3,48342	1,48342
	Varianzen sind nicht gleich			-,926	2,673	,430	-1,00000	1,08012	-4,68827	2,68827
G-9e	Varianzen sind gleich	.	.	1,464	5	,203	,50000	,34157	-,37802	1,37802
	Varianzen sind nicht gleich			1,732	3,000	,182	,50000	,28868	-,41869	1,41869
G-9f	Varianzen sind gleich	,046	,839	,663	5	,537	,66667	1,00554	-1,91816	3,25149
	Varianzen sind nicht gleich			,686	4,898	,524	,66667	,97183	-1,84717	3,18050
G-3	Varianzen sind gleich	6,429	,052	-,845	5	,437	-,25000	,29580	-1,01039	,51039
	Varianzen sind nicht gleich			-1,000	3,000	,391	-,25000	,25000	-1,04561	,54561
G-4	Varianzen sind gleich	,208	,668	,105	5	,921	,08333	,79495	-1,96015	2,12682
	Varianzen sind nicht gleich			,102	3,903	,924	,08333	,82074	-2,21802	2,38469
G-5	Varianzen sind gleich	1,429	,286	,000	5	1,000	,00000	,83666	-2,15070	2,15070
	Varianzen sind nicht gleich			,000	4,800	1,000	,00000	,81650	-2,12545	2,12545

Correlations between boys and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	G-Pre_Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9a	1,00	14	3,7500	,84921	,22696
	2,00	14	4,5000	,85485	,22847
G-9b	1,00	14	2,4286	,93761	,25059
	2,00	14	2,2500	1,39711	,37339
G-9c	1,00	14	2,7143	,99449	,26579
	2,00	14	2,3929	1,24311	,33224
G-9d	1,00	14	3,8929	,96434	,25773
	2,00	14	4,5357	,69238	,18505
G-9e	1,00	14	2,6071	,92359	,24684
	2,00	14	1,8929	,68440	,18291
G-9f	1,00	14	2,5357	,92952	,24843
	2,00	14	1,5714	,82874	,22149
G-3	1,00	13	2,5385	,51887	,14391
	2,00	14	2,8571	,53452	,14286
G-4	1,00	14	1,5714	,64621	,17271
	2,00	14	1,4286	,64621	,17271
G-5	1,00	14	1,6429	,74495	,19910
	2,00	14	1,7500	,70027	,18716

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9a	Varianzen sind gleich	,035	,853	-2,329	26	,028	-,75000	,32204	-1,41196	-,08804
	Varianzen sind nicht gleich			-2,329	25,999	,028	-,75000	,32204	-1,41196	-,08804
G-9b	Varianzen sind gleich	1,784	,193	,397	26	,695	,17857	,44969	-,74577	1,10291
	Varianzen sind nicht gleich			,397	22,735	,695	,17857	,44969	-,75227	1,10942
G-9c	Varianzen sind gleich	1,051	,315	,755	26	,457	,32143	,42547	-,55314	1,19599
	Varianzen sind nicht gleich			,755	24,805	,457	,32143	,42547	-,55519	1,19805
G-9d	Varianzen sind gleich	1,279	,268	-2,026	26	,053	-,64286	,31728	-1,29504	,00932
	Varianzen sind nicht gleich			-2,026	23,589	,054	-,64286	,31728	-1,29830	,01258
G-9e	Varianzen sind gleich	1,534	,227	2,325	26	,028	,71429	,30723	,08277	1,34580
	Varianzen sind nicht gleich			2,325	23,969	,029	,71429	,30723	,08016	1,34841
G-9f	Varianzen sind gleich	,223	,640	2,897	26	,008	,96429	,33283	,28015	1,64842
	Varianzen sind nicht gleich			2,897	25,665	,008	,96429	,33283	,27972	1,64885
G-3	Varianzen sind gleich	3,293	,082	-1,570	25	,129	-,31868	,20301	-,73678	,09942
	Varianzen sind nicht gleich			-1,572	24,944	,129	-,31868	,20278	-,73635	,09899
G-4	Varianzen sind gleich	,037	,848	,585	26	,564	,14286	,24424	-,35919	,64491
	Varianzen sind nicht gleich			,585	26,000	,564	,14286	,24424	-,35919	,64491
G-5	Varianzen sind gleich	,287	,597	-,392	26	,698	-,10714	,27325	-,66882	,45453
	Varianzen sind nicht gleich			-,392	25,901	,698	-,10714	,27325	-,66892	,45464

Correlations between girls and questions 3-5, 9a-f, 10a-f

Gruppenstatistiken

	G-Pre Post	N	Mittelwert	Standardabweichung	Standardfehler des Mittelwertes
G-9a	1,00	13	4,2308	,92681	,25705
	2,00	13	4,8462	,37553	,10415
G-9b	1,00	13	1,6923	,85485	,23709
	2,00	13	1,2308	,43853	,12163
G-9c	1,00	13	1,6154	,96077	,26647
	2,00	13	1,1538	,37553	,10415
G-9d	1,00	13	3,3846	1,04391	,28953
	2,00	13	3,9231	1,32045	,36623
G-9e	1,00	13	1,8462	,55470	,15385
	2,00	13	1,2308	,43853	,12163
G-9f	1,00	13	1,4615	,87706	,24325
	2,00	13	1,6154	,86972	,24122
G-3	1,00	13	3,0000	,00000[a]	,00000
	2,00	13	3,0000	,00000[a]	,00000
G-4	1,00	13	2,1538	,55470	,15385
	2,00	13	2,0000	,70711	,19612
G-5	1,00	13	1,8077	,63043	,17485
	2,00	13	1,8462	,68874	,19102

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit						
									95% Konfidenzintervall der Differenz	
		F	Signifikanz	T	df	Sig. (2-seitig)	Mittlere Differenz	Standardfehler der Differenz	Untere	Obere
G-9a	Varianzen sind gleich	6,912	,015	-2,219	24	,036	-,61538	,27735	-1,18781	-,04296
	Varianzen sind nicht gleich			-2,219	15,837	,041	-,61538	,27735	-1,20383	-,02694
G-9b	Varianzen sind gleich	3,048	,094	1,732	24	,096	,46154	,26647	-,08843	1,01150
	Varianzen sind nicht gleich			1,732	17,907	,100	,46154	,26647	-,09850	1,02158
G-9c	Varianzen sind gleich	8,699	,007	1,613	24	,120	,46154	,28610	-,12895	1,05202
	Varianzen sind nicht gleich			1,613	15,583	,127	,46154	,28610	-,14629	1,06937
G-9d	Varianzen sind gleich	,360	,554	-1,153	24	,260	-,53846	,46685	-1,50199	,42507
	Varianzen sind nicht gleich			-1,153	22,787	,261	-,53846	,46685	-1,50471	,42779
G-9e	Varianzen sind gleich	,083	,776	3,138	24	,004	,61538	,19612	,21062	1,02015
	Varianzen sind nicht gleich			3,138	22,787	,005	,61538	,19612	,20948	1,02129
G-9f	Varianzen sind gleich	,394	,536	-,449	24	,657	-,15385	,34257	-,86088	,55319
	Varianzen sind nicht gleich			-,449	23,998	,657	-,15385	,34257	-,86089	,55319
G-4	Varianzen sind gleich	,159	,693	,617	24	,543	,15385	,24926	-,36060	,66829
	Varianzen sind nicht gleich			,617	22,712	,543	,15385	,24926	-,36215	,66984
G-5	Varianzen sind gleich	,023	,880	-,149	24	,883	-,03846	,25896	-,57293	,49601
	Varianzen sind nicht gleich			-,149	23,815	,883	-,03846	,25896	-,57315	,49623

Correlations between students' English grades and questions 3-5, 9a-f, 10a-f before the project started

Deskriptive Statistiken

	G-Grades_English	Mittelwert	Standardabweichung	N
G-9c	1,00	1,8571	1,06904	7
	2,00	1,6000	,84327	10
	3,00	2,6667	1,15470	3
	4,00	3,4000	,89443	5
	5,00	3,0000	.	1
	Gesamt	2,1923	1,13205	26
G-9d	1,00	3,5714	1,27242	7
	2,00	3,8500	,94428	10
	3,00	3,6667	1,52753	3
	4,00	3,0000	,00000	5
	5,00	5,0000	.	1
	Gesamt	3,6346	1,03497	26
G-9e	1,00	1,8571	,37796	7
	2,00	2,0500	,83166	10
	3,00	3,3333	1,15470	3
	4,00	2,2000	,83666	5
	5,00	3,0000	.	1
	Gesamt	2,2115	,85057	26
G-4	1,00	2,4286	,53452	7
	2,00	1,8000	,42164	10
	3,00	1,3333	,57735	3
	4,00	1,8000	,83666	5
	5,00	1,0000	.	1
	Gesamt	1,8846	,65280	26

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
G_Grades_English	G-9a	2,120[a]	4	,530	,614	,657
	G-9b	5,495[b]	4	1,374	1,652	,199
	G-9c	12,915[c]	4	3,229	3,545	,023
	G-9d	4,373[d]	4	1,093	1,025	,418
	G-9e	5,538[e]	4	1,384	2,317	,091
	G-9f	1,892[f]	4	,473	,392	,812
	G-3	1,149[g]	4	,287	1,740	,179
	G-4	3,873[h]	4	,968	2,999	,042
	G-5	1,811[i]	4	,453	,969	,445

Correlations between students' English grades and questions 3-5, 9a-f, 10a-f after the project

Deskriptive Statistiken

	G-Grades_English	Mittelwert	Standardabweichung	N
G-9a	1,00	5,0000	,00000	7
	2,00	4,6667	,49237	12
	3,00	4,6667	,57735	3
	4,00	4,0000	1,41421	4
	5,00	5,0000	.	1
	Gesamt	4,6667	,67937	27
G-9b	1,00	1,1429	,37796	7
	2,00	1,8750	1,24545	12
	3,00	1,6667	,57735	3
	4,00	1,7500	,95743	4
	5,00	5,0000	.	1
	Gesamt	1,7593	1,15501	27
G-9c	1,00	1,0000	,00000	7
	2,00	1,9583	1,13735	12
	3,00	1,3333	,57735	3
	4,00	2,2500	,50000	4
	5,00	5,0000	.	1
	Gesamt	1,7963	1,11165	27

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
G_Grades_English	G-9a	2,667[a]	4	,667	1,571	,217
	G-9b	13,349[b]	4	3,337	3,441	,025
	G-9c	16,484[c]	4	4,121	5,795	,002
	G-9d	4,194[d]	4	1,049	,905	,478
	G-9e	2,599[e]	4	,650	1,633	,202
	G-9f	2,471[f]	4	,618	,874	,495
	G-3	3,852[g]	4	,963	.	.
	G-4	3,534[h]	4	,884	1,926	,142
	G-5	1,109[i]	4	,277	,553	,699

Correlations between students' biology grades and questions 3-5, 9a-f, 10a-f before the project started

Deskriptive Statistiken

	G-Grades_Biology	Mittelwert	Standardabweichung	N
G-9a	1,00	4,2222	,80845	18
	2,00	3,8750	1,31498	4
	3,00	3,0000	.	1
	4,00	4,0000	.	1
	Gesamt	4,1042	,88440	24
G-9b	1,00	1,7778	,80845	18
	2,00	2,5000	1,29099	4
	3,00	4,0000	.	1
	4,00	3,0000	.	1
	Gesamt	2,0417	,99909	24
G-3	1,00	2,8333	,38348	18
	2,00	2,7500	,50000	4
	3,00	2,0000	.	1
	4,00	2,0000	.	1
	Gesamt	2,7500	,44233	24

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
G_Grades_Biology	G-9a	1,691[a]	3	,564	,692	,568
	G-9b	6,847[b]	3	2,282	2,833	,064
	G-9c	6,722[c]	3	2,241	2,123	,129
	G-9d	2,191[d]	3	,730	,686	,571
	G-9e	,941[e]	3	,314	,381	,768
	G-9f	3,441[f]	3	1,147	1,533	,237
	G-3	1,250[g]	3	,417	2,564	,083
	G-4	2,083[h]	3	,694	1,916	,160
	G-5	,920[i]	3	,307	,838	,489

Correlations between students' biology grades and questions 3-5, 9a-f, 10a-f

Deskriptive Statistiken

	G-Grades_Biology	Mittelwert	Standardabweichung	N
G-9a	1,00	4,7778	,42779	18
	2,00	4,6000	,54772	5
	3,00	5,0000	.	1
	4,00	5,0000	.	1
	Gesamt	4,7600	,43589	25
G-9b	1,00	1,3333	,59409	18
	2,00	2,5000	1,58114	5
	3,00	5,0000	.	1
	4,00	1,0000	.	1
	Gesamt	1,7000	1,17260	25
G-9c	1,00	1,4444	,78382	18
	2,00	2,3000	1,20416	5
	3,00	5,0000	.	1
	4,00	2,0000	.	1
	Gesamt	1,7800	1,11878	25
G-9d	1,00	4,3333	1,08465	18
	2,00	4,3000	,67082	5
	3,00	5,0000	.	1
	4,00	5,0000	.	1
	Gesamt	4,3800	,97125	25
G-9e	1,00	1,3333	,48507	18
	2,00	2,1000	,74162	5
	3,00	2,0000	.	1
	4,00	1,0000	.	1
	Gesamt	1,5000	,61237	25

Tests der Zwischensubjekteffekte

Quelle	Abhängige Variable	Quadratsumme vom Typ III	df	Mittel der Quadrate	F	Sig.
G_Grades_Biology	G-9a	,249[a]	3	,083	,404	,752
	G-9b	17,000[b]	3	5,667	7,438	,001
	G-9c	13,796[c]	3	4,599	5,945	,004
	G-9d	,840[d]	3	,280	,270	,846
	G-9e	2,800[e]	3	,933	3,161	,046
	G-9f	,762[f]	3	,254	,411	,747
	G-3	3,840[g]	3	1,280	.	.
	G-4	,949[h]	3	,316	,614	,613
	G-5	1,000[i]	3	,333	,875	,470