

MASTERARBEIT | MASTER'S THESIS

Titel | Title

"Can CLIL and biology go together in middle school? - The implementation of a CLIL project in biology lessons at middle school"

verfasst von | submitted by

Christina Klein, BEd

angestrebter akademischer Grad | in partial fulfilment of the requirements for the degree of
Master of Education (MEd)

Wien | Vienna, 2024

Studienkennzahl lt. Studienblatt |
Degree programme code as it appears on the
student record sheet:

UA 199 502 507 02

Studienrichtung lt. Studienblatt | Degree
programme as it appears on the student record
sheet:

Masterstudium Lehramt Sek (AB) Unterrichtsfach
Biologie und Umweltbildung Unterrichtsfach Englisch

Betreut von | Supervisor:

Univ.-Prof. Mag. Dr. Ute Smit

Table of Contents

List of Figures	i
List of Tables	i
1 Introduction	1
2 Content and Language Integrated Learning (CLIL).....	3
2.1 A definition of CLIL	3
2.2 The 4Cs Framework	5
2.2.1 Content and Language.....	6
2.2.2 Cognition.....	8
2.2.3 Culture.....	11
2.3 A pluriliteracies approach.....	12
2.3.1 Aims and principles of a pluriliteracies approach	12
2.3.2 The pluriliteracies model.....	13
3 CLIL in a European context.....	14
3.1 The implementation of CLIL across Europe	14
3.2 CLIL practices in Austria	16
4 CLIL in the lower-secondary science classroom.....	19
4.1 CLIL with young learners	19
4.2 Benefits and challenges	20
4.3 Diversity in CLIL	21
5 Lesson Design.....	24
5.1 The function of materials	25
5.2 Selecting CLIL materials.....	25
5.3 Designing CLIL materials	26
5.3.1 Principles for designing CLIL materials	27
5.3.2 Cognitive discourse functions (CDFs)	30
5.4 CLIL teaching practices	31
6 Empirical study: methodology and research design	33
6.1 Research questions	33
6.2 Methodology	34
6.3 Data collection instruments	34
6.3.1 Pretest/posttest design	34
6.3.2 Student questionnaire	40
6.4 The materials	45

6.5	The participants	46
6.6	The school context	47
6.7	Data analysis	48
6.7.1	Analysis of pretest/posttest.....	48
6.7.2	Analysis of questionnaire	49
6.8	Limitations	50
7	Findings.....	51
7.1	Pretest and posttest results.....	51
7.1.1	Insights into learners' prior knowledge	52
7.1.2	Progress in content and vocabulary learning.....	54
7.1.3	English knowledge gains.....	56
7.1.4	Content knowledge.....	58
7.2	Results from the questionnaire	60
7.2.1	Interest in biology and English.....	60
7.2.2	Experiences with conducted CLIL lessons.....	61
7.2.3	Importance of scaffolding	65
7.2.4	Open-ended questions	66
8	Discussion	70
8.1	Content and vocabulary learning.....	71
8.2	The learners' experiences with CLIL	73
8.3	Inclusion of learners	74
8.4	Impact of scaffolding.....	75
9	Conclusion.....	76
10	Bibliography	79
11	Appendix	83
11.1	CLIL teaching materials	83
11.1.1	Self-designed worksheets	83
11.1.2	Parts of a flower – information cards	86
11.1.3	One of the flower models	87
11.2	The pretest	88
11.3	The posttest	89
11.4	The student questionnaire.....	90
11.5	Letter to the parents.....	92
11.6	Abstract (English)	93
11.7	Abstract (German).....	94

List of Figures

Figure 1. The 4Cs Framework (Coyle et al. 2010: 41)	6
Figure 2. The Language Triptych (Coyle et al. 2010: 36)	7
Figure 3. The pluriliteracies model (Meyer et al. 2015: 49)	14
Figure 4. The DIDI Framework (Siepmann & Pérez Cañado 2022: 207)	22
Figure 5. First task in the pretest (adapted from Maldonado et al. 2013).....	36
Figure 6. First task in the posttest (adapted from Maldonado et al. 2013)	38
Figure 7. Second task in the posttest	38
Figure 8. Task three in the posttest (adapted from Dreamstime 2000-2024)	39
Figure 9. The two open-ended questions in the questionnaire	44
Figure 10. Scores achieved by learners for labelling the parts of a flower in German	52
Figure 11. Scores achieved by learners for labelling the parts of a flower in German	53
Figure 12. Group A's German vocabulary knowledge of flower parts before and after the CLIL lessons	55
Figure 13. Group B's German vocabulary knowledge of flower parts before and after the CLIL lessons	56
Figure 14. Number of correctly labelled flower parts in German and English by Group A in posttest	57
Figure 15. Number of correctly labelled flower parts in German and English by Group B	57
Figure 16. Item 13: I can follow CLIL biology lessons better than regular biology lessons	64
Figure 17. The learners' favorite aspects of the CLIL sequences	67
Figure 18. A comparison between group A's and group B's favorite parts	68
Figure 19. An overview of the CLIL aspects the learners did not like	69
Figure 20. A comparison of group A's and group B's least favorite parts	70

List of Tables

Table 1. Dalton-Puffer's (2013: 235) cognitive discourse functions	10
Table 2. Ball et al.'s (2015: chapter 7) principles for CLIL material design	28
Table 3. Classification of statements in student questionnaire	42
Table 4. The first four statements of the questionnaire	43
Table 5. Overview of participants	47
Table 6. Number of participants in tests and questionnaire	51
Table 7. Students' prior knowledge concerning the process of pollination	54
Table 8. The learners' knowledge of the function of petals	58
Table 9. The process of pollination explained by learners.....	59
Table 10. Learners' general interest in biological topics	60
Table 11. Learners' interest in biology in general and at school	61
Table 12. Learners' experiences with the conducted CLIL lessons	61
Table 13. Item 7: I like ordinary biology lessons better than CLIL biology lessons	62
Table 14. Mean scores depicting difficulty perceived by learners	63
Table 15. Learners' perceived learning progress	64
Table 16. Learners' perceptions of scaffolding techniques	65
Table 17. Students' responses regarding the helpfulness of group work.....	66

1 Introduction

Speaking the first foreign language (FL) does not only broaden one's cultural horizon, but it is also a highly valuable skill in a globally interconnected world. For this reason, education programs across Europe have fostered foreign language teaching in schools for many years. Apart from traditional foreign language classes, which predominantly focus on English as the foreign language to be taught (EFL), bilingual teaching approaches have gained recognition in European schools as well. One of the most popular bilingual teaching approaches is called Content and Language Integrated Learning (CLIL), which aims at combining content and language learning in the classroom. More specifically, CLIL merges the teaching of a content subject such as biology, history, or geography with the teaching of a foreign language, which is mostly English when speaking of a European context.

Although CLIL is known for being highly advantageous to students' content and language learning, this approach is still underrepresented in a large number of Austrian schools. Due to its reputation of being a rather elitist approach for high-achieving learners, CLIL has mostly been applied in grammar schools, which often contain a homogeneous, high-performing student body (McClintic 2022: 897). This might be the reason why Austrian middle schools, which are known for their highly diverse pupils, have been more reluctant with the implementation of CLIL programs. For me, an English and biology teacher in her third year of teaching in a middle school, the question has arisen whether middle school students should really be deprived from CLIL teaching because they bring different learning conditions, educational needs and social backgrounds to the table. The middle school where I am currently working has never introduced CLIL to its learners, which sparked my motivation to investigate the potential of CLIL in middle schools. For this reason, this master's thesis investigates if CLIL and biology teaching can go together in a middle school. In particular, the following research questions lie at the core of this thesis:

1. To what extent is applying a CLIL approach beneficial to 5th graders' content and vocabulary learning in biology lessons at middle school?
2. In how far does adopting a CLIL approach facilitate the inclusion of all learners in biology lessons at middle school?

3. What principles can teachers employ to cater to the diverse educational needs of their learners?
4. What are the students' perceptions of CLIL biology lessons in contrast to regular biology lessons?

To answer these research questions and to obtain an understanding of the theoretical underpinnings of CLIL, its implementation across Europe and particularly in Austria, a comprehensive literature review is presented. The literature review also discusses the topic of lesson design and principles of CLIL materials development, which form the foundation of the self-developed materials for the implemented CLIL project. The empirical part of this thesis draws on the theoretical concepts discussed in the review and attempts to investigate the effects of self-conducted CLIL lessons on 5th grade learners' content and vocabulary learning. The students' learning progress is determined by means of a pretest and posttest. The insights gained from the learners' performances are complemented with their own perceptions of the conducted lessons. Thus, a questionnaire investigating the students' experiences with CLIL contributes to a more complete picture of how CLIL can work in middle school.

While the results gained from the pretest and posttest are compared and illustrated by means of Excel, the students' responses to the questionnaire are statistically analyzed with SPSS. In further steps, the results and insights gained are discussed and limitations of the study are depicted. Based on the findings, conclusions on what to consider when implementing CLIL in middle school are drawn and an outlook on further research is given.

2 Content and Language Integrated Learning (CLIL)

As a form of bilingual education, Content and Language Integrated Learning (CLIL) has become an increasingly popular teaching approach over the last decades. While bilingual education outside of Europe is often labeled as immersion or content-based teaching, CLIL is the dominant approach to bilingual education on the European continent (Nikula 2017: 111). In the early 1990s, phenomena such as migration, multilingualism and globalization created the need for European citizens to be equipped with more than one language (Coyle et al. 2010: 2). This need was recognized by the European policy makers, who introduced CLIL as a form of bilingual education to promote multilingualism within the EU (Hemmi & Banegas 2021: 1). In other words, CLIL should support Europeans in becoming multilingual citizens (Dalton-Puffer 2011: 184).

While all foreign language teaching, including CLIL, originally intended to provide each European citizen with three languages (L1 and two other European languages), current CLIL practices usually focus on one foreign language for the teaching and learning of content (Hemmi & Banegas 2021: 1). For this reason, it can be said that current realizations of CLIL are more similar to Canadian bilingual and immersion programs in the 1960s and 1970s (Hemmi & Banegas 2021: 1), which were established with the aim of fostering the French language skills of the Canadian population. To not neglect French as the second official language in Canada, parts of the school curriculum are taught in French (Navés 2009: 23). This is where CLIL and Canadian immersion overlap because both focus on the teaching of curricular content through a selected target language. To get a better understanding of CLIL and its core characteristics, it is more closely defined in the following section.

2.1 A definition of CLIL

Since the beginnings of CLIL in the 1990s, researchers have tried to come up with definitions that best describe this multifaceted approach. As CLIL is flexible and adaptable to various contexts (Coyle et al. 2010: 1), it allows for a variety of interpretations and realizations. Depending on the educational context, CLIL programs can either focus on content, language or on both. This thesis will discuss two frequently quoted definitions of CLIL, which both focus on integrating content and language alike. One well-established definition, which was coined

by Coyle et al. (2010: 1), describes CLIL “as a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language”. In other words, this definition focuses on developing an additional language and subject knowledge alike (Bärnthaler & Kelly 2021: 194). According to Coyle et al. (2010: 1), an additional language can be a learner’s foreign or second language as well as “some form of heritage or community language”. This is what distinguishes Coyle et al.’s definition from Dalton-Puffer’s, who is another well-known researcher in the field of CLIL. Dalton-Puffer (2011: 184) stresses that “CLIL is about using a foreign language or a lingua franca, not a second language”, which is why she describes CLIL as “an educational approach where curricular content is taught through the medium of a foreign language, typically to students participating in some form of mainstream education at the primary, secondary, or tertiary level”. Although this definition includes any foreign language for the teaching and learning of content subjects, English is the dominant foreign language used in CLIL settings (Dalton-Puffer 2011: 184). This is also emphasized by Hemmi and Banegas (2021: 1), who argue that English is most often offered as a foreign language in schools around the world and, thus, the main language of CLIL programs. However, this does not mean that CLIL lessons replace traditional English lessons. To illustrate this, CLIL is frequently content-driven, which means that CLIL lessons are usually held as content lessons by content teachers (Dalton-Puffer 2011: 184, Coyle et al. 2010: 1). In most cases, CLIL teachers are not language experts but specialists in content subjects such as biology, history, or geography. Since CLIL lessons are usually scheduled as content lessons, they do not interfere with regular English lessons, which are taught by language teachers (Dalton-Puffer 2011: 184).

When having a look at the implementation of CLIL programs in educational contexts, it becomes obvious that CLIL practices do not only differ from country to country but also across school types. That “CLIL practices vary considerably in schools across Europe” is also stated by the Eurydice report (Eurydice 2017: 14), which investigates language teaching practices in the European Union. This is due to a lack of specific guidelines and regulations regarding the implementation of CLIL programs (Dalton-Puffer 2011: 185). Although positive effects of CLIL are recognized and promoted by European policy makers in a variety of educational frameworks, “precise learning goals and objectives are largely missing” (Dalton-Puffer 2011: 185). Due to this lack of specific learning objectives, teachers have a lot of freedom in their choices regarding their CLIL practices in school. Thus, one could say that CLIL is being

approached from two directions, namely top-down and bottom-up. On the one hand, policy makers promote CLIL in language policies, while on the other hand, individual teachers or teams at school often develop their CLIL programs autonomously because specific regulations are missing (Dalton-Puffer 2007: 3). Thus, CLIL programs across countries or even within countries or regions are often difficult to compare (Hüttner & Smit 2014: 163). Not only do a lack of specific guidelines but also varied understandings concerning the core characteristics of CLIL lead to considerable differences in the implementation of this approach. This is supported by Cenoz et al. (2014: 243), who argue that the core features of CLIL such as “the balance between language and content instruction, the nature of the target languages involved, instructional goals, defining characteristics of student participants, and pedagogical approaches to integrating language and content instruction” are often comprehended in different ways. To obtain a common understanding of this approach, it is crucial to look at the core elements of CLIL in more detail.

2.2 The 4Cs Framework

Coyle et al. (2010: 41) introduced the 4Cs Framework to illustrate the interrelationship of the core elements that constitute CLIL. As depicted in Figure 1, content and language integrated learning combines content, communication, cognition, and culture, and positions them within specific contexts. While content refers to the subject matter being taught, communication involves the learning and using of language. Cognition describes the thinking processes that are necessary for content and language learning to be successful. The fourth C, namely culture, refers to the development of intercultural understanding and global citizenship, which should both be developed through CLIL (Coyle et al. 2010: 41). Coyle et al. (2010: 41) call this interplay between these elements “a symbiosis through which effective CLIL can unfold”.

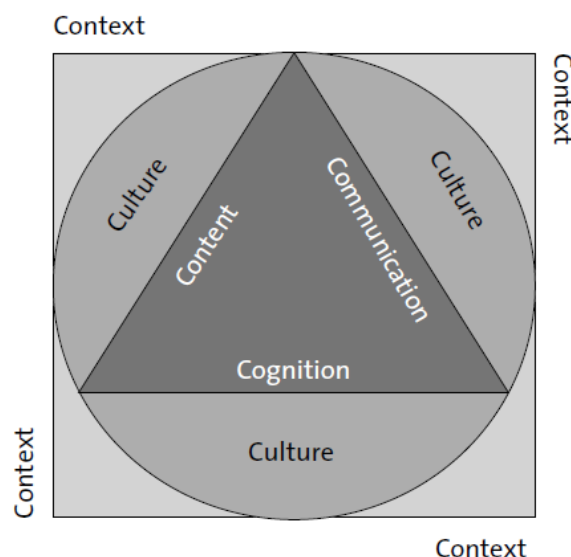


Figure 1. The 4Cs Framework (Coyle et al. 2010: 41)

After having briefly introduced the 4Cs of CLIL, it is necessary to have a closer look at each of them and the relationship between them.

2.2.1 Content and Language

As the term Content and Language Integrated Learning already suggests, the teaching and learning of content and language are the major foci of this approach. While the above-mentioned definitions of CLIL clearly put emphasis on the equal integration of content and language, researchers argue that this balance is often hard to achieve (Cenoz et al. 2014: 244; Dalton-Puffer 2007: 5). Although CLIL lessons can either be content-driven or language-driven (Dalton-Puffer 2007: 6), they are most often scheduled as content-lessons and, thus, rather content-driven (Pinner 2021: 24). When speaking of content in relation to CLIL, it makes sense to have a closer look at what is actually meant by content. Although CLIL is often understood as teaching a school subject through the medium of a foreign language, Coyle et al. (2010: 28) argue that the concept of content is more flexible than that. To illustrate this, content in CLIL can range from thematic elements from a curriculum to projects or even cross-curricular sequences (Coyle et al. 2010: 28). One has to bear in mind that content also depends on the learning facility. This means that factors such as “teacher availability, language support, age of learners and [...] social demands” (Coyle et al. 2010: 28) influence the choice of content. An important aspect is that the chosen content “makes the foreign language relevant” by providing learners with a reason to use the target language (Pinner 2021: 24). Content not only gives students a reason to use language, but it also provides them with an authentic purpose for using the target language in a communicative way (Pinner 2021: 24). Coyle et al. (2010: 33) also

stress the importance of applying language in authentic and interactive settings to foster the learners' communicative skills. This is where CLIL ties in with communicative language teaching; an approach that foregrounds the importance of communication in the language classroom (Richards & Rodgers 2014: 87). Since language is considered a tool for communication (Coyle et al. 2010: 32) and, thus, constitutes a core principle of CLIL, it is essential to clarify the meaning of language in relation to CLIL.

Developing knowledge of content and language requires learners not only to use language to learn but also how to use the language itself. This means that learners are confronted with different linguistic demands in the CLIL classroom. To better comprehend the concept of language in CLIL, Coyle et al. (2010: 36) developed the Language Triptych. The Language Triptych illustrates three perspectives from which CLIL language can be analyzed. As illustrated in Figure 2, learners require different types of language for CLIL linguistic progression to happen.

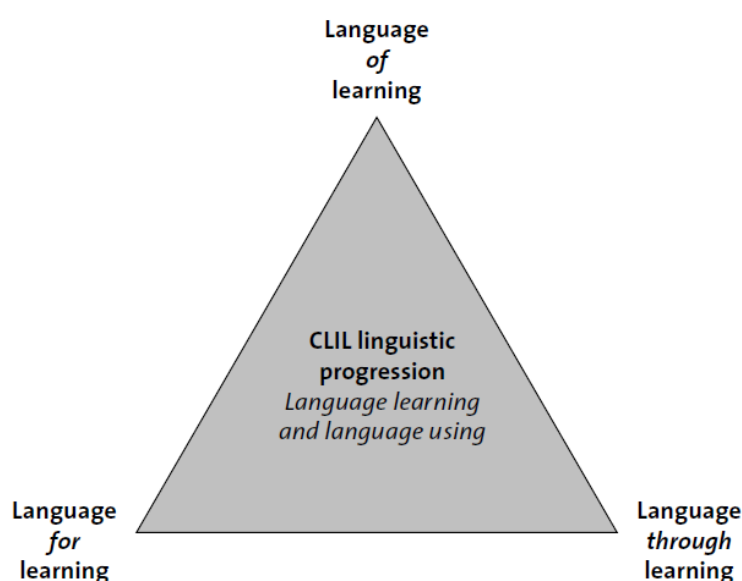


Figure 2. The Language Triptych (Coyle et al. 2010: 36)

Language of learning refers to the language learners need to understand certain concepts concerning a CLIL topic. For example, learners have to comprehend the concept of the past tense when they want to report on something that happened in the past. This does not mean that CLIL teachers should introduce the past tense from its roots but rather select certain verbs and phrases that are relevant to the content (Coyle et al. 2010: 37).

Language for learning describes the language learners need to express themselves in a foreign language setting. It is the teacher's responsibility to carefully plan and equip the learners with the language skills they need in order to operate successfully in a CLIL environment. This means that learners must develop a repertoire of skills and strategies that help them to take part in discussions, evaluate or draw conclusions. The language needed for successful learning can be made accessible through appropriate scaffolding, which must be carefully planned and carried out by the teacher (Coyle et al. 2010: 37).

Language through learning is based on the idea that learners must be actively involved in the language and thinking processes for learning to be effective. This can be achieved by asking learners to articulate their understanding of a certain concept. Articulating thought processes cannot only support learning, but it also fosters communication inside the classroom. It is likely that new linguistic demands and language features come up during a CLIL session. These demands need to be recognized and further developed by the CLIL teacher. One could say that language through learning emerges during the learning process and cannot always be predicted by the teacher (Coyle et al. 2010: 38).

To sum up, cognitively demanding content needs to be integrated with language learning and language using for CLIL to be effective. Content and language objectives are interrelated and need to be made explicit by the teacher so that progress in CLIL can happen (Coyle et al. 2010: 36). As illustrated in the 4Cs Framework above, content and language are not the only building blocks of CLIL. To receive a more complete picture of CLIL, it is essential to discuss the two remaining components, namely cognition and culture.

2.2.2 Cognition

When it comes to the effective learning of content and language, learners' cognitive engagement plays a crucial role. For CLIL to have an impact, it does not suffice to provide learners with knowledge and linguistic tools only. Belkhir (2020: 1) states that "[t]he connection between cognition and language is of paramount importance to language learning and teaching". Other researchers agree that learners need to be cognitively engaged in their learning by reflecting and articulating their own learning (Coyle et al. 2010: 29). This active cognitive involvement is considered crucial when content learning is concerned. For learning to be effective, learners not only need to be cognitively engaged, but they also have to know how to learn. In other

words, they need to develop metacognitive skills about learning. This thinking about learning is likely to happen when learners are faced with cognitive challenges, but they need to receive support and scaffolding from their teachers to develop such thinking skills. For example, students must be taught how to use creative thinking and problem-solving skills to successfully apply them. (Coyle et al. 2010: 29).

This ties in with Vygotsky's sociocultural theory and the concept of the zone of proximal development, which constitute theoretical foundations of CLIL (Dalton-Puffer 2007: 9). From a sociocultural perspective, social interaction is essential for humans' cognitive development, which Vygotsky illustrated by means of the zone of proximal development (ZPD). The zone of proximal development (ZPD) describes "[t]he difference between what an individual achieves by herself and what she might achieve when assisted" (Swain et al. 2015: 16). This does not only highlight the pivotal role of the teacher as a facilitator, but it also foregrounds the immense value of peer-collaboration when it comes to learners' development of thinking skills. Those skills are extremely important when learners are required to make meaning out of new knowledge or when they have to apply problem-solving strategies.

As cognition and the development of thinking skills are central aspects of all learning, they have received much attention from researchers in the field. Bloom's taxonomy (Bloom 1956 cited in Dalton-Puffer 2013: 221) was the first major attempt to categorize thinking processes based on the cognitive skills they involve. This taxonomy draws a distinction between lower-order and higher-order thinking skills, which are both essential for effective learning to take place (Coyle et al. 2010: 30). While lower-order thinking skills (LOTS) comprise the cognitive processes of remembering, understanding, and applying, higher-order thinking skills (HOTS) include analyzing, evaluating, and creating. This basic categorization has been further developed by researchers such as Anderson and Krathwohl (2001 cited in Dalton-Puffer 2013: 221), who expanded the model by a knowledge dimension. This connection of cognitive processes with types of knowledge is what makes the concept of lower-order and higher-order thinking skills so relevant to CLIL because it helps to conceptualize content learning (Coyle et al. 2010: 30). "[T]he critical analysis of new ideas [and] connecting them to already-known concepts" is what Coyle et al. (2010: 39) call deep learning. Coyle et al. (2010: 39) argue that deep learning "leads to understanding and long-term retention of those concepts so that they can be used for problem solving in unfamiliar contexts".

As already mentioned above, the learning of content is a core aspect of CLIL. Since CLIL lessons are mainly taught by subject teachers, CLIL objectives are usually formulated as content objectives (Dalton-Puffer 2013: 216). In most cases, CLIL teachers are not language specialists, which is why language specific goals are often missing in CLIL classes. To address this issue, Dalton-Puffer (2013: 235) has further developed the model of higher and lower-order thinking skills to bridge the gap between content and language teaching. She argues that “convergences in the curricular goals of second/foreign language education and subject-specific education(s)” need to be identified to fill the gap between subject and language pedagogies (Dalton-Puffer 2013: 220). Thus, Dalton-Puffer (2013: 220) has established a construct of cognitive discourse functions (CDFs), which brings together the “subject specific cognitive learning goals with the linguistic representations they receive in classroom interaction”. As illustrated in Table 1, Dalton-Puffer’s construct of cognitive discourse functions comprises seven different types, namely CLASSIFY, DEFINE, DESCRIBE, EVALUATE, EXPLAIN, EXPLORE, and REPORT. They all mirror communicative intentions such as classifying, defining, describing, evaluating, explaining, exploring, and reporting.

Table 1. Dalton-Puffer’s (2013: 235) cognitive discourse functions

CLASSIFY	Classify, compare, contrast, match, structure, categorize, subsume
DEFINE	Define, identify, characterize
DESCRIBE	Describe, label, identify, name, specify
EVALUATE	Evaluate, judge, argue, justify, take a stance, critique, recommend, comment, reflect, appreciate
EXPLAIN	Explain, reason, express cause/effect, draw conclusions, deduce
EXPLORE	Explore, hypothesize, speculate, predict, guess, estimate, simulate, take other perspectives
REPORT	Report, inform, recount, narrate, present, summarize, relate

Next to each type, there is a list of verbs that show how the respective cognitive discourse function can be realized in the classroom. In contrast to Bloom’s taxonomy, Dalton-Puffer (2013) moves away from this sharp distinction between higher-order and lower-order thinking skills by arranging the CDF construct in a horizontal manner. Arranging the CDFs this way makes the construct more flexible. To illustrate this, classifying does not always have to be less cognitively demanding than explaining or reporting if the task is adapted accordingly. However, it has to be mentioned that the CDF construct is not without its limitations and has to be further developed for CLIL contexts (Dalton-Puffer et al. 2022: 191). For example, Dalton-Puffer

(2013: 235) emphasizes that the labels and, thus, meanings given to the cognitive discourse functions are not unitary. This means that they could be interpreted differently across different contexts. Nevertheless, the construct is highly valuable for linking content and language learning objectives and, thus, crucial for CLIL material design. For this reason, the CDF construct will receive some more attention in the materials development section of this thesis.

2.2.3 Culture

Effective CLIL practice involves a further essential dimension, namely culture. Coyle et al. (2010: 39) argue that “culture determines the way we interpret the world, and that we use language to express this interpretation”. This close connection between culture and language is also stressed by Baker (2012: 62), who emphasizes that teaching language without the cultural context it appears in, is difficult. To illustrate this, language is needed to express customs, world views or ways of life, which often differ across cultures. Thus, it is crucial to encounter language in its cultural contexts. For cultural understanding to develop, content, communication and cognition must not be seen in isolation. It is crucial to link them to cultural contexts through social interaction. It is the teacher’s responsibility to provide effective interactional activities for students to develop cultural understanding and intercultural awareness (Coyle et al. 2010: 40). Pérez et al. (2017: 84) also highlight the importance of content for developing learners’ intercultural understanding. Pérez et al. (2017: 84) state that teachers need to “design and plan the teaching and learning process in different aspects, such as the selection of the contents which could enhance students’ opportunities to acquire intercultural values”. However, it does not suffice to foster intercultural awareness only on the classroom level. If CLIL attempts to have a cultural impact, then intercultural interaction needs to happen outside of the classroom as well (Coyle et al. 2010: 40).

While Coyle et al.’s (2010: 41) 4Cs Framework positions culture in relation to content, communication, and cognition to highlight their strong interrelationship, more recent work by Meyer and Coyle (2017: 218) also relates culture to academic disciplines. They argue that learners must also develop disciplinary cultural awareness, which is “a prerequisite to successfully communicating knowledge across subjects, cultures and languages (Meyer & Coyle 2017: 218). In other words, students must develop cultural awareness across academic disciplines to interpret content and language successfully. Culture can be considered a filter

through which content and language become meaningful. This is recognized by a pluriliteracies approach to language teaching, which builds on the 4Cs Framework but puts more focus on the integration of the Cs.

2.3 A pluriliteracies approach

For decades, the 4Cs Framework has been the main pedagogic tool for planning CLIL lessons. However, researchers argue that the 4Cs Framework does not come without its shortcomings (Meyer et al. 2015: 51). Meyer et al. (2015: 51) argue that “the integration of content and language is at the core of CLIL”, but the framework does not fully capture “how this integration might take place and how the complex interrelationship between the 4Cs can be conceptualized”. For this reason, researchers have further developed Coyle et al.’s (2010) 4Cs Framework by applying a pluriliteracies approach to teaching and learning. Before the pluriliteracies model will be presented in more detail, it is necessary to discuss the theoretical underpinnings of a pluriliteracies approach.

2.3.1 Aims and principles of a pluriliteracies approach

The Pluriliteracies Approach to Teaching for Deeper Learning (PTDL) aims at going “beyond superficial levels of learning” by fostering “deeper learning through an explicit focus on subject literacies” (Coyle 2023: 1). It is assumed that deeper learning constitutes a prerequisite for lifelong learning and, thus, has to be facilitated inside the classroom. When speaking of deeper learning, Coyle (2023: 1) refers to the development and internalization of conceptual knowledge “while practicing relevant skills and strategies in such a way that they can be successfully transferred to other contexts and problems”. It is crucial that students are actively involved in deeper learning processes while being mentored by their teachers (Coyle 2023: 3). The notion of deep learning has already been discussed in relation to Coyle’s 4Cs Framework. However, when taking a pluriliteracies approach, deeper learning is connected to the development of subject literacies, which constitute a further foundation of this approach. It is assumed that deeper learning is “directly linked to domain- or subject-specific ways of constructing and communicating knowledge” (Coyle 2023: 1). Learners need a solid comprehension of subject content and “deliberate practice of subject skills and strategies” to transfer knowledge (Coyle 2023: 1). In other words, they need to develop subject literacy.

Coyle (2023: 1) stresses the importance of “extending the concept of subject literacies across languages and all subjects of schooling”. Fostering subject literacies in all subjects across the curriculum is only one aspect of the multifaceted term ‘pluriliteracies’. Pluriliteracy does not only include the development of subject literacies, but it also refers to the use of language. In a globalized world, communicating knowledge across different cultures and languages is of considerable importance, which is why learners need to become literate in languages as well. (Coyle 2023: 2). The term pluriliteracy also comprises a third component, namely textual fluency. Textual fluency describes “the ability to critically navigate, evaluate and produce a wide variety of plurimodal texts and text types” (Coyle 2023: 2), which is of considerable importance in a world where numerous communication channels and media exist. After having discussed the theoretical foundations of a pluriliteracies approach, the pluriliteracies model is presented in the following section.

2.3.2 The pluriliteracies model

The pluriliteracies model developed by the Graz Group is an attempt to visualize how the integration of the 4Cs proposed by Coyle (2010) could work. Meyer et al. (2015: 51) base their model on the assumption that “*C-Content* in and by itself is meaningless unless it is conceptualized”. Meyer et al. (2015: 51) elaborate on this as follows:

To actively construct knowledge and to promote subject-specific literacies, learners need to conceptualise content in ways that are appropriate to the subject *C-Culture*. [...] [I]t is this subject *C-Culture* that determines how the *C-Cognition* is put to use the way that *C-Content* will be *conceptualised* and how the *C-Communication* is used to (co-)construct knowledge.

For content to be conceptualized successfully, learners need to apply a range of subject-specific cognitive discourse functions as well as a set of other skills and strategies. Furthermore, it is essential that students know how to communicate successfully across cultures and languages to show their understanding of a concept (Meyer et al. 2015: 51). The idea is that learners “make meaning by strengthening the connections between [a] conceptual continuum and [a] communication continuum” (Meyer et al. 2015: 50), which is illustrated in Figure 3 below.

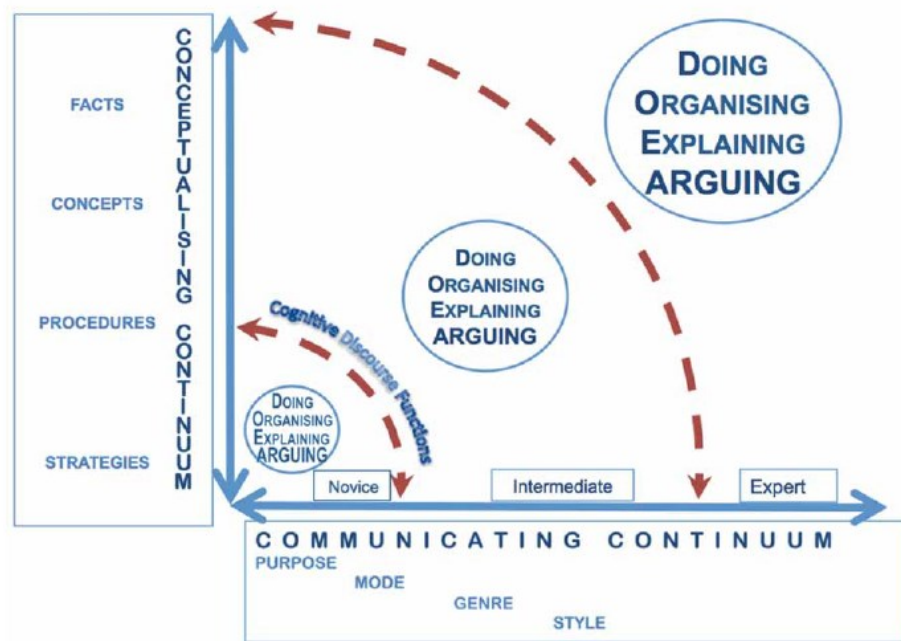


Figure 3. The pluriliteracies model (Meyer et al. 2015: 49)

Figure 3 shows how learners progress along the conceptual continuum as well as the communication continuum while being involved in cognitive discourse functions such as doing, organizing, explaining, and arguing. Eventually, learners need to be able to “verbalize their increasingly complex conceptual understanding adequately in the appropriate language” to demonstrate a deep understanding of subject-specific skills and strategies (Meyer & Coyle 2017: 205-206).

After having discussed the theoretical underpinnings of CLIL, it is time to investigate CLIL implementation and practices across Europe.

3 CLIL in a European context

3.1 The implementation of CLIL across Europe

Since its beginnings in the mid-1990s, CLIL has received much recognition in many countries around the world, but especially in Europe. According to Nikula (2017: 113), CLIL has been implemented in almost every EU country to foster bilingual education. As Europe is a multilingual continent with numerous official languages and a variety of national educational

contexts, realizations of CLIL across Europe are highly versatile and context-dependent (Pérez-Cañado 2012: 319). What most CLIL programs on the European continent have in common, is the teaching of a number of curricular subjects through a selected target language. In the European context, “English comes across as the most widely taught language, along with French and German” (Pérez-Cañado 2012: 320). Although any curricular subject could be taught through the medium of a foreign language, history, geography, natural science, and social sciences are among the most common ones in secondary education (Pérez-Cañado 2012: 320).

The distribution of CLIL on the secondary level shows that this approach is unequally distributed among upper and lower secondary schools. Although CLIL is more frequently applied on the upper secondary level, it is becoming increasingly popular in lower secondary schools as well (Sylvén 2013: 302). While Sweden, for example, provides a higher number of CLIL lessons in upper secondary schools, the Netherlands put more emphasis on CLIL programs in lower secondary education (Sylvén 2013: 302). In Finland, CLIL is also represented to a larger extent in primary and lower secondary schools (Nikula, Skinnari & Mard-Miettinen 2023: 1067). Spain, as an example of a southern European country, sticks out due to its large expansion of CLIL programs across the country. While in the past, CLIL programs in Spain were mostly voluntary and only accessible to high-performing students, current research findings by McClintic (2022: 898) show that this situation has shifted over the last few years. Optional CLIL classes in Spain have been reduced and replaced by nation-wide bilingual CLIL centers. Due to the large variety of CLIL programs, Spain lists more differences than similarities in its CLIL programs (McClintic 2022: 898). Since Spanish regions can make autonomous decisions regarding their educational practices, unified CLIL practices are missing. In contrast to Spain, the Netherlands have very specific CLIL standards, which are captured in a framework called *Standard for Bilingual Education*. Such guidelines not only support teachers in their CLIL practices, but they also facilitate the comparison of CLIL research in the country. Other European countries such as Austria or Finland lack those specific guidelines, which results in less uniform applications of CLIL (Nikula 2017: 114).

To better comprehend the large variety of CLIL implementations across Europe, one also needs to discuss the individual countries’ underlying motivations for implementing CLIL. When looking at CLIL in Spain, McClintic (2022: 897) points out that Spain “has been plagued with low foreign language (FL) competence results” for decades. Students’ weak foreign language

performance in a world where the importance of English as a global language cannot be overlooked, called for action in the field of foreign language education. Thus, one could say that Spanish CLIL was implemented to counteract students' poor language performance and to foster Spanish citizens' foreign language competence in the long term. In Italy, similar "top-down initiatives by educational authorities" (Nikula 2017: 113) have been observed to tackle poor foreign language teaching results. A further common phenomenon, which could be observed for a long time, was the implementation of CLIL only for gifted or high-achieving students. In Germany, for example, CLIL was more frequently applied in schools with an academic focus, where usually many high-performing students were present (Schwab et al. 2014: 4). More current research shows that CLIL programs in Germany are expanding to other school types as well (Siepmann et al. 2021: 2). In the Netherlands, the situation is similar. While CLIL was only offered in academically oriented school types in the past, researchers have recently noticed an expansion to different school types (van Kampen et al. 2018: 223). This development hints at a shift away from rather homogeneous CLIL settings to more diverse ones. After having given an overview of CLIL implementations across Europe, the realization of CLIL in Austria will be discussed separately in the following section as Austrian CLIL practices are highly relevant to this thesis.

3.2 CLIL practices in Austria

Content and language integrated learning established itself in Austrian language teaching right from its beginnings in the 1990s. The recognition of CLIL as an innovative and promising approach to language teaching was influenced by several factors. Austria's entry into the European Union in 1995 not only affected political decisions but also broadened Austria's horizon regarding bilingual education (Dalton-Puffer 2007: 46). CLIL, which had already been introduced in the EU as part of their multilingual policy, also received increasing attention in Austria after its accession to the EU. Other factors such as the growing recognition of English as a global language as well as a growing number of multilingual citizens, encouraged schools and subsequently students and parents to engage with CLIL (Dalton-Puffer 2007: 46). After having been recognized by all these participants of the educational system, CLIL was implemented as a teaching approach in many different types of Austrian schools, ranging from the primary to the upper secondary level (Bauer-Marschallinger et al. 2021: 1).

While the recent introduction of the new curriculum requires primary schools to offer foreign language lessons from grade one to four (VS Curriculum 2023: 22), regular foreign language teaching usually starts at the lower secondary level with a fixed number of foreign language lessons a week. In terms of foreign language teaching, Austrian language policy resembles those in other European countries. While school subjects are usually taught in the national language, which is German in the Austrian case, foreign language teaching constitutes another compulsory part of language teaching (Bauer-Marschallinger et al. 2021: 2). When having a look at Austrian school curricular, it becomes obvious that English is the main foreign language being taught. This dominant role of English in the Austrian school system is also mirrored in current implementations of CLIL. As proposed by Dalton-Puffer et al. (2010: 286), CLIL in Austria could be labeled as CEIL (Content and English Integrated Learning) because CLIL programs almost exclusively focus on English as the foreign language to be taught. It has to be noted that CLIL teachers often do not have a language teaching background (Hofstadler et al. 2021: 221), which is due to the fact that CLIL lessons are often timetabled as content lessons and, thus, being taught by teachers of the respective content subjects.

While CLIL being a part of content lessons is nationwide rather uniform, individual CLIL programs and practices can be highly versatile and often differ not only from school to school but also within a specific school type. To better understand the large variation of CLIL implementations in Austria, it is necessary to have a closer look at the Austrian school system. Children already start their educational career in their last year of kindergarten, which is followed by four years of primary school. Afterwards, students attend some form of lower secondary school, which can either be a middle school (Mittelschule) or a grammar school (Gymnasium). Splitting up lower secondary education into middle schools and grammar schools has caused debate for many years. Researchers such as Bauer-Marschallinger et al. (2021: 4) speak of segregation within the educational system as high-achieving learners are usually sent to grammar schools while low-performing students (often with weaker social backgrounds) are sent to middle schools. Educational researchers such as Biewer et al. (2019: 12) strongly argue against this segregation within the school system in a time where heterogeneity should be perceived as an asset. A selection of school types can also be noticed at the upper secondary level. After grade 8, students can decide whether they would like to continue their education at the upper secondary level of a grammar school or in a vocational college. The main difference between Austrian grammar schools and vocational schools is their

educational focus. While grammar schools foreground the teaching and learning of general and academic knowledge, vocational colleges focus on the skills and knowledge students need for professions in different fields. Both school types have in common that they lead to “Matura”, which is a school leaving exam after 12/13 years of school and a requirement for entering tertiary education.

The different foci established by individual schools not only determine the importance those schools attribute to English but also affect the implementation and realization of CLIL programs. According to Bauer-Marschallinger et al. (2021: 3), actual CLIL implementations can be highly situated and often depend on local factors. Since “there is nothing resembling a ‘CLIL curriculum’ for every CLIL teacher to follow in Austria”, schools and individual teachers receive the freedom to establish tailor-made CLIL programs that work for their specific school contexts (Hofstadler et al. 2021: 221). While grammar schools, for example, can decide autonomously whether and how they implement CLIL, vocational colleges called HTL (Höhere Technische Lehranstalt) are required to teach 72 CLIL lessons per school year from grade 11 to 13 (Hofstadler et al. 2021: 221). Research in language teaching in Austria has shown that “all higher vocational schools have followed the lead of the technical schools” by implementing CLIL in one or two subjects from grade 11 to 13 (Dalton-Puffer et al. 2019: 203).

For middle schools, the focus of this thesis, the implementation guidelines are much less specific, which can be seen in the following passage taken from the new curriculum for middle schools. This is the only passage on CLIL that can be found in the curriculum for middle schools.

Kompetenzorientierter Unterricht ist an den Prinzipien der kommunikativen Didaktik auszurichten, wobei insbesondere Modelle der Immersion in der schulischen Praxis bzw. ‘Content and Language Integrated Learning’ (CLIL) gefördert werden sollen (MS Curriculum 2023: 10).

It is mentioned that CLIL should be applied in middle school, but there is neither information on the extent of CLIL programs nor on any specific implementation guidelines. When taking into account the little attention given to CLIL in the curriculum for middle schools, it is not surprising that this approach is underrepresented in this particular school type. Moreover, a study conducted by Schwab et al. (2014: 4) has found that CLIL in secondary schools is almost exclusively applied in grammar schools, which usually comprise a large number of high-performing learners. A further crucial factor are the parents, who often show a larger interest in the English education of their offspring in grammar schools.

This orientation of CLIL towards high achievers has also been observed in the Austrian education system for a long time. Although Coyle et al. (2010: 2) argue that CLIL is suitable for “a broad range of learners”, Madrid and Pérez-Cañado (2018: 242) state that “CLIL branches normally comprise the more motivated, intelligent, and linguistically proficient students”. However, with students becoming increasingly heterogeneous at all school types and levels, CLIL practices are about to become more inclusive (Bauer-Marschallinger et al. 2021: 2). Since Austrian middle schools are known for their large diversity among students, they provide a highly interesting CLIL environment. For this reason, the implementation of CLIL in middle schools, particularly in science lessons, will be discussed in the next chapter of this thesis.

4 CLIL in the lower-secondary science classroom

In many countries across Europe, including Austria, science lessons are frequently combined with bilingual education. Since English can be considered “the global language of science” (Meyerhöffer & Dreesmann 2019: 1), it seems particularly useful to teach scientific content through the medium of the English language. By applying CLIL in the science classroom, students should expand their foreign language skills while developing scientific literacy. When speaking of scientific literacy, researchers (Ke et al. 2020: 32) refer to students’ “understandings of science content and how science works”, so that they can become “responsible citizens who can use science and make informed decisions in their lives”. It should not get unnoticed that science classrooms around Europe are shaped by cultural and linguistic diversity. To ensure access to science education for this large diversity of students, CLIL has shown to be a promising approach as it establishes English as the language of instruction (Valdés-Sánchez & Espinet 2020: 2426). Since CLIL is a highly popular approach to science teaching, it seems worthwhile to discuss benefits and potential challenges of CLIL teaching in a lower secondary school context.

4.1 CLIL with young learners

While studies have shown that CLIL science classes can be highly beneficial to students’ English language competence, content learning poses a challenge to many learners (Llinares & Nashaat-Sobhy 2021: 338). Llinares and Nashaat-Sobhy (2021: 338) argue that especially

young learners face a “double challenge [...] in understanding and expressing content in a second language”. Thus, one might think that CLIL is only suitable for more advanced language learners. However, researchers agree that young learners can equally benefit from this bilingual approach (Fazzi & Menegale 2023: 225). When speaking of young learners, it has to be mentioned that the literature discussed in this thesis includes learners up to the age of 12. Since lower secondary students are the focus of this thesis, it is not only meaningful to explore the benefits CLIL can offer to young learners, but it is also necessary to evaluate potential drawbacks of CLIL with young learners to best support their content as well as language learning.

4.2 Benefits and challenges

Fazzi and Menegale (2023: 226) argue that CLIL is particularly beneficial to young learners as it assists them in developing intercultural understanding and helps them to develop autonomy as learners. Accessing content through another language, even in the early years of language learning, can considerably broaden learners’ cultural horizons and lay their foundations of becoming global citizens (Fazzi & Menegale 2023: 226). The importance of fostering students’ intercultural competence is also pointed out by Nawrot-Lis (2019: 22), who argues that CLIL is a promising way of increasing learners’ intercultural awareness. Another beneficial aspect of CLIL, which can already unfold in young learners, is the development of learner autonomy. According to Wolff (2003: 219), CLIL is highly suitable for increasing learner autonomy as students are more involved in establishing their learning objectives, which often evolve naturally out of student’s interest in a certain topic. Social interaction formats such as group work and the application of learning strategies also contribute to the development of autonomy in learners (Wolff 2003: 219).

When having a look at the effect of CLIL on learners’ linguistic development, it becomes obvious that CLIL can considerably foster learners’ language skills. Studies show that CLIL can particularly increase students’ fluency, vocabulary and grammatical knowledge as well as their writing skills (Basterrechea & Leiser 2019: 108). When content learning is concerned, Fazzi and Menegale (2023: 225) argue that findings are different for younger learners as they often struggle with more abstract topics and, thus, are likely to be overwhelmed by the cognitive demands of an activity. This is also pointed out by Ellison (2018: 248), who stresses that “the

use of the additional language can make teaching and learning more engaging and cognitively challenging for both children and teachers”. For this reason, it is essential that teachers scaffold CLIL lessons appropriately so that even young learners, who have just started to learn a foreign language, can benefit from bilingual lessons. In other words, it is the teacher’s responsibility to scaffold and guide the students’ learning so that the positive effects of CLIL can unfold. Even though learners might need more time to fully comprehend content in a foreign language, CLIL is worth the effort as it “provides opportunities to learn curricular content whilst capitalising on the inhibition, curiosity and appetite for discovery of many children, which provide the momentum for learning” (Ellision 2018: 248).

4.3 Diversity in CLIL

As discussed above, teachers need to be particularly well-prepared when introducing CLIL to young learners since they have different cognitive needs than more advanced students. When implementing CLIL at lower secondary schools, it is essential to note that students not only bring different cognitive and linguistic needs to the table, but they show a variety of other educational needs as well. Especially middle schools are known for having a highly diverse student population and, thus, a large number of heterogenous classrooms.

Before discussing the effects of CLIL with diverse groups of learners, it has to be clarified what the term diversity actually means in the context of this thesis. When speaking of diversity among students, one has to recognize the students’ varying achievement levels, learning paces, intellectual capacities, cultural backgrounds, and physical impairments (Julius & Madrid 2017: 17). In other words, students bring a variety of individual needs to the classroom, which need to be addressed by the teacher for successful learning to happen. This is also emphasized in the recently introduced curriculum for Austrian middle schools, which establishes a strong focus on inclusion and individualization (MS Curriculum 2023: 4). According to Madrid and Pérez Cañado (2018: 244), inclusive education can be understood as “an educational modal that aims to respond to the learning needs of all students with a special focus on those who are at risk of marginalization and social exclusion”. The DIDI Framework proposed by Pérez Cañado (n.p. cited in Siepmann & Pérez Cañado 2022: 207) illustrates how diversity can lead to learners’ integration rather than exclusion through differentiation and inclusion.

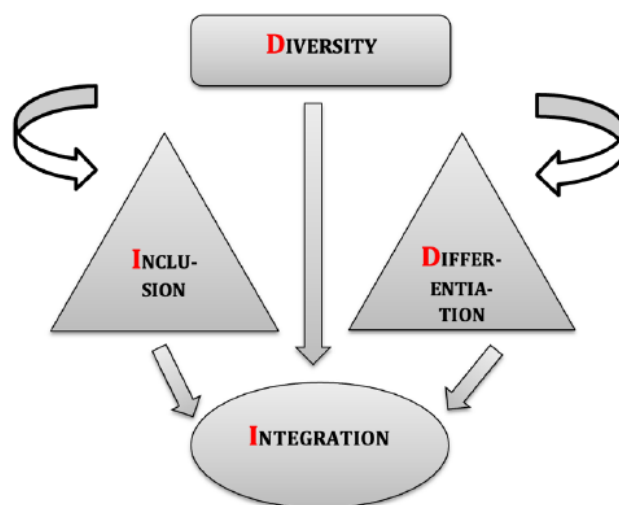


Figure 4. The DIDI Framework (Siepmann & Pérez Cañado 2022: 207)

As Figure 4 depicts, catering to diversity can lead to the inclusion and integration of all learners in the learning process. However, the question arises whether implementing CLIL can facilitate the inclusion of all learners by attending to their diverse educational needs. According to Bauer-Marschallinger et al. (2021: 4), there is only a small number of studies that focus on how CLIL can cater to the needs of diverse groups of learners. A lot of studies that focus on how teachers deal with diversity in CLIL lessons constitute a part of the ADiBE project. ADiBE, which is short for Attention to Diversity in Bilingual Education, investigates how teachers address diversity in CLIL classes around Europe (Pérez Cañado, Rascón Moreno & Cueva López 2023: 1). Since studies on CLIL in heterogenous classrooms have only been published recently, one can assume that diversity in CLIL is a rather new research area. This is supported by Madrid and Pérez Cañado (2018: 242), who argue that for many years, CLIL practices were elitist, which means that CLIL was almost exclusively applied in homogenous settings with a large number of high-achieving students. The recent focus on inclusion and individualization suggests that weaker learners with special needs and weak socio-economic backgrounds must not be deprived of bilingual approaches such as CLIL, which is why CLIL is increasingly implemented in mainstream education across Europe.

Since CLIL is becoming increasingly popular in schools that represent heterogenous student populations, it is worthwhile discussing if and how CLIL can work in such diverse settings.

Research has found that CLIL can work successfully with heterogeneous groups of learners if certain conditions are met (Pérez Cañado, Rascón Moreno & Cueva López 2023: 1). For example, a study conducted in Finland has found that underachieving students can achieve similar results in CLIL lessons as they can in traditional lessons (Roiha 2014: 3). This is supported by Madrid and Pérez Cañado (2018: 245), who argue that CLIL can be beneficial to learners with diverse needs if teachers adapt input to their students' learning paces and comprehension levels. However, they also state that “studies are still very much in their infancy” (Madrid & Pérez Cañado 2018: 246), which is why more research in this area is needed.

Since CLIL classrooms are becoming increasingly heterogenous in terms of students' social backgrounds, educational needs and experiences, teachers need to be aware of how they can cater to this diversity in a classroom. Although there is a lack of information on classroom practices in heterogenous CLIL classrooms (Siepmann et al. 2021: 1), researchers agree that additional scaffolding and special support for students is needed in such classrooms (Siepmann et al. 2021: 3). How student learning can be supported in diverse CLIL settings is represented by the following six ADiBE principles (Siepmann & Pérez Cañado 2022: 208-209):

- 1) Teachers as designers
- 2) Dialogic classroom
- 3) Explicitness
- 4) Learner centeredness
- 5) Multimodality and multiliteracies
- 6) Scaffolding

The first principle regards teachers as designers, which means that “in an inclusive classroom, teachers consider the various needs of their learners, their relationships, the specific context factors, as well as the available materials and resources, to ensure that all learners can achieve the goals of a lesson” (Siepmann & Pérez Cañado 2022: 208). Teachers need to create a dialogic classroom, which can support students in achieving the objectives of a CLIL lesson. This principle foregrounds the importance of collaboration and dialogic interaction inside the classroom, which should foster student participation and co-construction of knowledge (Siepmann & Pérez Cañado 2022: 208).

A further principle for catering to diversity points to the significance of making learning explicit. This can be achieved by modelling cognitive processes and outcomes. The fourth principle

suggested refers to learner centeredness. Putting learners into the focus of “the teaching-learning process requires that teachers promote autonomy, participation, and interaction in the classroom” (Siepmann & Pérez Cañado 2022: 209), which should lead to the students’ own construction of knowledge. This again highlights the teacher’s crucial role as a facilitator rather than expert.

With regard to the representation of input, Siepmann and Pérez Cañado (2022: 209) refer to the importance of multimodality and multiliteracies. They argue that providing different types of visual input and texts can not only “compensate for individual learners’ weaknesses” but also “cater to students’ strengths”. Scaffolding student learning constitutes the final principle suggested for catering to diversity in the CLIL classroom. As discussed at the beginning of this paper, scaffolding is not only considerably important in ordinary CLIL lessons, but becomes even more essential when teaching CLIL in diverse classrooms. By means of scaffolding, teachers can offer support that is geared towards the learners’ current individual needs, which is essential to foster student learning in diverse classrooms (Siepmann and Pérez Cañado 2022: 209). Catering to students’ diversity already starts with preparing lessons and materials. For this reason, the next chapter takes a closer look at lesson design.

5 Lesson Design

Materials constitute a crucial part of every CLIL lesson as they should support learners in achieving learning objectives. Mehisto (2012: 15) defines learning materials “as information and knowledge that are represented in a variety of media and formats, and that support the achievement of intended learning outcomes”. The importance of materials in education is also highlighted by Ball (2018: 22), who argues that especially “less experienced teachers or those working within a more niched educational paradigm, such as CLIL” rely on quality materials. While there are numerous resources and materials available for teaching and learning English as a second language, the availability of CLIL materials is scarce (Ball 2018: 222, Meyer 2013: 265). Ball (2018: 222) even argues that “[o]ne of the greatest hurdles facing CLIL implementation involves materials provision and design”. Considering the large variety of CLIL practices within and across European countries, it is not surprising that one cannot find materials that suit each individual CLIL case (Ball 2018: 223). For this reason, CLIL teachers are often not only required to select and adapt existing materials, but they are also faced with

designing their own materials. Since the process of material selection and design should ideally result in the availability of quality CLIL materials, it is essential to regard some criteria.

5.1 The function of materials

Since all teaching requires high-quality materials, teachers need to select their materials carefully. Before having a look at the selection, adaption and development of CLIL materials, it is crucial to clarify the function of materials in CLIL. Materials are an essential component of CLIL, as they fulfill a variety of functions. Ball (2018: 224) point out that materials not only provide security for teachers but also for learners. To illustrate this, textbooks or e-books contain the content that is required by the curriculum for a specific subject and, thus, constitute some form of reference for teachers. Materials in textbooks are usually “arranged and ordered in a way that best reflects that particular content” (Ball 2018: 224), which offers teachers some guidance for their teaching practice. When looking at the usefulness of materials from the learners’ perspective, it has to be mentioned that they are an important physical reference. Whenever students want to revise a concept or read up on a topic, they can consolidate their materials. A further crucial function of materials relates to the objectives of learning. Mehisto (2012: 16) argues that materials take on an essential role in CLIL as they make learning objectives visible to students and teachers.

5.2 Selecting CLIL materials

The selection and adaption of already existing materials is one major task for CLIL teachers. Especially for novice teachers, this task can be a daunting one. To facilitate the process of material selection, Mehisto (2012: 16) suggests highly useful principles for choosing CLIL materials. He argues that all materials should support learners as well as teachers and not limit them. This is also mentioned by Coyle et al. (2010: 91), who emphasizes that selected materials need to present content in manageable ways. Moreover, learning materials should promote “the creation of relational links between intended learning, students’ lives, the community, and various school subjects (Mehisto 2012: 16). In other words, selected materials should be relevant to the lives of students to build intrinsic motivation, which promotes learning (Mehisto 2012: 16). A further crucial aspect to look out for when choosing materials relates to the integration of content and language. CLIL materials should aim at developing learners’ content knowledge and language skills alike (Mehisto 2012: 16). For this reason, linguistic and content

materials often need to be adapted in order to integrate both aspects. Quality materials also enhance critical thinking and support students in becoming autonomous learners (Mehisto 2012: 16). For autonomy to develop, materials need to be student-centered. However, one has to keep in mind that student-centered learning needs to be carefully structured by the teacher (Coyle et al. 2010: 109). A further principle, which ties in with Coyle et al.'s 4C Framework, relates to the development of intercultural knowledge. CLIL materials should avoid stereotypical class, gender, and cultural representations and should include "diverse peoples and cultures" to foster intercultural awareness. A final important principle is the development of media literacy. CLIL materials should encourage learners to critically evaluate presented information to become media-literate citizens. While these principles seem particularly helpful for selecting already existing materials, they are not that useful for designing materials from scratch. For this reason, materials design and some helpful considerations are discussed in the following section.

5.3 Designing CLIL materials

Due to the large variety of CLIL contexts, it is a frequent phenomenon that required materials do not exist and, thus, have to be created by the teachers themselves. Ball (2018: 224) argues that successful material design not only involves a shared understanding of CLIL pedagogies, but it also requires much time from the teachers. To foster an understanding of what CLIL materials are supposed to achieve, researchers (Mehisto 2012, Meyer 2013, Ball 2018) have developed specific principles for designing CLIL materials. On the one hand, these principles should form the foundation of CLIL materials, while on the other hand, they are supposed to be easily applicable and, thus, time-saving for teachers. When having a look at the different sets of principles proposed by Mehisto (2012), Meyer (2013), and Ball (2018), it becomes obvious that they show similarities as well as differences. To illustrate this, all of them mention *scaffolding* as well as *critical thinking* as one of their principles. While Mehisto (2012) does not explicitly mention CLIL-related input and output, Meyer (2013: 267) and Ball (2018: 228) discuss the importance of input and output in CLIL as one of their principles. When comparing Mehisto's (2012) and Ball's (2018) principles, it becomes obvious that Ball's principles are more closely linked to CLIL material design, while some of Mehisto's principles seem more general. Nevertheless, it is worth mentioning Mehisto's (2012) criteria for the development of materials, as several of them can be applied to CLIL.

According to Mehisto (2012: 17-25), quality CLIL materials:

- make the learning intentions (language, content, learning skills) and process visible to students,
- systematically foster academic language proficiency,
- foster learning skills development and learner autonomy,
- include self, peer and other types of formative assessment,
- help create a safe learning environment,
- foster cooperative learning,
- seek ways of incorporating authentic language and authentic language use,
- foster critical thinking,
- foster cognitive fluency through scaffolding [...],
- help to make learning meaningful.

When having a look at Mehisto's ten principles for quality material design, it becomes obvious that some of them are less CLIL-specific and more relatable to general educational practices. Ball et al. (2015: chapter 7) argue that making learning intentions visible, fostering academic language skills, creating a safe learning environment, fostering co-operative learning, and fostering cognitive fluency through scaffolding constitute the most relevant principles for CLIL material design. While these principles already provide a solid foundation for designing CLIL materials, Ball et al. (2015: chapter 7) offer an even more specific list for CLIL material design. Since Ball et al.'s principles can be considered highly useful and easily applicable to CLIL material design, they constitute the foundation of the self-developed materials for this thesis. Thus, Ball et al.'s (2015: chapter 7) seven principles for designing CLIL materials are discussed in more detail below.

5.3.1 Principles for designing CLIL materials

According to Ball et al. (2015: chapter 7), their suggested principles “derive from particular learning situations which arise from the practice of CLIL”. They also attempt to avoid linguistic and conceptual simplifications as it does not make any sense in hard CLIL, where the teaching of curricular content is at focus (Ball 2018: 228). An overview of the respective principles is illustrated below.

Table 2. Ball et al.'s (2015: chapter 7) principles for CLIL material design

1	The primacy of 'task' (the text–task relationship)
2	Prioritizing the three dimensions of content
3	Guiding input and supporting output
4	Scaffolding and embedding
5	Making key language salient
6	The concept of 'difficulty' in didactic materials
7	Thinking in sequences

When speaking of the primacy of task or the text-task relationship, Ball et al. (2015: chapter 7) suggest that the “‘text’ should be secondary to the task”. With other words, teachers should consider the task superior to the text. To illustrate this, learners can still work with demanding texts as long as the task is manageable for them. However, for a task to be effective, it has to fulfill certain criteria. Ball et al. (2015: chapter 7) argue that a task must be goal-oriented and requires interaction among learners. It should also have identifiable stages and “‘a set of work plans’ [...], [which form] the basis for a sequence of activities” (Ball et al. 2015: chapter 7). With regard to fostering learners’ motivation, it is particularly important that they recognize the purpose of an activity. Researchers agree that “a motivated student is always more likely to engage and therefore to learn” (Ball et al. 2015: chapter 7).

Ball et al.'s second principle suggests prioritizing the three dimensions of content. To better comprehend this principle, it is necessary to take a look at what is actually meant by the three dimensions of content. Ball et al. (2015: chapter 7) point out that “any activity or task could be defined as the teaching of conceptual content, by means of procedural choices, using specific language derived from the discourse context”. When speaking of conceptual content, Ball et al. (2015: chapter 7) mean the actual subject content, which needs to be acquired. Procedural choices refer to the skills that are necessary for working on the concepts. Such skills might

involve interpreting, producing or describing (Ball et al. 2015: chapter 7). The language dimension relates to “[s]pecific language items associated with the conceptual content” (Ball et al. 2015: chapter 3). When creating CLIL materials, it is the teacher’s task to recognize those three dimensions and adapt each one to the demands of their CLIL contexts (Ball et al. 2015: chapter 7).

The third principle for CLIL materials design assumes that students cannot be left to their own resources when dealing with CLIL materials. According to Ball et al. (2015: chapter 7), learners must acquire input skills as well as output tools to solve a task effectively. It is the teachers’ responsibility to guide their learners and provide them with the skills they need to successfully complete a task. This is especially important when working with authentic materials. Ball (2018: 227) stresses that authentic input needs to be mediated, for example, by appropriate pre- and while-listening tasks, to guide the students to the successful completion of a task.

When Ball et al. (2015: chapter 7) address scaffolding and embedding, they refer to explicit and implicit types of language support. While scaffolding can be considered an explicit form of language support, embedding happens rather implicitly. Scaffolding, for example, involves providing specific language support, which helps learners to complete a task. For example, teachers can explicitly point to helpful vocabulary and linguistic structures to assist their students in achieving the goals of a lesson. In contrast to scaffolding, embedding is not that salient. Embedded language support is usually part of a text itself without being explicitly highlighted. It is assumed that students recognize the language that is typical of a specific type of text and incorporate it in their own production (Ball et al. 2015: chapter 7).

The next principle highlights the necessity to foreground language features that are essential for dealing with a specific topic. According to Ball et al. (2015: chapter 7), this principle is closely linked to scaffolding and embedding as it focuses on language support. If teachers want to make key language salient, they can, for example, provide a vocabulary box with all the terms students need to know for dealing with a topic. This principle is particularly important when CLIL is part of content lessons because they usually contain lots of topic-specific vocabulary (Ball et al. 2015: chapter 7).

The sixth principle revolves around the issue of difficulty in CLIL materials. Ball et al. (2015: chapter 7) claim that “not the materials themselves are ‘easy’ or ‘difficult’ but rather the tasks that we as educators assign to them”. This principle ties in with principles one and two, which focus on the text-task relationship and the dimensions of content. Ball et al. (2015: chapter 7) argue that it is the teachers’ task to break down a topic so that it is comprehensible for students. This can be achieved by taking the three dimensions of content into account. If a topic is conceptually, procedurally, and linguistically complex, it is likely that learners perceive it as difficult. To counteract this issue, teachers need to balance the conceptual, procedural, and linguistic demands so that a task becomes manageable for students (Ball et al. 2015: chapter 7).

The final principle suggests that “CLIL should not be seen in isolation, but as part of a larger sequence” (Ball et al. 2015: chapter 7). This principle assumes that something happened before a task and that something will happen afterwards. It assumes that learners have some sort of knowledge about a concept, which helps them to make connections. Ball et al. (2015: chapter 7) suggest that CLIL lessons ideally follow a specific structure, which should comprise an orientation, a complication, and a resolution phase. According to Ball et al. (2015: chapter 7), it is essential to work on key language in the complication phase to avoid frustration among the students too early in the CLIL sequence. They also point out that new language should not be introduced in the resolution phase as this phase rather serves the purpose of assessing and summing up (Ball et al. 2015: chapter 7).

5.3.2 Cognitive discourse functions (CDFs)

As briefly mentioned in the first chapter of this thesis, cognitive discourse functions (CDFs) play a pivotal role for CLIL material design since they attempt to link content and language learning objectives (Dalton-Puffer 2013: 220). However, Bauer-Marschallinger (2019: 10) stresses that there is a lack of available CLIL materials that are based on CDFs. For this reason, it is again the CLIL teachers who are required to design their own materials if none are available. Morton (2020: 8) discusses lesson and material design from a pluriliteracies perspective and offers practical guidelines on how teachers can effectively apply the CDF construct when preparing their lessons. When applying a pluriliteracies approach to lesson and material design, Morton (2020: 8) argues that one must add the dimension of literacy to content and language learning. He states that “CLIL teachers need to connect the three dimensions of content, literacy

and language, when planning and delivering instruction” (Morton 2020: 8). In other words, CLIL teachers need not only regard “the conceptual content and skills belonging to the subject and specific language features needed to express them (e.g. terminology) but also the expected forms of communication (e.g. typical texts)” (Morton 2020: 8). Morton (2020: 9) refers to CDFs as “a conceptual toolkit” for integrating content, literacy, and language in CLIL teaching. He elaborates on this as follows:

CDFs form a link between cognition and language or thinking and speaking/writing. As such, they are a bridge between content learning objectives, the specific types of communication (literacies) associated with academic subjects, and the language used to express knowledge and thinking.

When it comes to CLIL material design, teachers must not only focus on content objectives, but they have to explicitly formulate literacy and language objectives as well. Morton (2020: 15) also stresses the importance of taking CDFs as parts of learning objectives seriously. This means that teachers need to draw their students’ attention to the CDFs and what they require them to do. For all objectives to be achievable, teachers should not establish too many objectives for one lesson or teaching unit (Morton 2020: 14). When applied effectively, the CDF construct can be highly valuable for teachers to integrate content, language, and literacy objectives of a CLIL lesson.

5.4 CLIL teaching practices

Effective CLIL not only involves well-chosen materials, but it relies on well-conceived classroom practices as well. Researchers agree that effective CLIL pedagogy involves a variety of language teaching tools, authentic materials, and visual support (Mahan et al. 2021: 402, Ball et al. 2015: chapter 9). The choice of materials is particularly important as it is likely to influence the learners’ motivation. Since researchers agree that motivation is crucial for learning a second language (Sylvén 2017: 51), it is important to discuss how the choice of materials can positively influence students’ motivation. When speaking of a CLIL setting, Pinner (2021: 25) argues that authenticity plays a pivotal role. He claims that not only authentic content, but also authentic materials seem to be vital for maintaining learners’ motivation. When speaking of materials authenticity, Pinner (2021: 25) refers to “materials not produced for language teaching purposes”. It is assumed that materials which were produced for a real-world audience pursue an authentic purpose. Establishing an authentic purpose in CLIL seems to be essential for increasing learners’ motivation. This is also supported by Sylvén (2017: 55), who stresses that

selected content should not only be relevant to the learners, but it should aim at addressing real world problems as well. This can be achieved by personalizing content around the students' own interests (Pinner 2021: 30). For CLIL to be motivating, selected materials should also foster learner-autonomy, reflection, and critical thinking (Pinner 2021: 30).

For students at primary and lower secondary level, visuals seem to be vital for making key content accessible (Hood 2020: 54). Hood (2020: 54) mentions that authentic images such as photographs are highly beneficial for young learners to grasp content. When teachers introduce a new topic with lots of unknown vocabulary, it is important to provide the students with the necessary vocabulary (Hood 2020: 54). It is the teacher's responsibility to recognize their students' linguistic demands and to offer them language support where necessary. A further crucial pedagogical practice involves the style of teacher talk. Ball et al. (2015: chapter 9) stress the importance of teacher talk in CLIL settings. Learners should not be cognitively overloaded with what the teacher is saying, which is why teachers need to carefully plan the language and instructions they are using in the CLIL classroom. Hood (2020: 51), for example, suggests scripting the language of routines so that students have a collection of model sentences of what instructions could look like. Having a set of phrases, which are frequently used in the classroom, seems particularly important for younger learners, who are not that proficient in the target language yet (Hood 2020: 51).

A further crucial aspect of CLIL teaching relates to scaffolding. Since foreign language learners "have fewer linguistic resources in the language of instruction" (Mahan 2022: 74), it is necessary to support students through scaffolding. When speaking of scaffolding, Mahan (2022: 76) distinguishes between comprehension strategies and task-solving strategies. While comprehension strategies include the activation of previous knowledge, academic language development and supportive materials, task-solving strategies involve the use of discourse and metacognitive skills. By applying selected scaffolding techniques, teachers support students in becoming autonomous learners (Mahan 2022: 75).

6 Empirical study: methodology and research design

The empirical part of this thesis discusses the implementation and evaluation of a CLIL project conducted in a middle school. To better comprehend the research interest as well as the chosen methodology, this chapter presents the underlying research questions, the research design, the process of data collection, and a thorough analysis of the data gained.

The study conducted within the scope of this thesis is of a pre-experimental nature and follows a mixed methods approach. This pre-experimental study adopts a pretest/posttest research design to investigate the effects of CLIL biology lessons on learners' content and vocabulary knowledge. To gain insights into the students' experiences with the CLIL lessons, a questionnaire complements the results gained from the pretest and posttest. Before the chosen methodology and research design will be further elaborated on, it is time to discuss the underlying research questions of this thesis.

6.1 Research questions

The following research questions revolve around the implementation of CLIL sequences in biology lessons in grade 5. While the first research question aims to investigate the potential of CLIL for 5th graders' content and language learning in biology, the second research question aims to find out how CLIL can facilitate the inclusion of all learners in biology lessons at middle school. The third question investigates principles teachers can employ to address the diverse needs of their learners. The last RQ involves the learners' experiences with the respective CLIL lessons. The research questions were formulated as follows:

RQ1: To what extent is applying a CLIL approach beneficial to 5th graders' content and vocabulary learning in biology lessons at middle school?

RQ2: In how far does adopting a CLIL approach facilitate the inclusion of all learners in biology lessons at middle school?

RQ3: What principles can teachers employ to cater to the diverse educational needs of their learners?

RQ4: What are the students' perceptions of CLIL biology lessons in contrast to regular biology lessons?

Before answering these research questions, the chosen methodology, the research design, and the data collection tools will be discussed in more detail.

6.2 Methodology

The empirical part of this thesis is based on a pre-experimental study similar to one conducted by Escobar Urmeneta and Sánchez Sola (2008). According to Cohen et al. (2011: 322), true experiments are often less qualified for educational research as they require a “random assignation of participants to control or experimental groups”. Since quasi-experiments in the form of a pre-experimental design do not make use of control groups, conducting a pre-experimental study seemed reasonable. Moreover, Cohen et al. (2011: 322) argue that pre-experimental studies are particularly useful for testing a new teaching method as they provide insights into the value of a new method or approach. Escobar Urmeneta and Sánchez Sola (2008: 70) also stress the suitability of the chosen methodology for educational research since such a design “offers the advantage of facilitating an approach with low levels of intrusiveness”. Although the chosen methodology seems highly suitable for conducting research in the context of this thesis, possible limitations must be mentioned. The main limitation regards the generalizability of the results. Since a pre-experimental design does not select participants randomly and lacks a control group, one cannot generalize the findings gained (Escobar Urmeneta & Sánchez Sola 2008: 71).

6.3 Data collection instruments

The chosen instruments for collecting data involve quantitative tools. While pretests and posttests constitute one part of the data, student questionnaires represent the second part of the data. Since reliable results can only be gained through well-constructed tools, test as well as questionnaire design is discussed in more detail below.

6.3.1 Pretest/posttest design

To find out in how far learners can profit from CLIL lessons in middle school, a pretest-posttest design was chosen. The pretest-posttest design is highly popular in experimental and quasi-experimental research as it can show how a treatment or intervention affects an experimental group (Rogers & Révész 2019: 135). While the pretest tries “to ensure the comparability” of an

experimental and a control group before an intervention, the posttest “allows the researchers to determine the immediate effects of the treatment on the outcome variable(s)” (Rogers & Révész 2019: 135). Since the study conducted for the purpose of this thesis is of quasi-experimental nature, it lacks a control group. Nevertheless, it seemed valuable to administer a pretest to investigate what the learners had already known about the biology topic prior to the CLIL lessons. Both classes in which the CLIL lessons were held, received the pretest a few days before the actual CLIL sequences “to decrease the likelihood that the effects of the treatment are confounded by testing effects that may arise from completing the pretest (Rogers & Révész 2019: 136). As suggested by Rogers and Révész (2019: 136), the posttest was administered immediately after the CLIL project. Although researchers recommend administering a delayed posttest because the effects of an intervention might take some time to unfold (Rogers & Révész 2019: 136), the study did not make use of a delayed posttest due to time constraints.

The pretest and the posttest aimed at collecting data on the effects of the CLIL lessons on the learners’ content and vocabulary knowledge. Since the chosen topic for the CLIL project was the process of pollination, the students had to answer questions about this topic in the pretest and the posttest. Before the designed pretest and posttest are presented in more detail, it is necessary to look at some guidelines for constructing pre- and posttests.

Cohen et al. (2011: 493) present helpful guidelines for the construction of tests. They argue that pretests and posttests must test the same content, but the wording of the questions in the tests should differ. They also mention that the level of difficulty needs to be the same in the pretest and the posttest. This is particularly important when constructing the posttest. The posttest must not be easier than the pretest to gain reliable results. Cohen et al. (2011: 493) also state that experimental groups and control groups (if there are some) have to receive the same pretests and posttests to ensure comparability. For this reason, both groups of participants obtained identical pretests and posttests.

6.3.1.1 The pretest

The self-constructed pretest included three different tasks, which aimed at testing students’ prior knowledge on flowering plants and the process of pollination. Since dealing with nature is one

of the main topics mentioned in the curriculum for primary schools (Curriculum for primary schools 2012: 84), it could be assumed that the learners had already gained some knowledge on flowering plants and pollination. However, one could not assume that all the students had the same prior knowledge of the topic because the learners had attended different primary schools. For this reason, it was necessary to find out what the students had already learnt about the topic. Regarding the language of the pretest, it has to be noted that the pretest was entirely held in German. Since primary schools in Austria usually do not offer science lessons in English, it was assumed that the learners did not have any English vocabulary about pollination at their disposal. To find out if the learners could label the parts of a flowering plant in German, they had to complete a labeling task, which is illustrated below.

1) Beschrifte die Blüte mit den Begriffen aus der Box.

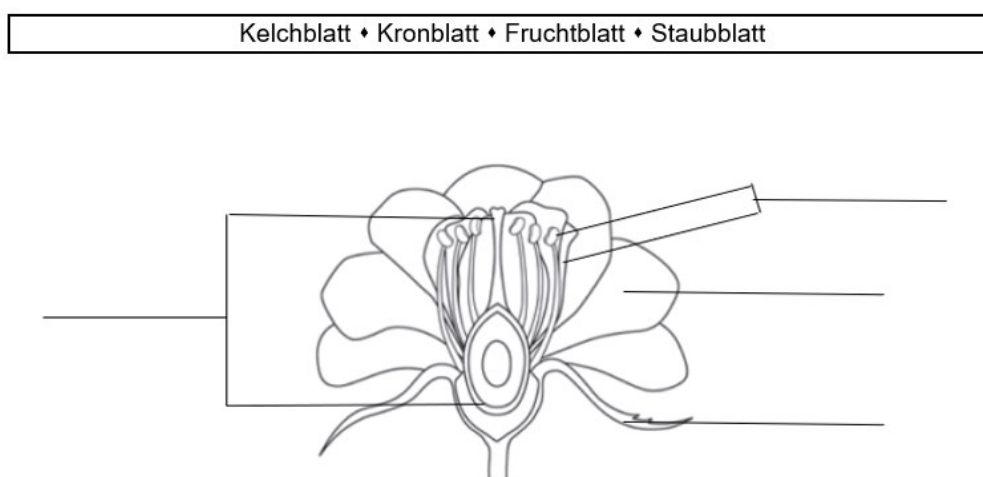


Figure 5. First task in the pretest (adapted from Maldonado et al. 2013)

Figure 5 illustrates the first task in the pretest. The learners had to label the parts of a flower by choosing the appropriate German term. When having a look at the instructions to the task, one notices that the instructions ask the students to label the parts of a flower. The performative verb *label* was deliberately chosen as it belongs to the cognitive discourse category DESCRIBE (Dalton-Puffer 2013: 235). Although Dalton-Puffer's list of CDFs does not visually divide CDFs into lower- and higher-order thinking skills, one can assume that describing is less cognitively challenging than explaining, for example. To further reduce the difficulty of the pretest, the learners only had to select from the given terms and did not have to come up with the terms themselves. Since it was more likely that the parts of flowering plants were part of

the learners' receptive rather than productive knowledge, providing the words was considered necessary.

In contrast to the first task, the second task was more cognitively challenging than the first one. The instructions to the second task said, "Erkläre in Stichworten, warum die äußeren Blütenblätter bunt gefärbt sind". As one can notice, the instructions incorporate the verb *explain*, which represents the cognitive discourse function EXPLAIN (Dalton-Puffer 2013: 235). Explaining can be considered more cognitively demanding as it asks students to come up with reasons why flowering plants have colored petals.

The final task asked the students to think of words that come to their mind when thinking of pollination and to describe the process of pollination, if possible. The German instructions were formulated as follows: "*Welche Begriffe fallen dir zur Bestäubung ein? Schreibe sie auf! (Wenn du weißt, was bei der Bestäubung passiert, beschreibe sie kurz.)*". While the first part of the question wanted the learners to name terms that can be linked to pollination, the second part asked them to describe the process of pollination. When taking a close look, one can notice two performative verbs, which point to the same CDF. The instructions ask the students to *name* and *describe*, which are both verbs that belong to the cognitive category DESCRIBE and, thus, represent a cognitive discourse function. As all three tasks show, the pretest aimed at gaining insights into the students' prior knowledge and pre-existing concepts of the topic of pollination. To find out if the learners' conceptual as well as vocabulary knowledge had increased during the CLIL lessons, it was necessary to conduct a posttest.

6.3.1.2 The posttest

The posttest, which was administered immediately after the CLIL project, served two purposes. On the one hand, it aimed at investigating changes in the learners' content knowledge after the CLIL lessons, while on the other hand, it attempted to measure the learners' vocabulary gains. To get a more comprehensive picture of the posttest and its purposes, the individual tasks are depicted and described below. Figure 6 shows the first task in the posttest.

1) Label (=beschrifte) the parts of the flower with the correct **English and German** terms!

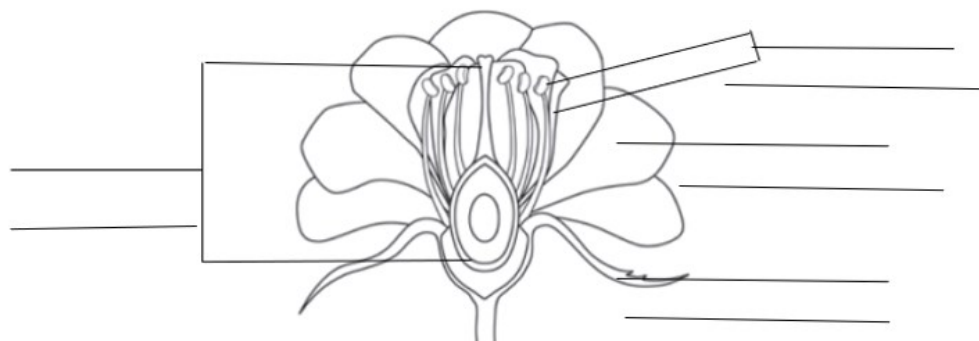


Figure 6. First task in the posttest (adapted from Maldonado et al. 2013)

The first task in the posttest was similar to the first task in the pretest as the learners had to label the parts of a flowering plant, which means that they had to perform the same CDF again, namely DESCRIBE. However, this time, the learners had to label the parts not only in German but also in English. While the purpose of the German labelling task was to find out if the learners' German vocabulary knowledge had increased, the English labelling task aimed at gaining insights into the students' English vocabulary acquisition during the project. The second task in the pretest was a matching task, which is illustrated below.

2) Match the flower parts with their functions. Draw lines!

1) sepals	a) They are the male reproductive organs.
2) stamens	b) They are the female reproductive organs.
3) petals	c) They attract insects.
4) carpels	d) They protect the inner parts of the flower.

Figure 7. Second task in the posttest

As depicted in Figure 7, the students had to match the main parts of a flowering plant with their functions. The task was formulated in English to investigate if the students could apply the content, they had learnt in the CLIL lessons using the English language. When having a look at the instructions, one notices the verb *match*. According to Dalton-Puffer's list of CDFs (2013: 235), matching is an activity that represents the cognitive discourse function CLASSIFY. In other

words, this activity required the learners to classify the functions of the flower parts by matching. One can argue that task two in the posttest is cognitively less demanding than task two in the pretest since the first one included the CDF EXPLAIN while the latter one incorporated the CDF CLASSIFY. Although Cohen et al. (2011: 493) state that the level of difficulty must not vary between pretests and posttests, it seemed necessary to demand a lower CDF in the posttest. To illustrate this, the second task in the posttest was formulated in English and, thus, already more cognitively challenging than task two in the pretest, which was formulated in German.

The last task in the posttest did not require the learners to use a specific language. Since the focus of the task was on the content, namely the process of pollination, the learners could decide whether they wanted to answer in English or German. Task three is illustrated in Figure 8 below.

3) Have a look at the picture and describe the **process of pollination**. You can do that in **English or German! Write short sentences.**



Figure 8. Task three in the posttest (adapted from Dreamstime 2000-2024)

As shown in Figure 8, the learners had to describe the process of pollination using their own words. Since this task aimed at finding out if the students had understood the concept of pollination, the language used to perform the task did not matter. While describing the process of pollination, the students applied the CDF DESCRIBE, which was the same as in the last task of the pretest.

Since the constructed pre- and posttest focused primarily on the learners' content and vocabulary acquisition during the CLIL project, a second data collection tool was necessary to gain information on the learners' experiences with the CLIL lessons. For this reason, a student questionnaire was used to get detailed insights into the students' perceptions and experiences.

The following section discusses the construction of questionnaires in general and then presents the questionnaire that was designed for the purpose of this thesis.

6.3.2 Student questionnaire

The learners' experiences with the CLIL lessons were investigated by means of a questionnaire. According to Iwaniec (2019: 334), questionnaires are highly versatile instruments for collecting data as they "objectively measure a great variety of abstract constructs". For example, questionnaires can be effectively used to gain information on people's "attitudes, opinions, beliefs, interests, and values" (Dörnyei 2009: 5). Since the purpose of the self-constructed questionnaire was to gain insights into the students' perceptions on and experiences with CLIL, administering a questionnaire seemed highly useful for collecting this type of data. Before the constructed questionnaire is presented in more detail, it is necessary to discuss typical features of questionnaires as well as their benefits and limitations.

Since questionnaires are one of the most popular data collection tools in educational research (Bartram 2019: 1), it is important to provide a definition of questionnaires. A frequently quoted definition describes questionnaires as "any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting from among existing answers" (Brown 2001: 6 cited in Dörnyei 2009: 3-4). According to Dörnyei (2009: 6), questionnaires offer a variety of advantages, which makes them highly popular research instruments. Questionnaires are not only time-consuming and cost-efficient, but they also require little effort from the researcher during the administration process (Dörnyei 2009: 6). This is supported by Bartram (2019: 1), who argues that "questionnaires often allow researchers to collect large amounts of data from sizeable groups of respondents in a relatively short amount of time". Another reason for handing out questionnaires to students is "the anonymity and confidentiality that questionnaires offer" (Bartram 2019: 2). In contrast to interviews, questionnaires are completely anonymous and, thus, more encouraging for students to give honest answers. This is particularly useful when teachers try to collect data from their own students, which was the case in this thesis.

After having discussed the advantages of questionnaires, it is necessary to have a look at their limitations as well. Dörnyei (2009: 6) stresses that “it is very easy to produce unreliable and invalid data by means of ill-constructed questionnaires”. He argues that questions have to be simple enough for respondents to understand. However, asking questions only on a superficial level does not allow an in-depth investigation of the topic and, thus, might lead to unreliable results (Dörnyei 2009: 7). Another main shortcoming of questionnaires relates to the motivation of respondents. Since participants often do not feel highly motivated to answer numerous questions in a questionnaire, they might skip questions or only respond to them on a superficial level without thoroughly thinking about their answers. Such respondent behavior can lead to unreliable results or low return rates (Iwaniec 2019: 326). A further source of unreliable results can be linked to respondents’ literacy problems. Questionnaires assume that respondents do not have any problems with reading and writing (Iwaniec 2019: 326). However, it is not always the case that participants are fully literate in a language, which affects their comprehension as well as response to questions in a questionnaire (Dörnyei 2009: 7). Answering questions in a second or foreign language can even be more challenging for participants. This also needs to be kept in mind when designing questionnaires for language learners. Another limitation involves the truth of the respondents’ answers. Dörnyei (2009: 8) argues that research participants often refrain from providing answers that are true for themselves if the answers seem inappropriate or socially undesired. Although questionnaires seem to pose a variety of challenges, they can still offer insightful and valid results if constructed well.

Cohen et al. (2011: 379) offer practical guidelines for constructing questionnaires, which served as the foundation of the student questionnaire constructed for this thesis. Before a questionnaire can be designed, it is essential to determine a questionnaire’s purpose (Cohen et al. 2011: 379). The student questionnaire applied in this thesis aimed at investigating the learners’ experiences with the conducted CLIL lessons. Since investigating students’ perceptions of the CLIL sequences seemed rather unspecific, it was necessary to come up with subcategories before formulating the questions (Cohen et al. 2011: 379). The formulated categories are illustrated in the table below.

Table 3. Classification of statements in student questionnaire

Categories student questionnaire	
1.	Enjoyment of biology/regular lessons
2.	Interest in English/Exposure to English
3.	Enjoyment of CLIL biology lessons
4.	Perceived challenges in CLIL lessons
5.	Perceived language gains
6.	Helpfulness of scaffolding material

In a further step, it was necessary to decide on the structure of the questionnaire and the types of the questions. Cohen et al. (2011: 381) state that “the larger the size of the sample, the more structured, closed and numerical the questionnaire may have to be”. Since the questionnaire aimed to collect data from two classes with around 20 students each, it seemed useful to construct a rather structured questionnaire with mainly closed questions. However, two open questions seemed necessary to find out what the students liked best and what they didn’t like during the CLIL lessons. The closed questions needed to be answered by choosing given responses on a Likert scale. Likert scales are the most frequently applied scales for answering closed-ended questions (Iwaniec 2019: 329). Such scales are highly popular as they offer “a degree of sensitivity and differentiation of response whilst still generating numbers” (Cohen et al. 2011: 386). In other words, respondents receive the opportunity “to indicate a level of agreement with a statement by choosing from responses ranging typically from ‘strongly agree’ to ‘strongly disagree’ (Iwaniec 2019: 329). It has to be mentioned that the response options as well as the questionnaire items of the self-constructed questionnaire were formulated in German to receive more reliable answers. Since the participants were 5th graders and had just started to learn English as a second language, it seemed meaningful to construct the questionnaire in German. Paying attention to potential language barriers is crucial when designing questionnaires to avoid the production of unreliable responses (Dörnyei 2009: 7). To get an idea of the questionnaire under discussion, the first part of it is illustrated below.

Table 4. The first four statements of the questionnaire

		stimmt völlig	stimmt eher	weiß nicht	stimmt eher nicht	stimmt gar nicht
1.	Ich interessiere mich für biologische Themen.					
2.	Mir gefällt Biologie und Umweltkunde in der Schule.					
3.	Ich mag die englische Sprache.					
4.	Ich verwende Englisch nur in der Schule.					

Table 4 depicts some of the closed questions as well as the possible response options. One can notice that the questionnaire made use of a five-point Likert scale, which means that there was a middle option for the students to choose. Middle options are useful when participants cannot relate to an item at all. Before choosing an option that does not represent their true response, they can select the neutral option (Iwaniec 2019: 329). To gain as much information as possible, respondents should only choose the neutral option if necessary.

While rating scales “combine the opportunity for a flexible response with the ability to determine frequencies, correlations and other forms of quantitative analysis” (Cohen et al. 2011: 387), one needs to bear their limitations in mind. For example, numbers or specific wordings can have different meanings to respondents. It can occur that participants mean the same but choose a different option because they understand it differently. Moreover, one cannot assume equal intervals between the categories on a scale. To illustrate this, a rating of 4 is not automatically twice as powerful as a rating of 2, which needs to be kept in mind when analyzing results (Cohen et al. 2011: 387).

When planning a questionnaire, not only the types of questions are important but also how the items are formulated. Dörnyei (2009: 41) presents some strategies for quality item design, which were considered during the item formulation process. For questionnaire items to be easily comprehensible, it is crucial to formulate simple and short questions. Moreover, the language

used must not be overly complicated. For example, items should not contain any acronyms, abbreviations, and colloquialisms (Dörnyei 2009: 41). When writing questionnaire items, one should also avoid ambiguous or loaded terms to guarantee as much clarity as possible. Dörnyei (2009: 42) also suggests avoiding negative constructions as well as questions that ask for more than one answer. While negative constructions should be avoided, it is recommended to include positively as well as negatively worded questions to receive responses on both sides of the rating scale (Dörnyei 2009: 43).

The final part of the self-constructed questionnaire included two open-ended questions, which aimed for a personal comment from the students. According to Cohen et al. (2011: 392), open-ended questions can be highly valuable as they “might contain the ‘gems’ of information that otherwise might not be caught in the questionnaire”. As illustrated below, the two open-ended questions asked for a personal comment from the learners on what they liked best and what they didn’t like about the CLIL lessons.

17. Was hat dir an der Biologiestunde mit Englisch am besten gefallen? ¶

18. Was hat dir an dieser Biologiestunde nicht so gut gefallen? ¶

Figure 9. The two open-ended questions in the questionnaire

After having constructed the questionnaire, it had to go through a brief piloting stage. Cohen et al. (2011: 402) argue that pre-testing a questionnaire is essential for its success as it increases a questionnaire’s “reliability, validity and practicability”. For this reason, a group of 6th graders received the questionnaire to test if the wording of the formulated items was clear. The piloting stage led to some minor changes in the formulation of some items, but then it was ready to be administered.

6.4 The materials

Before data could be collected, it was necessary to conduct CLIL sequences with the learners. Based on principles for CLIL material development (Ball et al. 2015), teaching materials were created and applied in the classroom (see appendix). The purpose of the self-developed materials was twofold. On the one hand, the learners should become familiar with the parts of flowering plants and the process of pollination in English and German, while on the other hand, selected cognitive discourse functions should be fostered. To illustrate this twofold aim, the chosen tasks are elaborated on in more detail.

Since learners' motivation plays a crucial role in CLIL (Sylvén 2017: 51), the learners were presented with some authentic material at the beginning of the teaching sequence. Each group received a real bellflower and a deck of cards showing the different parts of a bellflower. It was the learners' task to identify the flower parts depicted on the cards and to find them in the real flower. Working with real flowers should not only increase the learners' interest but also give them a purpose for learning about flowering plants. While identifying and locating the flower parts, the students performed the CDF *DEFINE*.

As illustrated in the second task, the learners had to label the flower parts on a worksheet. Since the learners should acquire the terms for the flower parts in German and English, this activity included both languages. After having learnt the parts of a flower, the learners were encouraged to guess the function of some flower parts. More specifically, they had to activate their pre-existing knowledge and guess the function of the petals and sepals. While doing so, they performed the cognitive discourse function *EXPLORE*. According to Dalton-Puffer's (2013: 235) classification of CDFs, guessing represents the CDF *EXPLORE*. This activity also ties in with Ball et al.'s (2015: chapter 7) sixth principle of material design, which emphasizes the importance of connecting new knowledge with what learners already know about a topic. Ball et al.'s (2015: chapter 7) principles are also represented in the fourth task, which asked the students to read a text about the functions of flower parts. Afterwards, they had to match the parts of a flower with their functions. This activity relies heavily on scaffolding and making key language salient, which are both principles suggested by Ball et al. (2015: chapter 7). Key words were not only highlighted in bold but also translated in a list called 'Language Tips'. These scaffolding techniques should reduce the difficulty of the task, which is necessary when

a text is rather demanding for learners (Ball et al. 2015: chapter 7). While matching the flower parts with their functions, the learners performed the CDF CLASSIFY.

The second part of the CLIL sequence revolved around the process of pollination. To maintain the students' motivation, they were allowed to conduct a simple experiment. As can be seen in the appendix, the learners were presented with models of flowering plants. The flower models contained some juice, which represented the nectar. The students also received straws, which symbolized the mandibles of insects. Then they had to drink the juice from the flowers with a straw. While doing so, curry got stuck on the face of some students. After the experiment, they needed to draw conclusions on why some of them had curry in their faces. They also had to guess what the curry symbolized. While performing this activity, the learners applied the CDFs EXPLAIN and EXPLORE, which both can be considered highly cognitively engaging. This activity encouraged the learners to discuss and interact with each other, which can be highly useful when dealing with challenging tasks. After having completed this activity, it was briefly discussed with the teacher, who led over to the topic of pollination.

The follow-up task involved watching a video about pollination and bringing statements about pollination into the correct order. The video was chosen since it presented the process of pollination in a child-oriented way and offered a different source of input. To support the learners, key language was again made salient and explained in a box called 'Language Tips'. In a final step, some learners were asked to recount the process of pollination in their own words. The learners who managed to do that, performed the highly cognitively engaging CDF called REPORT.

6.5 The participants

Since the empirical part of this thesis aimed at investigating if and how CLIL can work with middle school students, the participants of the study were learners at a middle school in the Southern Burgenland. More specifically, the study was conducted with two classes of 5th grade students, who had never been exposed to CLIL teaching before. When the study was conducted, the learners were aged between ten and eleven years. Each class comprised almost 20 students,

most of whom were allowed to participate in the study. A detailed overview of the participants is given in the table below.

Table 5. Overview of participants

	Group A	Group B
male	12	10
female	6	6
total number of participants	18	16
L1 German	17	15
other L1	1	1

As can be seen in the table, 18 students from class A and 16 students from class B participated in the CLIL project. Both classes contained a larger number of boys than girls. Regarding the learners' mother tongues can be said that all learners, except for two, had German as their L1.

6.6 The school context

As mentioned above, the study was conducted in a middle school in the Southern Burgenland. In comparison to other middle schools in Austria, the respective school is rather small with around 150 students. Each grade comprises two parallel classes, which both receive the same amount of subject and language teaching. In terms of biology teaching, it has to be said that the 5th and 8th graders have two biology lessons a week, while the 6th and 7th graders only have one biology lesson every week. The number of English lessons does not vary from 5th to 8th grade, which means that all grades receive four regular English lessons a week. Apart from the regular English lessons, the school offers English as an elective subject in the 7th and 8th grade. This elective subject comprises two hours a week. Regarding CLIL teaching, it has to be mentioned that CLIL has never been part of the school's timetable. This means that CLIL was a totally new approach to the learners.

After having given some basic information on the school context, it is crucial to take a closer look at the student body. The school under discussion is located in the countryside of the Southern Burgenland, which means that the pupils either come from the same village where the

school is located or live in neighboring villages. Thus, one can say that the majority of the pupils share the same or similar cultural background. Although migration flows have led to some cultural diversity over the past few years, there is only a small number of students with different cultural backgrounds. While the cultural diversity among the students is less marked, they are highly diverse in terms of socio-cultural backgrounds and special educational needs. For example, there are students who have teaching assistants and extra lessons with teachers who have received special training in supporting students with special educational needs. Moreover, in the 5th grade classes, there is team-teaching in every main subject to best support the learners. From the 6th to 8th grade, the students are divided into smaller groups in English, German and math.

6.7 Data analysis

After completing the data collection process, it was necessary to organize and analyze the data collected from the students. The following section provides deeper insights into the analysis of the collected data, namely the results from the pretest and the posttest as well as the learners' responses to the questionnaire.

6.7.1 Analysis of pretest/posttest

To ensure anonymity, the students' pretests and posttest were coded with S1, S2, etc. This was necessary to enable a comparison between each learner's results and to determine the extent of the learner's vocabulary and content gains throughout the CLIL sessions. Since data had been collected in both 5th grades, class 1a was labeled as Group A and class 1b was called Group B. In a further step, it was important to clear the data. This means that results from students who only took the pretest or the posttest were excluded from the analysis. After having cleared the data, 18 data sets from group A and 16 data sets from group B were available for analysis. To determine the learning progress for each participant, but also to facilitate a comparison between both classes, the learners' responses were transformed into numerical data. This means that each task in the pretest and posttest received a certain number of points, which could be compared. The students' responses to task 3 were analyzed qualitatively as well, which means that apart from noting down a score, the exact wording of the students' answers was written down as well. This way, it was possible to determine vocabulary and knowledge gains. Since the first research question aimed at gaining insights into the learners' content and vocabulary learning during the

CLIL lessons, it was necessary to code the different tasks with either C (content) or V (vocabulary).

The first task in the pretest was labelled as a vocabulary task since it asked the students to label the parts of a flower with the German words given in a box. In the posttest, the students had to do the same. However, the learners had to label the flower not only in German but also in English to find out if the learners could remember the English terms as well. The second task in the pretest asked the learners to guess the function of the petals in German. If they guessed the function correctly, they received one point. If the students matched the petals with their function correctly in the posttest, they also got a point. In the posttest, they also had to match other flower parts and received points for each correct answer. Analyzing the data this way not only enabled a comparison between the pretest and the posttest but also provided insights into the learners' content learning using the English language.

The third task required the students to describe the process of pollination. The students could get two points if they described pollination correctly. If their descriptions were partly correct, they received one point. To get more information on the students' learning progress, this task was not only analyzed in terms of the scores the learners achieved, but also qualitatively by looking at how the use of their language/vocabulary changed from the pretest to the posttest.

6.7.2 Analysis of questionnaire

Since all the closed-ended questions in the questionnaire were Likert scale items, the questionnaire lent itself towards quantitative analysis. According to Cohen et al. (2011: 604), quantitative analysis is not only suitable for large-scale research, but can “serve small-scale investigations” as well. To analyze the data quantitatively, the statistical analysis program SPSS was used. Before the desired measures could be calculated, it was necessary to code the questionnaire. To illustrate this, group A was coded as 1 while group B was coded as 2. Another example would be the coding of the participants' sexes. Females were coded as 1 and males were coded with 2. In a further step, the negatively formulated items needed to be recoded to obtain reliable results. Another measure ensuring reliability involved the anonymity of the

questionnaire. To encourage the learners to answer as honestly as possible, the questionnaire was conducted completely anonymously.

After having prepared the data, mathematical measures could be calculated. Descriptive statistics were used to calculate frequencies and measures of central tendency such as means, medians, and modes to get insights into the data (Cohen et al. 2011: 622).

As the questionnaire also contained two open questions, a coding frame needed to be developed (Cohen et al. 2011: 407). The defined categories involved the English language, visual media, real flowers, etc.). After defining the categories, the learners' answers were classified accordingly.

6.8 Limitations

Before the findings are presented, limitations of the study need to be pointed out. One of the main limitations concerns the sample size of the study. Since this study was only conducted in two parallel classes at a specific middle school, with around 20 students each, one cannot make any generalizations. Thus, it would be highly interesting to conduct similar CLIL projects in other middle schools to draw conclusions for a larger school context. Limitations regarding the gathered results need to be mentioned as well. Since the pretest and posttest did not go through a piloting stage due to time constraints, task difficulties could only be detected after administering the tests. If the first task in the posttest had been constructed differently, it is likely that some of the results would have been more significant. Regarding the questionnaire, it has to be said that it was administered completely anonymously. While anonymous questionnaires are more likely to evoke honest responses, a comparison between the students' questionnaire responses and their test results was not possible. This can be considered a shortcoming since the answers in the questionnaire might have explained specific results. Finally, it needs to be said that the results might be distorted to a certain extent. Since the learners conducted the CLIL project with their English and biology teacher, who was me, they probably responded more positively or negatively to the questionnaire items depending on their attitudes towards the teacher. To receive completely valid results, it is favorable if the class

teacher is not the one conducting the CLIL project. Nevertheless, highly insightful findings could be gathered and are presented below.

7 Findings

This section presents the results gained during the data analysis process. While the results obtained from the pretest and posttest mainly serve to answer the first research question, the data gathered by means of the questionnaire will be used to answer questions two to four. The insights gained from the pretest and posttest illustrate the learners' content and vocabulary knowledge before and after the CLIL sessions. In a first step, each group will be discussed separately, while in a second step, the results from groups A and B will be compared. Another part of this section constitutes the analysis of the questionnaire, which gives information on the learners' experiences with the CLIL lessons. Before the findings can be presented in much detail, some general information on both groups and the participants is given.

Table 6. Number of participants in tests and questionnaire

	Group A		Group B	
	tests	questionnaire	tests	questionnaire
male	12	12	10	10
female	6	6	6	6
total	18	18	16	16

Table 6 shows that 18 students from group A and 16 students from group B completed the tests and the questionnaire.

7.1 Pretest and posttest results

This section presents the results received from the pretests and posttests. The findings are further divided into subcategories to get more detailed information on the learners' content and vocabulary learning.

7.1.1 Insights into learners' prior knowledge

The results gained from the tests serve to answer the first research question, which investigated the effects of the CLIL lessons on the learners' content and vocabulary learning. The first task in the pretest required the students to label the parts of a flower in German to get an understanding of what the learners already know. In total, the learners could receive four points for labelling the picture correctly, which is illustrated in the bar chart below.

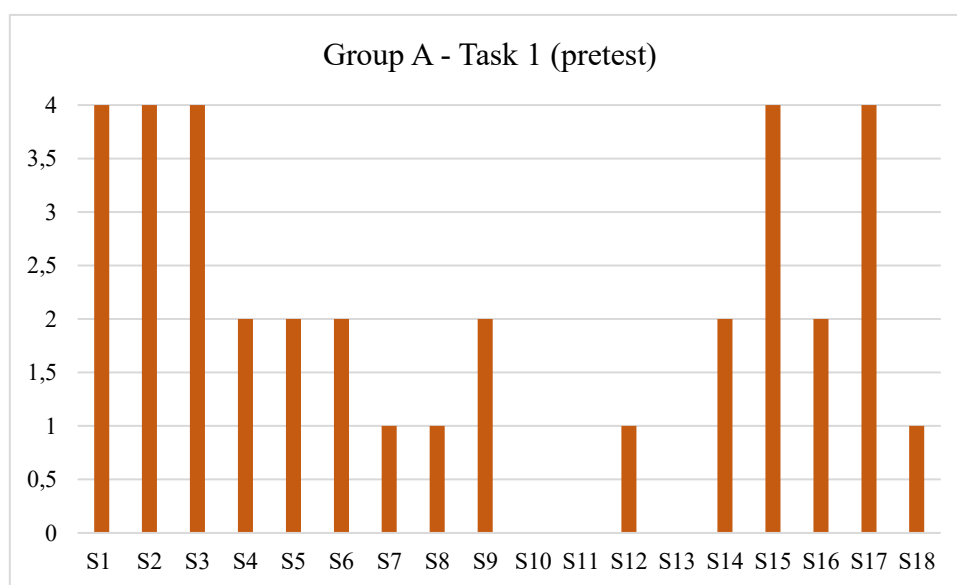


Figure 10. Scores achieved by learners for labelling the parts of a flower in German

The chart clearly illustrates that the learners already had some prior knowledge to the CLIL lessons. Five out of 18 students were able to label all four missing flower parts correctly. Six students could name at least two parts of a flower and four learners could label one flower part. Three students could not label anything correctly. When looking at the pretest results gained from group B, it becomes immediately obvious that group B showed less prior knowledge than group A. Group B's results can be seen in the bar chart below.

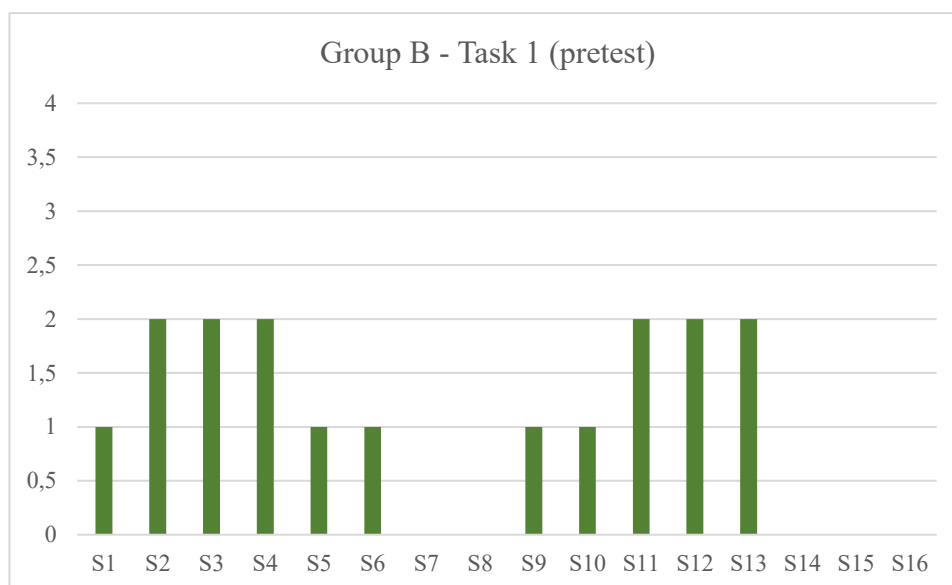


Figure 11. Scores achieved by learners for labelling the parts of a flower in German

The chart illustrates that nobody from group B could label three or four flower parts correctly. Six students managed to name two parts of a flower and five learners could name 1 part. Four students could not provide a correct answer.

The second task in the pretest aimed to investigate the learners' pre-existing knowledge regarding the function of the petals. Learners who could explain the function of the petals correctly, received one point. By looking at the results, it was detected that only three learners from each group could explain the function of the petals correctly. While the first task clearly indicated more prior knowledge in group A, the second task did not do so.

The third task wanted to find out more about the learners' knowledge of pollination. For this reason, the students had to describe the process of pollination. The analysis of the students' answers showed that a few students explained pollination completely correctly, some learners explained it partly correctly and others could not explain it at all. The table below illustrates the findings gained for both groups.

Table 7. Students' prior knowledge concerning the process of pollination

	Group A	Group B
totally correct	2	0
partly correct	6	5
only key words	7	10
no response	3	1

The table depicts the number of students and the degree of correctness of their responses. It can be noted that two students from group A could explain the term pollination totally correctly, while no students from group B could do that. Six students from group A could partly explain pollination, while five students from group B could do the same. Seven learners from group A and 10 learners from group B were able to provide key words such as bee, honey, flowers, or nectar. There were also some students in each group that did not provide a response. After having presented snippets of the learners' prior knowledge about flowering plants and pollination, it is time to take a closer look at their learning progress by comparing the results gained from the pretest and the posttest.

7.1.2 Progress in content and vocabulary learning

To gain insights into the learners' growth of content and vocabulary knowledge, the results obtained from the pretest and posttest needed to be compared. The following chart illustrates a comparison between Group A's pretest and posttest results regarding their German vocabulary knowledge.

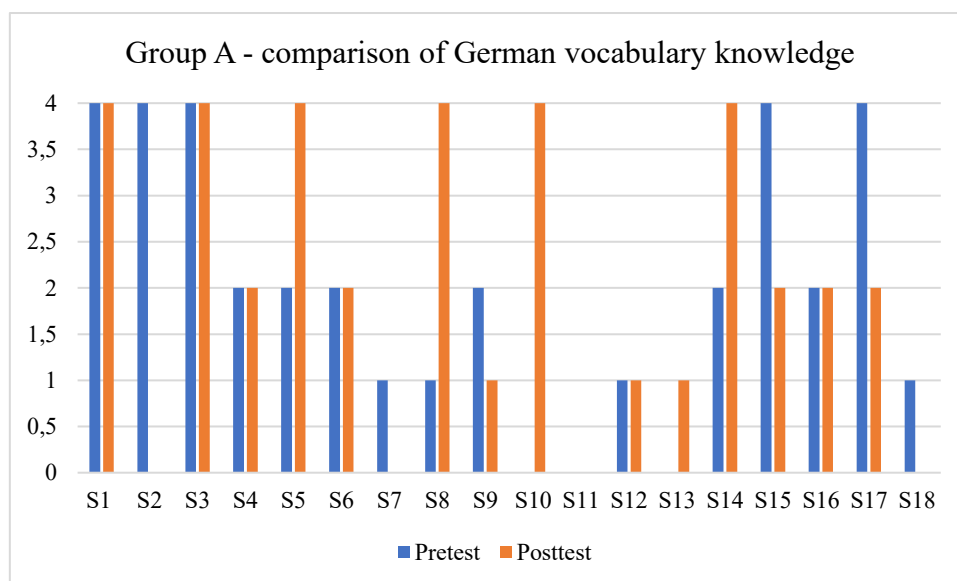


Figure 12. Group A's German vocabulary knowledge of flower parts before and after the CLIL lessons

The findings demonstrate the learners' individual performances on labelling the parts of a flower in German. It can be seen that S1 and S3 managed to label all flower parts correctly in the pretest and the posttest. S4, S6, S12, and S16 also achieved the same number of points in both tests. Five students from group A (S3, S8, S10, S13, S14) showed knowledge gains in the posttest. This means that they were able to name more parts correctly in the posttest than in the pretest. For example, S10 could not label one part appropriately in the pretest but was able to name all four parts correctly in the posttest. When having a look at students 2, 7, 9, 15, 17, and 18, it can be noticed that they performed better on the pretest than on the posttest. This finding will be interesting to discuss later on. When taking group A as a whole, it is useful to mention the calculated mean values as well. The mean value calculated for the pretest and the posttest both amount to 2.0. Although individual students performed significantly better in the posttest, the group as a whole did not show considerable learning gains in terms of their knowledge of flower parts. The same chart was compiled for group B's results, which is presented below.

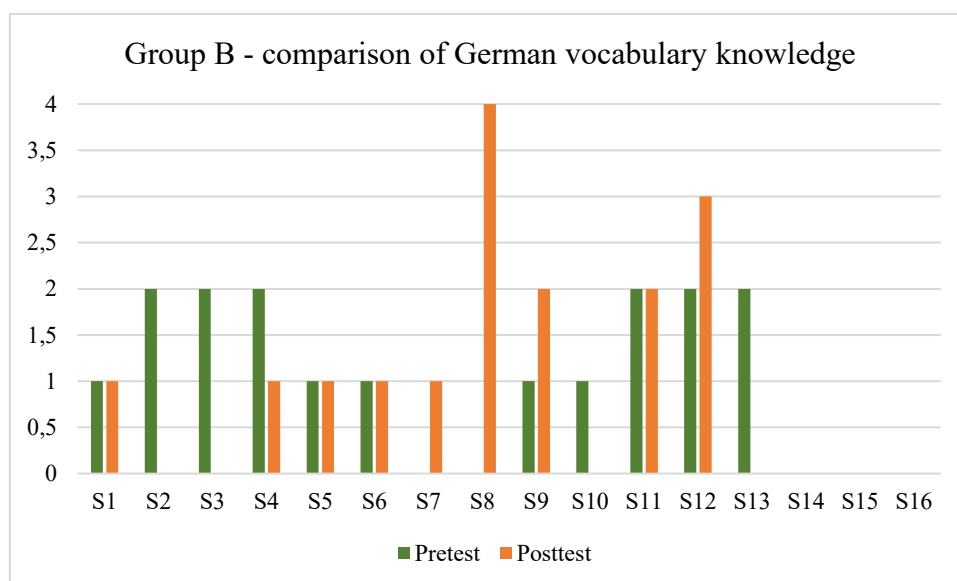


Figure 13. Group B's German vocabulary knowledge of flower parts before and after the CLIL lessons

When taking a look at group B, one can notice that the individual students' results are highly diverse. Four students received the same number of points in the pretest and the posttest. Only four students (S7, S8, S9, S12) performed better in the posttest than in the pretest. It is interesting to note that five students (S2, S3, S4, S10, S13) did better in the pretest than in the posttest. Three learners (S14, S15, S16) did not give a response in both tests. The calculated mean score for the group amounts to 1.1 for the pretest and 1.0 for the posttest, which needs to be discussed later in the discussion part.

7.1.3 English knowledge gains

The posttest also asked the learners to indicate the missing flower parts in English. The chart below presents the number of correctly labelled flower parts in German and English for group A.

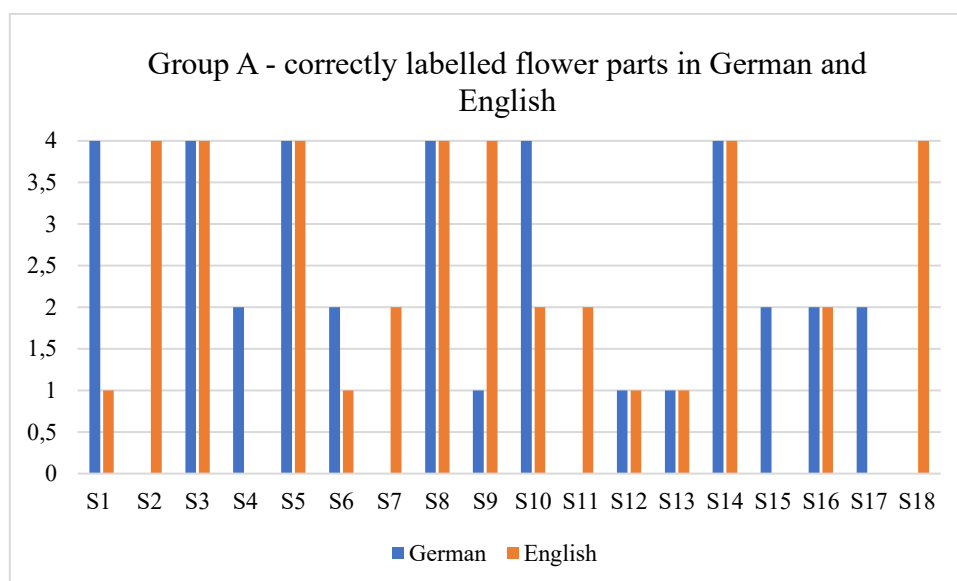


Figure 14. Number of correctly labelled flower parts in German and English by Group A in posttest

The bar chart illustrates that four students from group A could label all four flower parts in German and English correctly. It is interesting to note that five learners (S2, S7, S9, S11, 18) provided a larger number of correct English than German responses. A further important finding refers to the fact that all learners except for S4, S15, and S17 were able to label at least one flower part in English correctly. When comparing the calculated mean scores, it is highly interesting that the mean score for the English items (2.2) is slightly higher than the one calculated for the German responses, which is 2.1. The same chart was created and analyzed for group B, which can be seen below.

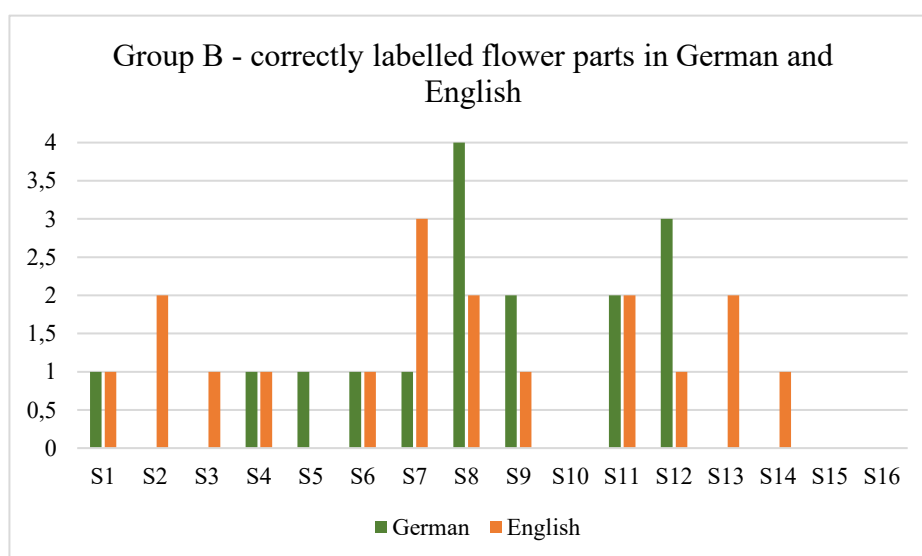


Figure 15. Number of correctly labelled flower parts in German and English by Group B

The chart compiled for group B shows that 12 out of 16 students could label at least one flower part in English. Four learners could name the same number of flower parts in German and in English. Three learners could neither label a flower part in German nor in English. The calculated mean scores are also interesting to look at. While the mean value for the German responses comes to 1.0, the mean score for the English items amount to 1.1, which means that the learners did slightly better in labelling the flower parts in English.

7.1.4 Content knowledge

During the CLIL lessons, the learners should also acquire knowledge regarding the function of the flower parts, especially the petals. While the pretest aimed at finding out if the students were aware of the important function of the petals, the posttest wanted the learners to match the four most important flower parts with their functions. The table below illustrates the learners' knowledge about the function of the petals before and after the CLIL sequences.

Table 8. The learners' knowledge of the function of petals

	Group A		Group B	
	pretest	posttest	pretest	posttest
number of correct responses	3	8	3	4

The table demonstrates that three learners from group A could explain the function of the petals correctly before the CLIL lessons and eight students were able to do it after the lessons. From group B, only 4 students were aware of the function of petals after the conducted lessons.

In the posttest, the students did not only have to match the function of the petals but also the function of the sepals, carpels, and stamen. Group A's average score reached in this task was 1.2, while group B achieved a mean score of 1.4. These findings show that group B could match the flower parts and their functions slightly better.

While the first part of the tests focused on flower parts and their functions, the second half was dedicated to the process of pollination. The aim of the tasks in the pretest and posttest was to investigate the learners' conceptual understanding of pollination, which means that the tasks focused on content learning. The table below illustrates a comparison of the learners' knowledge of pollination before and after the CLIL sequences. Since the task focused on the concept of pollination, the learners were allowed to answer this question either in German or in English. All of the learners provided their explanations in German. The students' responses were analyzed in terms of the degree of their correctness. For this reason, the categories *totally correct*, *partly correct* and *too vague response* were formulated.

Table 9. The process of pollination explained by learners

	Group A		Group B	
	pretest	posttest	pretest	posttest
totally correct	2	9	0	5
partly correct	6	8	5	8
too vague response	7	1	10	2
no response	3	0	1	1
total number of students	18	18	16	16

When having a look at the table, one can immediately recognize that both groups had a better understanding of pollination in the posttest than in the pretest. To illustrate this, only two students from group A could explain the process of pollination correctly in the pretest, but nine students provided completely correct answers in the posttest. Moreover, more learners from group A could give partly correct responses instead of vague answers and each student in group A was able to give at least a vague answer instead of none. The results are similar for group B. While no student could provide a totally correct answer in the pretest, five students managed to explain pollination correctly in the posttest. Eight learners offered partly correct responses and only two instead of ten learners managed to give partly correct answers instead of too vague ones. In the pretest as well as in the posttest, one learner did not provide an answer at all. To sum the table up, it can be said that the understanding of the process of pollination has increased in both groups.

7.2 Results from the questionnaire

This section illustrates the insights gained from the questionnaire. This section is also divided into subcategories to get a thematic overview of the questionnaire results.

7.2.1 Interest in biology and English

As illustrated above, 34 students completed the questionnaire and offered insights into their experiences with the CLIL lessons. Since CLIL biology lessons are the focus of this thesis, it is crucial to take a look at the learners' general interest in biological topics and their interest in biology at school in particular. For this reason, the students' attitudes toward biology are presented in the chart below.

Table 10. Learners' general interest in biological topics

	Group A		Group B	
	n	%	n	%
strongly disagree	1	5.6	2	12.5
disagree	2	11.1	3	18.8
neutral	1	5.6	1	6.3
agree	12	66.7	8	50.0
strongly agree	2	11.1	2	12.5

The table illustrates that the majority of both groups is interested in biology in general. While 66.7% of group A are interested in biology, only 50% of the students from group B are interested in biological topics. Only two students from each group are highly interested in biology. When comparing the mean score of both groups, it also becomes obvious that group A (3.7) is slightly more interested in biology than group B (3.3).

Table 11. Learners' interest in biology in general and at school

	Group A		Group B	
	in general	at school	in general	at school
mean score	3.7	3.9	3.3	3.6

That there is a larger interest in biology in group A also holds true when comparing the learners' interest in biology lessons at school. The mean scores illustrated above show that group A likes biology lessons at school better than group B.

After having compared the learners' attitudes towards biology, it is important to mention their attitudes towards the English language as well. While group A reached a mean score of 3.7, group B only shows a score of 2.9. These results demonstrate that not only group B's interest in biology but also the group's interest in the English language is lower than group A's. These insights will be important when discussing the results later.

7.2.2 Experiences with conducted CLIL lessons

Another part of the questionnaire specifically focused on the learners' experiences with the conducted CLIL lessons, which are presented in more detail below.

Table 12. Learners' experiences with the conducted CLIL lessons

	Group A	Group B
I liked the CLIL biology lessons.	3.8	3.3
I can imagine having more CLIL biology lessons in the future.	3.8	2.8
I like ordinary biology lessons better than CLIL biology lessons.	2.6	2.3
I liked the topics of the CLIL lessons.	3.5	3.3

When having a look at table 12, it becomes obvious that group A liked the CLIL biology lessons better than group B. The item which states “I can imagine having more CLIL biology lessons in the future”, is particularly interesting. While group A shows a mean score of 3.8, group B only reached a score of 2.8. These results reveal that group A feels more positive towards having further CLIL biology lessons than group B. With regard to the learners’ interest in the topics of the conducted lessons, group A shows again a higher interest. That group A enjoyed the CLIL lessons more than group B can be confirmed when having a look at the last item in the table. By having a look at the mean scores achieved by both groups, it can be noticed that group A is more likely to enjoy further CLIL biology lessons. This becomes even more obvious when having a closer look at the findings. The table below depicts that 31% of the students from group B strongly agreed and 37.5% agreed to the statement “I like ordinary biology lessons better than CLIL biology lessons”. In contrast to group B, only 27.8% of group A strongly agreed and 22.2% agreed. For this reason, one can clearly say that group A enjoyed the CLIL biology lessons to a larger extent than group B.

Table 13. Item 7: I like ordinary biology lessons better than CLIL biology lessons

	Group A		Group B	
	n	%	n	%
strongly disagree	0	0	1	6.3
disagree	6	33.3	2	12.5
neutral	3	16.7	2	12.5
agree	4	22.2	6	37.5
strongly agree	5	27.8	5	31.3

When taking both groups together, the findings show a mean score of 2.4. This illustrates that the learners’ enjoyment of the CLIL biology lessons was rather low. At this point, it makes sense to differentiate between the students whose mother tongue is German and those who speak a different first language. These findings are particularly interesting since the CLIL lessons aimed at facilitating the inclusion of all learners in the learning process. While the calculated mean score for learners with German as a first language amounts to 2.4, the score for learners with a different first language comes to 2.0. These numbers depict that students who speak German as their first language liked the CLIL lessons slightly better than the students with a different L1.

However, when interpreting these results, one has to keep in mind that only two students have an L1 other than German.

After having presented the learners' perceptions of regular biology lessons in contrast to CLIL lessons, it is useful take a look at how the learners perceived the difficulty of the CLIL lessons, which is depicted in the table below.

Table 14. Mean scores depicting difficulty perceived by learners

	Group A	Group B	Total
Learning the parts of a flower in English was difficult for me	2.9	2.8	2.8
Studying pollination in English was difficult for me	3.5	3.2	3.4

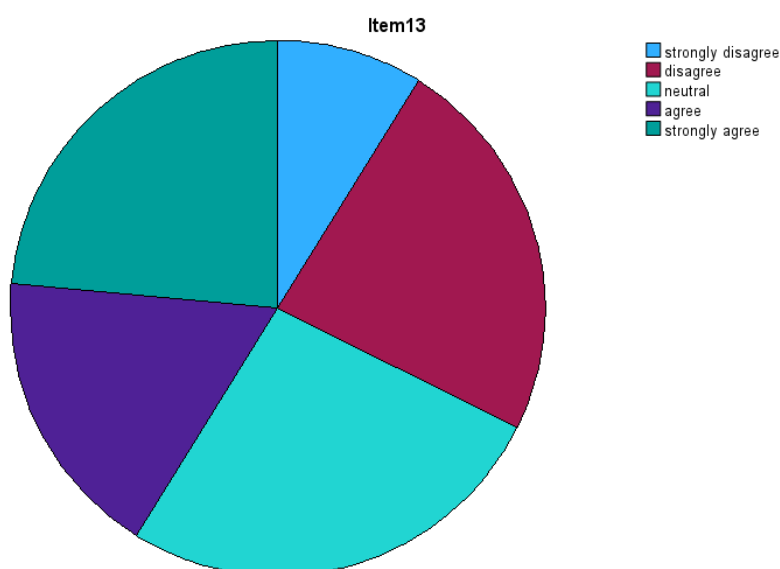
The results in the table above show how difficult the learners perceived learning the flower parts and pollination in English. To avoid confusion, it has to be said that both statements were coded reversely. This means that the means scores illustrate that group B perceived the lessons slightly more difficult than group A.

Apart from investigating the difficulty of the conducted CLIL lessons for the learners, it was important to find out if the learners could follow the lessons and how they perceived their own learning progress, which is illustrated in Table 15.

Table 15. Learners' perceived learning progress

	Group A	Group B
The CLIL biology lessons expanded my English vocabulary.	3.6	3.6
I could follow the CLIL lessons easily.	3.9	3.7
I could follow the CLIL lesson better than regular biology lessons.	3.4	3.0

As illustrated in the table above, group A and group B perceived the CLIL lessons beneficial for their vocabulary learning to the same extent. In terms of how well the learners could follow the CLIL lessons, group A responded slightly more positively, which is shown by the mean score of 3.9. For group B, only a mean score of 3.7 could be calculated. The numbers also show that group A could follow the CLIL lessons better than group B. To get a clearer picture of how many students could follow the CLIL lessons better than regular biology lessons, a pie chart is presented below.

**Figure 16.** Item 13: I can follow CLIL biology lessons better than regular biology lessons

The chart shows that eight students strongly agreed and six students agreed to the statement “I can follow CLIL biology lessons better than regular biology lessons”. Only three students

disagreed with the statement. With regard to inclusion and the learners' mother tongues, it was highly interesting to find out how the learners with first languages other than German responded. The results of the analysis show that one of the two students with different mother tongues strongly agreed to the statement, while the other one strongly disagreed. These findings are interesting and will further be elaborated on in the discussion.

7.2.3 Importance of scaffolding

Further insightful findings are related to scaffolding materials and learner support. The CLIL lessons incorporated a variety of scaffolding techniques, which aimed at supporting the learners during the CLIL lessons. To gain insights into the learners' experiences with the scaffolding provided, the questionnaire contained several items that investigated the students' experiences in this respect. A major part of the scaffolding included language tips on the learners' materials. A child-oriented video explaining pollination was considered as visual support for the learners. With regard to cooperation and peer support, the CLIL lessons offered several sequences during which the students were allowed to work in groups. To what extent the learners perceived the scaffolding as helpful, is presented below.

Table 16. Learners' perceptions of scaffolding techniques

	Group A	Group B	Total
language tips	3.9	3.8	3.9
video	3.1	3.5	3.3
group work	4.4	4.4	4.4

The table above clearly shows that group work was perceived as the most helpful scaffolding technique. The mean score of 4.4 is considerably higher than the mean scores for language tips and the video. With a total mean score of 3.9, the language tips were also considered valuable. When taking a look at the scores for the video, one can notice that group B perceived the video slightly more helpful than group A, but the total score shows that the opinions towards the video were rather neutral. Since the results for group work seem to stand out, it is interesting to have a closer look at the learners' experiences with group work. The calculated mode for the whole data set shows that most students strongly agreed to the statement "Working in groups helped

me to solve the CLIL tasks”. The exact frequencies of how the students responded to the item are presented below.

Table 17. Students’ responses regarding the helpfulness of group work

	n	%
strongly disagree	0	0
disagree	1	2.9
neutral	3	8.8
agree	11	32.4
strongly agree	19	55.9
total	34	100

The table demonstrates that more than half of the students strongly agreed and over a third of the participants agreed to the helpfulness of group work in CLIL lessons. While one student disagreed, no one strongly disagreed, which strengthens the usefulness of applying group work in CLIL.

7.2.4 Open-ended questions

To give the students an opportunity to make their own comments to the CLIL sequences, the questionnaire contained two open-ended questions at the end. While the first question asked, “What did you like best about the CLIL biology lessons?”, the second question investigated what the learners did not like about the CLIL sequences. Since the analysis of the open-ended questions had shown recurring student answers, categories were formulated to get a clearer picture of the learners’ responses.

With regard to the first open-ended question, seven categories could be formulated. The categories were labelled as follows: *video*, *real bellflower*, *flower model*, *group work*, *English language*, *topic in general*, and *no response*. To get an understanding of what the students liked best about the CLIL biology lessons, a pie chart was created.

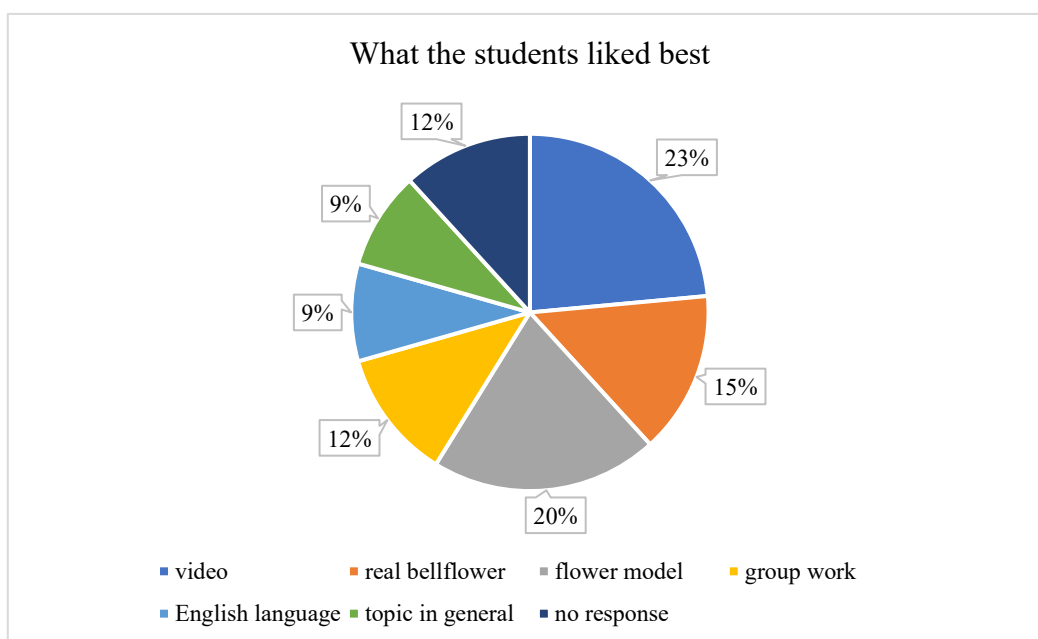


Figure 17. The learners' favorite aspects of the CLIL sequences

This pie chart illustrates what the learners liked most during the CLIL lessons. It is important to note that the chart contains the responses of both groups. When taking a look at the chart, it becomes immediately obvious that most students mentioned the video, which means that they liked the video best. The second largest proportion mentioned the flower model as their favorite part of the CLIL sequence. Fifteen percent liked working with a real bellflower best, which is closely followed by group work. Nine percent of the learners stated that they liked the topic and other nine percent mentioned the English language as their preferred part. It has to be noted that 12% did not give a response, which amounts to a total of four students.

While the chart above has already given insightful findings on the learners' preferences during the CLIL lessons, it is even more interesting to compare the responses of group A and B to get a better understanding of their differing experiences with the CLIL lessons. For this reason, a bar chart illustrating a comparison between both groups is presented.

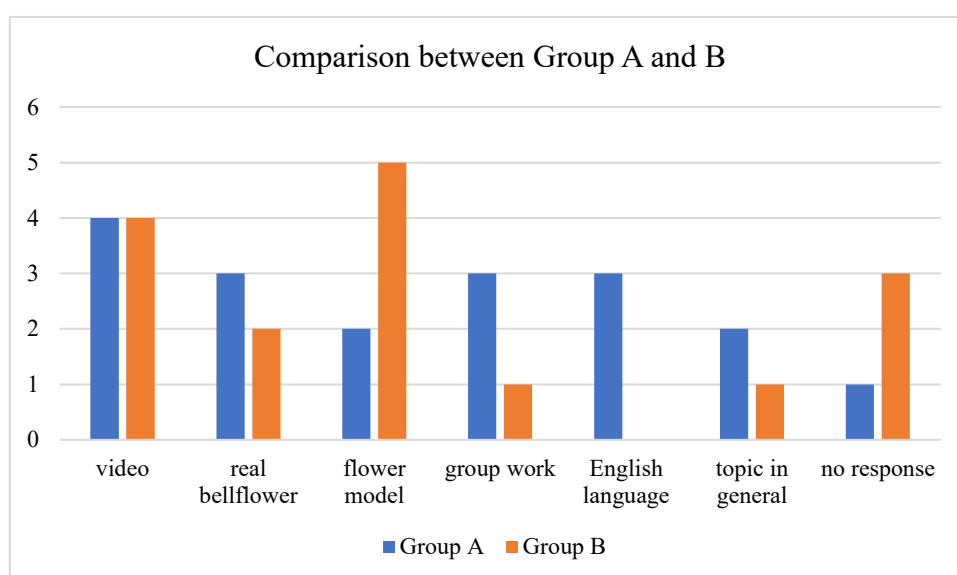


Figure 18. A comparison between group A's and group B's favorite parts

As the comparison above illustrates, four students of each group liked the video best. Another prominent result includes the flower model. While five students from group B mentioned the flower models as their favorite part, only two students from group A did so. It is also interesting to note that group A enjoyed group work and using the English language more. Group B did not even once come up with the English language. After having learnt more about the students' favorite aspects of the CLIL sequences, it is equally insightful to look at the components their did not like. For this reason, findings gained from the second open-ended question will be presented below.

Similar to the first open-ended question, categories were formulated for the second question as well. Based on the learners' responses, nine suitable categories could be formulated. The categories include *the English language*, *the topic*, *difficult vocabulary*, *the video*, *worksheets*, *group work*, *the posttest*, *liked everything*, and *no response*. A detailed overview of the students' answers is given in the pie chart below.

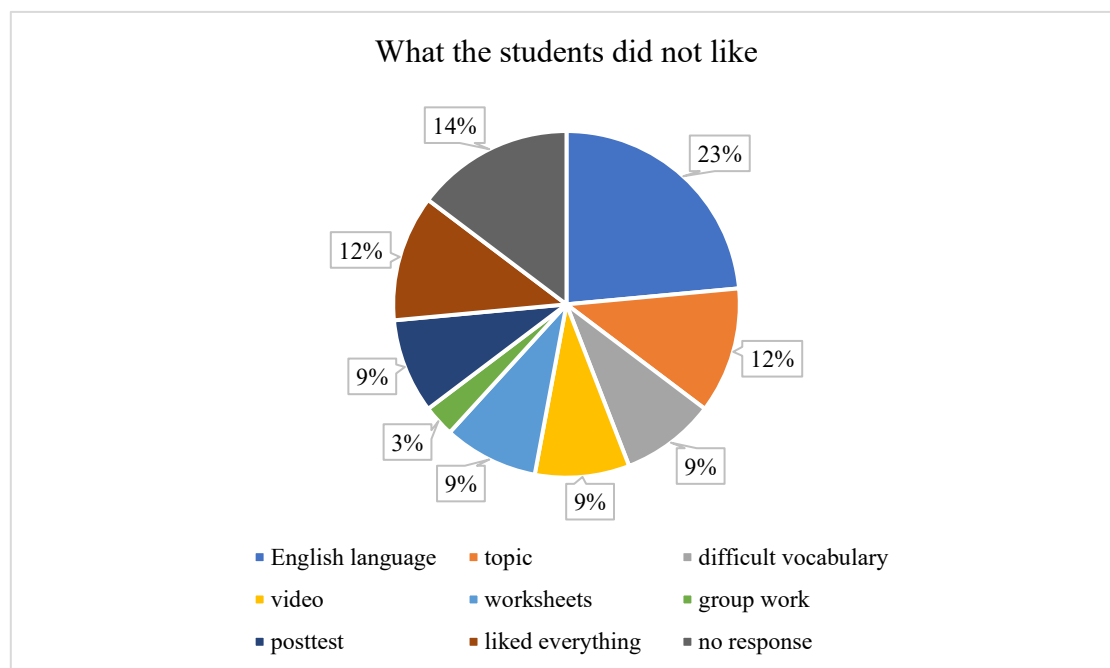


Figure 19. An overview of the CLIL aspects the learners did not like

When having a look at the pie chart, it can be noticed that most of the respondents stated that they did not like the English language. Twelve percent of the students were not fond of the topic, but another 12% said that they liked everything. The posttest, the worksheets, the video and difficult vocabulary were mentioned equally often, namely by nine percent (3 students). One student did not enjoy working in groups and five students did not respond at all. After having found out that a fairly large proportion of the learners did not enjoy using the English language, it makes a lot of sense to compare both groups again to investigate if both groups disliked the English language to the same extent. For this reason, a chart illustrating a comparison between both groups is given below.

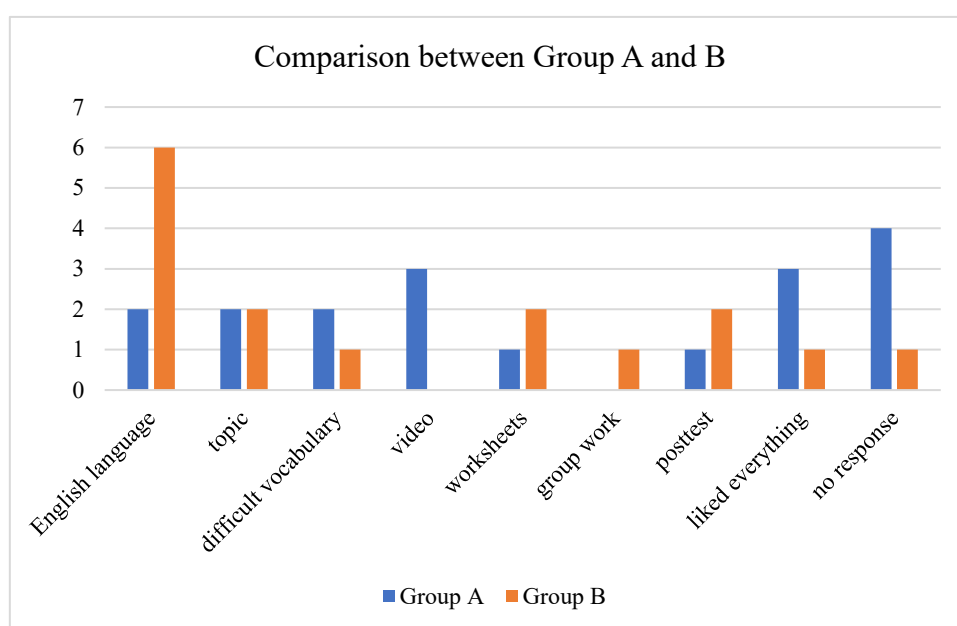


Figure 20. A comparison of group A's and group B's least favorite parts

By having a look at the comparison between both groups, it becomes immediately clear that group B enjoyed working in English a lot less than group A. More specifically, six students from group B stated the English language as their least favorite part of the lessons, while only two students from group A mentioned English. What is also interesting is that only students from group A disliked the video and only one learner from group B did not like to work in groups. The posttest also seemed to be an unfavorable part for learners of both groups.

After having analyzed all the relevant aspects of the questionnaire and the tests, it is time to discuss, connect and interpret the findings in the next section.

8 Discussion

This section aims at discussing the findings, which were presented above. The findings gained from the pretests and posttests as well as the insights received through the questionnaire will be discussed in relation to the research questions and the theoretical concepts presented in the first part of this thesis. While the results gained from the tests mainly serve to get an impression of the learners' content and vocabulary learning during the CLIL sequences, the questionnaire will complement the results with the learners' own experiences and perceptions of the CLIL lessons.

8.1 Content and vocabulary learning

The first research question aimed at investigating the extent to which applying a CLIL approach is beneficial to 5th graders' content and vocabulary learning in biology lessons at middle school. To answer this question, it is necessary to discuss the results from the pretests before comparing them with the posttests. The findings clearly show that most of the learners had already heard of flower parts and pollination before dealing with the topic at school. More specifically, almost all learners from group A were able to label some flower parts correctly, which is why it can be assumed that the learners in group A had heard of pollination in primary school. In contrast to group A, group B does not show a large amount of pre-existing knowledge. This means that the prior knowledge of both groups differed and might be one aspect that influenced the differing results and experiences. Duske (2017: 74), for example, stresses the importance of prior knowledge for successful learning. The enormous relevance of pre-existing knowledge structures for effective learning is also emphasized by Rumlich (2022: 219). He states that "prior knowledge is the single most powerful predictor of students' final general EFL proficiency" (Rumlich 2022: 219). Thus, it can be assumed that the varying pre-existing knowledge present in both groups seemed to influence their further learning process.

As the findings show, group A outperformed group B in almost all activities. However, it has to be noted that the differences are sometimes only subtle. When taking a look at the learners' vocabulary learning during the CLIL lessons, the individual learners' results show that many students from group A could name more flower parts in German after the CLIL biology lessons. Group B's German vocabulary knowledge seemed to have decreased after the CLIL lessons. To clarify this phenomenon, it has to be said that in the posttest, the learners had to label the flower parts in German and in English. During the analysis of the tests, it seemed that several students only focused on one language, which was mostly English, and did not write down the German words they had already known in the pretest. This is supported by findings demonstrating the learners' vocabulary gains in English. The results show that the students in group B could label more flower parts correctly in English than German. This strengthens the assumption that individual students focused more on the English language after the CLIL sequences than on German. Cohen et al. (2011: 488) warn against such problems that might occur because of the test design. According to Cohen et al. (2011: 488), students must "know exactly the kind and specificity of the answer required". Although it was specifically mentioned in the instructions to label the flower parts in both languages, some learners seemed to overlook it. For this reason,

it might have been a reasonable idea to provide the required vocabulary on the task sheet to avoid confusion among the learners.

The CLIL sequences not only aimed at increasing students' vocabulary knowledge, but they also attempted to develop the learners' content knowledge of flowering plants and the process of pollination. Since all the flower parts and, especially, the petals play a crucial role for successful pollination, it was necessary to find out more about the learners' prior knowledge. As the results illustrate that only three learners from each group could describe the function of the petals correctly, one can assume that the learners pre-existing knowledge about the function of flower parts was limited. When taking a look at the posttest results, one can clearly detect a growth of content knowledge in group A. To illustrate this, after the CLIL lessons eight instead of only three learners were aware of the function of the petals, which they had to match in English. However, only four students from group B were able to achieve the same. These results show that the CLIL lessons contributed to the 5th graders' content knowledge but to a varying extent. It has to be added that not only content learning happened in this case but also language learning. Since several students were able to match the flower parts and their functions in English, one can assume that the learners acquired the content in English and could retrieve it from their memory in the posttest. This clearly demonstrates that already young learners can acquire content knowledge in a foreign language, although it is likely to be more cognitively challenging than learning content in one's first language. This ties in with Fazzi's and Menegale's (2023: 225) findings, which point to the difficulty for young learners to grasp abstract or cognitively challenging content in a foreign language.

The cognitively most demanding part of the CLIL sequences with regard to content and language learning seemed to be the concept of pollination. The learners did not only have to understand the process of pollination, but they also had to explain how pollination works in the posttest. The learners were free to choose whether they wanted to explain pollination in German or in English. Due to the high cognitive demand of explaining a biological concept in one's own words, it is no surprise that all of the students described the process of pollination in German. As the results show, a large number of learners successfully described pollination and some of them even incorporated some English words. To illustrate this, only two learners from group A could explain pollination correctly in the pretest, while half of the group described it completely correctly in the posttest. Group B showed a growth of knowledge as well. While no student was

able to elaborate on pollination in the pretest, five learners explained it correctly and eight learners described it partly correctly in the posttest. This demonstrates that the CLIL lessons had a considerably positive effect on the 5th graders content knowledge. Although none of the participants used the English language to elaborate on pollination, a large number of learners was able to do it in German, which clearly shows that combining both languages did not have a detrimental effect on the learners' content learning.

The fact that some learners even incorporated English words in their German explanations indicates that some learners already started to process the concept of pollination in English. They might have lacked the linguistic resources to comprehensively describe pollination in English. This insight foregrounds the crucial role of the teacher, whose responsibility it is to provide effective scaffolding (Ellison 2018: 248). Although the learners received a variety of scaffolding materials during the CLIL lessons, they seemed to have required scaffolding that led them towards the production of knowledge using the foreign language. Llinares and Nashaat-Sobhy (2021: 338) also stress “the double challenge that young learners face in understanding and expressing content in a second language”. They argue that the linguistic resources learners need to express content in an L2 have to be identified by the teacher. With regard to explaining the concept of pollination, it would have been valuable to provide more language support and communicative activities, which could have encouraged the learners to actively apply the newly learnt language features. Such an activity might have encouraged the learners to use English for explaining the process of pollination in the posttest. While this first part of the discussion mainly depicted the extent to which the learners' content and vocabulary was influenced by the CLIL lessons, the second part offers insights into the students' own perceptions of CLIL and the provided scaffolding.

8.2 The learners' experiences with CLIL

To obtain a more comprehensive understanding of how CLIL can be implemented successfully in middle school, it was important to find out more about the students' perceptions of CLIL. For this reason, one of the research questions wanted to investigate the students' perceptions of CLIL biology lessons in contrast to regular biology lessons. To better understand the learners' experiences with CLIL, it was necessary to look at their general interest in biology and English. The findings gained from the questionnaire depict that the students in group A have a larger

interest in biological topics in general and are more interested in the English language than group B. Group A also seems to like biology at school better than group B. It can be assumed that those initial attitudes might have affected the learners' perceptions of the conducted CLIL lessons.

When taking a look at how much the learners enjoyed the CLIL biology lessons, the results distinctly show that group A liked the CLIL lessons better than group B. This becomes obvious when looking at the learners' responses to the statement "I can imagine having more CLIL biology lessons in the future". The results illustrate that group A has a larger interest in further CLIL lessons than group B. This is also supported by further results from the questionnaire, which illustrate that many students from group B prefer regular biology lessons to CLIL lessons. The groups' differing interest in the CLIL lessons might be linked to the choice of topic as well. By looking at the results, one can notice that group A found the selected topic more interesting than group B. That the topic choice can considerably foster the learners' motivation is also emphasized by Pinner (2021: 30), who argues that the chosen topics should revolve around the learners' own interests.

8.3 Inclusion of learners

Apart from investigating the students' perceptions of CLIL lessons in contrast to regular biology lessons, the pre-experimental study wanted to find out in how far adopting a CLIL approach can facilitate the inclusion of all learners in biology lessons at middle school. By looking at the results from the questionnaire, one can notice that group A could follow the CLIL sequences more easily than group B, which is interesting since both groups have the same number of English and biology lessons a week. However, at this point it has to be added that class A is known for performing better on English tests than group B, and thus, group A has the reputation of being slightly better in English than the parallel class. It is likely that group A's higher linguistic competence was beneficial to them when following the CLIL lessons. What is highly interesting to note is that eight students strongly agreed and six students agreed to the statement "I can follow CLIL biology lessons better than regular biology lessons". This means that a third of the learners did not have any difficulty following the lessons. Only three students disagreed with the statement and even fewer strongly disagreed, which means that a large number of the students could follow the CLIL lessons quite well.

With regard to the inclusion of all learners, it is particularly interesting to look at the students with other mother tongues than German. However, it has to be pointed out that there were only two students with different mother tongues. Due to the small number of participants with L1s other than German, one must be careful when interpreting and using the results. Nevertheless, it is insightful to have a closer look at the responses of those two as they perceived the CLIL lessons rather differently. The results depict that one of those two students strongly agreed to the statement “I can follow CLIL biology lessons better than regular biology lessons”, while the other one strongly disagreed. Based on these results, one could assume that learners with mother tongues other than German can profit from CLIL lessons if their knowledge of the English language is broad enough. However, this is a rather weak finding as the number of participants with different L1s was too small. To ensure that as many learners as possible can follow CLIL lessons without difficulties, teachers need to provide appropriate scaffolding. The effectiveness of the scaffolding techniques applied during the CLIL project are discussed in the following section.

8.4 Impact of scaffolding

The employed scaffolding techniques during the project involved language tips, a video and group work. The language tips were directly provided on the worksheets in a box called *language tips*. The findings distinctly show that both groups perceived group work as most helpful. Both groups reached a mean score of 4.4 on the Likert scale, which suggest a strong tendency towards the helpfulness of group work. The positive impact of collaborating with peers is also foregrounded by Fazzi and Menegale (2023: 228), who argue that peer work can contribute to a deeper understanding of a topic. The language tips provided by the teacher were considered the second most helpful scaffolding technique, while group A perceived the language hints slightly more valuable than group B. When taking a look at the mean scores, it becomes obvious that the English video about pollination was the least helpful support for the students. However, it is interesting to note that class B experienced the video as more beneficial than group A. A possible explanation might be that class B contains more visual learners, who grasp content more easily when receiving visual input. The importance of applying a variety of different scaffolding practices in heterogeneous classrooms is also stressed by Madrid and Pérez Cañado (2018: 245), who point out that audiovisual material can facilitate student learning.

It is highly interesting to note that the video and group work were also mentioned by the students in the open-ended questions. When the learners were asked what they liked best about the CLIL lessons, 23% mentioned the video and 12% referred to group work. Since several students mentioned those scaffolding practices as the parts they liked best, one can assume the significance those practices had for the learners. A significant proportion of students, namely 20%, mentioned the flower model as their favorite part and 15% liked the real bell flower best. This is highly insightful since Madrid and Pérez Cañado (2018: 245) also recommend the use of realia to support student learning.

When taking a look at what the students did not like about the CLIL lessons, 23% mentioned the English language. This is a fairly large proportion considering the fact that English is a main component of CLIL lessons. However, this finding becomes more comprehensible when having a closer glimpse at the learners' responses. While only two learners in class A did not like using the English language, six students from class B said that they did not like using English. After having found out that group B generally seems to be the group which liked the CLIL project less, these findings are not that surprising after all. This claim can be supported with the findings presented above. When the learners were asked about their general attitude towards English, group B reached a significantly lower mean score than group A. This explains why more students from group B did not like English during the CLIL project. Based on the insights gained from the findings and the discussion, conclusions on the successfulness of CLIL in middle schools are drawn in the final section of this thesis.

9 Conclusion

To conclude, the empirical study conducted for this thesis has not only shed light on middle school learners' content and vocabulary learning in CLIL biology lessons, but it has also provided insights into their first experiences with CLIL. Based on a thorough literature review, this thesis has also suggested principles to facilitate the inclusion of learners in a CLIL classroom by catering to the learners' diverse educational needs.

First of all, the findings from the study indicate that middle school learners' content and vocabulary learning can benefit from a CLIL approach. To illustrate this, the comparison

between the pretests and posttests has shown a growth of the learners' content knowledge of flowering plants and the process of pollination. Since the learners acquired some of the content not only in German but also in English, they clearly benefited from the CLIL approach. In other words, the CLIL lessons provided them with more than a regular biology lesson would have done. Although the students were reluctant to use the English language in the written production task, the results indicated attempts to incorporate English by writing down certain words in the desired language. The findings also depict vocabulary gains in the content area of flowers and pollination. Even though the CLIL project only comprised a sequence of four lessons, positive effects on the learners' content and vocabulary knowledge could be observed. This raises hope for the success of implementing more extensive CLIL projects at middle schools.

A further finding points towards the successful inclusion of a variety of students into the CLIL lessons. Since the results showed that many learners could follow the CLIL lessons easily or even found CLIL lessons better than regular biology lessons, one should not ignore the potential of a CLIL approach in middle schools. Nevertheless, further research into the field of CLIL in heterogeneous learning settings is needed to gain a broader understanding of the specific requirements that learners with diverse needs demand. Based on this study, it can be said that scaffolding and teacher support play an essential role when implementing CLIL in middle schools. For example, the findings have shown that students in this specific context value a variety of support such as audiovisual materials and peer interaction. Moreover, real-world objects seem to attract the learners' attention. This is particularly important in a subject like biology, where students constantly learn about the interrelationship between phenomena in the world around them.

Further important insights relate to the learners' prior knowledge and general attitudes towards a subject and the foreign language it is taught through. The study has shown that learners with a larger amount of prior knowledge and a more positive attitude towards biology and English are more likely to profit to a larger extent from CLIL biology lessons. This became obvious when comparing the results gained from both 5th grade classes. Class A showed more pre-existing knowledge and a rather positive attitude towards biology and the English language than class B. After having compared both classes, it became obvious that group A showed a more significant growth of knowledge than group B. Group A also reported more positive experiences with CLIL in the questionnaire, which might be linked to their affirmative stance on CLIL.

Learners' prior knowledge as well as their attitudes toward CLIL is something to keep in mind for teachers who attempt to introduce a CLIL approach to their students.

In conclusion it can be said that applying a CLIL approach in the specific middle school under investigation can definitely pay off, if teachers plan, conduct and scaffold lessons based on the needs of their students. If CLIL can work with 5th graders of one middle school, one can be optimistic that bilingual teaching can be beneficial in other middle schools as well.

10 Bibliography

- Baker, W. 2012. "From cultural awareness to intercultural awareness: culture in ELT". *ELT Journal* 66(1), 62–70.
- Ball, P.; Kelly, K.; Clegg, J. 2015. *Putting CLIL into practice*. Oxford: Oxford University Press.
- Ball, P. 2018. "Innovations and challenges in CLIL materials design". *Theory into Practice* 57(3), 222–231.
- Bärnthaler, A.; Kelly, K. 2021. "Top-down and bottom-up CLIL teacher development: lessons learned from Austrian in-service CLIL teacher CPD". In Hemmi, C.; Banegas, D. L (eds.). *International perspectives on CLIL*. Cham: Springer International Publishing, 193–216.
- Bartram, B. 2019. "Using questionnaires". In Lambert, M. (ed.). *Practical research methods in education*. London: Routledge, 1–11.
- Basterrechea, M.; Leese, M. J. 2019. "Language-related episodes and learner proficiency during collaborative dialogue in CLIL". *Language Awareness* 28(2), 97–113.
- Bauer-Marschallinger, S. 2019. "With united forces: how design-based research can link theory and practice in the transdisciplinary sphere of CLIL". *CLIL Journal of Innovation and Research in Plurilingual and Pluricultural Education* 2(2), 7–23.
- Bauer-Marschallinger, S.; Dalton-Puffer, C.; Heaney, H.; Katzinger, L.; Smit, U. 2021. "CLIL for all? An exploratory study of reported pedagogical practices in Austrian secondary schools". *International Journal of Bilingual Education and Bilingualism*, 1–16. DOI: 10.1080/13670050.2021.1996533.
- Belkhir, S. 2020. *Cognition and language learning*. Newcastle: Cambridge Scholars Publishing.
- Biewer, G.; Proyer, M.; Kremsner, G. 2019. *Inklusive Schule und Vielfalt*. Stuttgart: Kohlhammer Verlag.
- Bundesministerium für Bildung, Wissenschaft und Forschung. *Lehrplan der Mittelschule*. 2023. <https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007850> (27 February 2023)
- Bundesministerium für Bildung, Wissenschaft und Forschung. *Lehrplan der Volksschule*. 2012. https://www.bmbwf.gv.at/Themen/schule/schulpraxis/lp/lp_vs.html (16 June 2024).
- Bundesministerium für Bildung, Wissenschaft und Forschung. *Lehrplan der Volksschule*. 2023. https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2023_II_1/Anlagen_0001_C_E7F0AA2_A925_4A4D_8C3C_355D12BD22D1.pdf (20 July 2024).
- Cenoz, J.; Genesee, F.; Gorter, D. 2014. "Critical analysis of CLIL: taking stock and looking forward". *Applied Linguistics* 35(3), 243–262.
- Cohen, L.; Manion, L.; Morrison, K. 2011. *Research methods in education*. (7th edition). London: Routledge.
- Coyle, D.; Hood, P.; Marsh, D. 2010. *CLIL: content and language integrated learning*. Cambridge: CUP.
- Coyle, D. 2023. "A deeper learning companion for CLIL: putting pluriliteracies into practice". In Coyle, D.; Meyer, O.; Staschen-Dielmann, S. (eds.). *Key ideas and principles of pluriliteracies teaching for deeper learning*. Cambridge: CUP, 1–4.
- Dalton-Puffer, C. 2007. *Discourse in content and language integrated learning (CLIL) classrooms*. Amsterdam: John Benjamins Publishing Company.

- Dalton-Puffer, C.; Nikula, T.; Smit, U. 2010. "Language use and language learning in CLIL: current findings and contentious issues". In Dalton-Puffer, C.; Nikula, T.; Smit, U. (eds.). *Language use and language learning in CLIL classrooms*. Amsterdam: John Benjamins Publishing Company, 279-293.
- Dalton-Puffer, C. 2011. "Content-and-language integrated learning: from practice to principles?". *Annual Review of Applied Linguistics* 31, 182–204.
- Dalton-Puffer, C. 2013. "A construct of cognitive discourse functions for conceptualising content-language integration in CLIL and multilingual education". *European Journal of Applied Linguistics* 1(2), 216-253.
- Dalton-Puffer, C.; Boeckmann, K.-B.; Hinger, B. 2019. "Research in language teaching and learning in Austria (2011–2017)". *Language Teaching* 52(2), 201–230.
- Dalton-Puffer, C.; Hüttner, J.; Llinares, A. 2022. "CLIL in the 21st century: retrospective and prospective challenges and opportunities". *Journal of Immersion and Content-Based Language Education* 10(2), 182–206.
- Dörnyei, Z.; Taguchi, T. 2009. *Questionnaires in second language research: construction, administration, and processing*. (2nd edition). London: Routledge.
- Dreamstime. 2000-2004. *Pollination*. <https://www.dreamstime.com/process-cross-pollination-using-animal-pollinator-bee-anatomy-flower-parts-detailed-diagram-section-reproduction-image130012203>. (20 May 2023).
- Duske, P. 2017. *Bilingualer Unterricht im Fokus der Biologiedidaktik: Auswirkungen von Unterrichtssprache und -kontext auf Motivation und Wissenserwerb*. Wiesbaden: Springer.
- Ellison, M. 2018. "CLIL in the primary school context". In Garton, S.; Copland, F. (eds.). *The Routledge handbook of teaching English to young learners*. London: Routledge, 247-268.
- Escobar Urmeneta, C.; Sánchez Sola, A. 2009. "Language learning through tasks in a content and language integrated (CLIL) science classroom". *Porta Linguarum* 11, 65-83.
- Eurydice Brief. 2017. *Key data on teaching languages at school in Europe*. Brussels: Eurydice.
- Fazzi, F.; Menegale, M. 2023. "Doing CLIL with primary learners". In Banegas, D. L.; Zappa-Hollman, S. (eds.). *The Routledge handbook of content and language integrated learning*. London: Routledge, 225–237.
- Hemmi, C.; Banegas, D. L. 2021. "CLIL: an overview". In Hemmi, C.; Banegas, D. L. (eds.). *International perspectives on CLIL*. Cham: Springer International Publishing, 1-15.
- Hofstadler, N.; Babic, S.; Lämmerer, A.; Mercer, S.; Oberdorfer, P. 2021. "The ecology of CLIL teachers in Austria: an ecological perspective on CLIL teachers' wellbeing". *Innovation in Language Learning and Teaching* 15(3), 218–232.
- Hood, P. 2020. "A rationale for CLIL in primary schools". In Coyle, D.; Chambers, G. N.; Bower, K.; Cross, R. (eds.). *Curriculum integrated language teaching: CLIL in practice*. Cambridge: CUP, 43-60.
- Hüttner, J.; Smit, U. 2014. "CLIL (content and language integrated learning): the bigger picture. A response to: A. Bruton. 2013. CLIL: some of the reasons why ... and why not. *System* 41 (2013): 587–597". *System* 44, 160–167.
- Iwaniec, J. 2019. "Questionnaires: implications for effective implementation". In McKinley, J.; Rose, H. (eds.). *The Routledge handbook of research methods in applied linguistics*. London: Routledge, 324-335.
- Julius, S.; Madrid, D. 2017. "Diversity of students in bilingual university programs: a case study". *The International Journal of Diversity in Education*, 17(2), 17–28.
- Ke, L.; Zangori, L.; Sadler, T.; Friedrichsen, P. 2020. "Integrating scientific modeling and socio-scientific reasoning to promote scientific literacy". *IGI Global*, 31-54.

- Llinares, A.; Nashaat-Sobhy, N. 2021. "What is an ecosystem? Defining science in primary school CLIL contexts". *Language Teaching for Young Learners* 3(2), 337–362.
- Madrid, D.; Pérez Cañado, M. L. 2018. "Innovations and challenges in attending to diversity through CLIL". *Theory into Practice* 57(3), 241–249.
- Mahan, K. R. 2022. "The comprehending teacher: scaffolding in content and language integrated learning (CLIL)". *The Language Learning Journal* 50(1), 74–88.
- Maldonado, N.; Bergadà, R.; Carrillo, N.; Jové, L.; Olivares, P. 2013. *The thinking lab science: flowering plants*. Cambridge: CUP.
https://xtec.gencat.cat/web/.content/alfresco/d/d/workspace/SpacesStore/0073/ac3baf9e-c473-4f76-bbb5-70c0631f466a/flowering_plants.pdf (20 May 2023)
- McClintic, G. H. 2022. "Attention to diversity in a Spanish CLIL classroom: teachers' perceptions". *Journal of Language Teaching and Research* 13(5), 897–907.
- Mehisto, P. 2012. "Criteria for producing CLIL learning material". *Encuentro* 21, 15–33.
- Meyer, O. 2013. "Introducing the CLIL-pyramid: key strategies and principles for CLIL planning and teaching". In Eisenmann, M.; Summer, T. (eds.). *Basic issues in EFL teaching and learning*. Heidelberg: Universitätsverlag Winter, 295–313.
- Meyer, O.; Coyle, D.; Halbach, A.; Schuck, K., Ting, Teresa. 2015. "A pluriliteracies approach to content and language integrated learning: mapping learner progression in knowledge construction and meaning-making". *Language, Culture, and Curriculum* 28(1), 41–57.
- Meyer, O.; Coyle, D. 2017. "Pluriliteracies teaching for learning: conceptualizing progression for deeper learning in literacies development". *EuJAL* 5(2), 199–222.
- Meyerhöffer, N.; Dreesmann, D. C. 2019. "The exclusive language of science? Comparing knowledge gains and motivation in English-bilingual biology lessons between non-selected and preselected classes". *International Journal of Science Education* 41(1), 1–20.
- Morton, T. 2020. "Cognitive discourse functions: a bridge between content, literacy and language for teaching and assessment in CLIL". *CLIL Journal of Innovation and Research in Plurilingual and Pluricultural Education* 3(1), 7–17.
- Navés, T. 2009. "Effective content and language integrated learning (CLIL) programmes". In Ruiz De Zarobe, Y.; Jiménez Catalán, R. M. (eds.). *Content and language integrated learning: evidence from research in Europe*. Bristol: Multilingual Matters, 22–40.
- Nawrot-Lis, B. 2019. *The challenges of content acquisition in a CLIL course: a CLIL-based chemistry course at the lower secondary school level*. Berlin: Springer.
- Nikula, T. 2017. "CLIL: a European approach to bilingual education". In Van Deusen-Scholl, N.; May, S. (eds.). *Second and foreign language education*. Cham: Springer International Publishing, 111–124.
- Nikula, T.; Skinnari, K.; Mard-Mietinen, K. 2023. "Diversity in CLIL as experienced by Finnish CLIL teachers and students: matters of equality and equity". *International Journal of Bilingual Education and Bilingualism* 26(9), 1066–1079.
- Pérez-Cañado, M. L. 2012. "CLIL research in Europe: past, present, and future". *International Journal of Bilingual Education and Bilingualism* 15(3), 315–341.
- Pérez Cañado, M. L.; Rascón Moreno, D.; Cueva López, V. 2023. "Identifying difficulties and best practices in catering to diversity in CLIL: instrument design and validation". *International Journal of Bilingual Education and Bilingualism* 26(9), 1022–1030.
- Pérez Gracia, E.; Gómez Parra, M. E.; Serrano Rodríguez, R. 2017. "CLIL teachers' perceptions of intercultural competence in primary education". *Revista Digital de Investigación En Docencia Universitaria*, 82–99.
- Pinner, R. 2021. "Authenticity and motivation in CLIL: creating a meaningful purpose by experiencing the language in use". In Hemmi, C.; Banegas, D. L. (eds.). *International perspectives on CLIL*. Cham: Springer International Publishing, 23–41.

- Richards, J. C.; Rodgers T. S. 2014. *Approaches and methods in language teaching*. (3rd edition). Cambridge: CUP.
- Rogers, J.; Révész, A. 2019. "Experimental and quasi-experimental designs". In McKinley, J.; Rose, H. (eds.). *The Routledge handbook of research methods in applied linguistics*. London/New York: Routledge, 133-143.
- Roiha, A. S. 2014. "Teachers' views on differentiation in content and language integrated learning (CLIL): perceptions, practices and challenges". *Language and Education* 28(1), 1–18.
- Rumlich, D. 2022. "Exploring the importance of prior knowledge and verbal cognitive abilities for foreign language learning". In Piske T.; Steinlen, A. (eds.). *Cognition and second language acquisition: studies on pre-school, primary school and secondary school children*. Tübingen: Narr Francke Attempto Verlag, 219-243.
- Schwab, G.; Keßler, J.-U.; Hollm, J. 2014. "CLIL goes Hauptschule –Chancen und Herausforderungen bilingualen Unterrichts an einer Hauptschule: Zentrale Ergebnisse einer Longitudinalstudie". *Zeitschrift für Fremdsprachenforschung* 25(1), 3-37.
- Siepmann, P.; Rumlich, D.; Matz, F.; Römhild, R. 2021. "Attention to diversity in German CLIL classrooms: multi-perspective research on students' and teachers' perceptions". *International Journal of Bilingual Education and Bilingualism*, 1–17.
- Siepmann, P.; Pérez Cañado, M. L. 2022. "Catering to diversity in CLIL: designing inclusive learning spaces with ADiBE digital materials". *International Journal of English Studies* 33(1), 203-222.
- Swain, M.; Kinnear, P.; Steinman, L. 2015. *Sociocultural theory in second language education: an introduction through narratives* (2nd edition). Bristol: Channel View Publications.
- Sylvén, L. K. 2013. "CLIL in Sweden – why does it not work? A metaperspective on CLIL across contexts in Europe". *International Journal of Bilingual Education and Bilingualism* 16(3), 301–320.
- Sylvén, L. K. 2017. "Motivation, second language learning and CLIL". In Llinares, A.; Morton, T. (eds.). *Applied linguistics perspectives on CLIL*. Amsterdam: John Benjamins Publishing Company, 51-65.
- Valdés-Sánchez, L.; Espinet, M. 2020. "Coteaching in a science-CLIL classroom: changes in discursive interaction as evidence of an English teacher's science-CLIL professional identity development". *International Journal of Science Education* 42(14), 2426–2452.
- van Kampen, E.; Admiraal, W.; Berry, A. 2018. "Content and language integrated learning in the Netherlands: teachers' self-reported pedagogical practices". *International Journal of Bilingual Education and Bilingualism* 21(2), 222–236.
- Wolff, D. 2003. "Content and language integrated learning: a framework for the development of learner autonomy". In Little, D.; Riddley, J.; Ushioda, E. (eds.). *Learner autonomy in the foreign language classroom: teacher, learner, curriculum and assessment*. Dublin: Authentik, 211-223.

11 Appendix

11.1 CLIL teaching materials

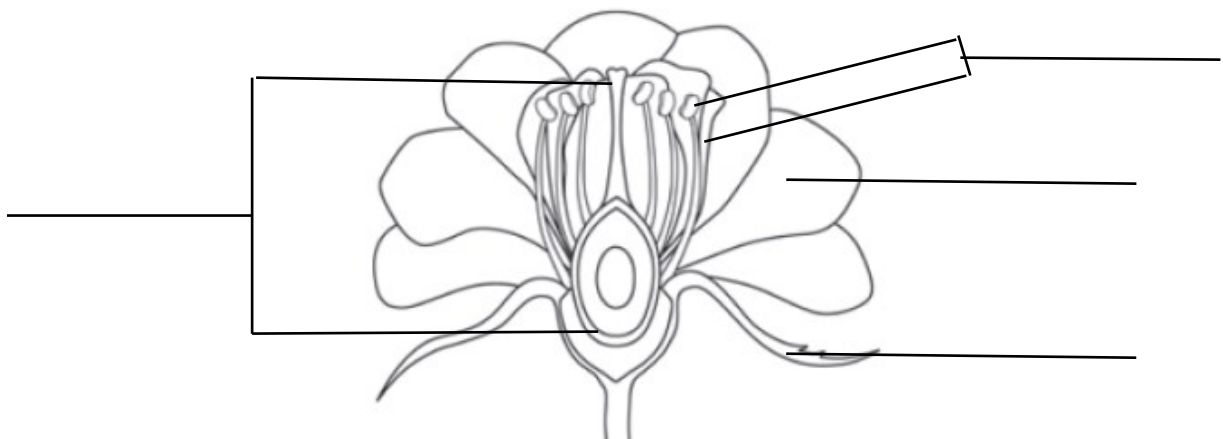
11.1.1 Self-designed worksheets

The main parts of a flower

1. Have a look at the flower in front of you. Try to find the flower organs depicted (=abgebildet) on the cards. **(GW)**

2. Label the main parts of the flower with the correct terms. **(GW)**

petal (Kronblatt) ♦ **sepal** (Kelchblatt) ♦ **carpel** (Fruchtblatt) ♦ **stamen** (Staubblatt)



3. Before you read the text, guess (=vermute) the function of the sepals and petals! **(IW)**

4. Before you read the text, have a look at the language tips. Then read the text and match the flower parts with their functions. **(IW)** Compare your solutions with a partner. **(PW)**

All flowering plants usually have roots, a stem, leaves, and flowers. The flower part is very important because it contains the male and female **reproductive organs**. It makes the **seeds** too. Most flowers have four basic parts: **sepals**, **petals**, **carpels**, and **stamens**. The main parts of a flower are the carpels and stamens. You can find these parts in the center of a flower. In the carpel, there are egg cells. Carpels are the **female** reproductive organs. In the stamens, there are **pollen cells**. Stamens are the **male** reproductive organs. While petals attract insects, sepals protect the inner parts of the flower.

sepals

carpels

petals

stamens

male reproductive
organs; contain
pollen

attract
pollinators
(insects)

protect the inner
flower organs

female
reproductive
organs

Language Tips



flower organs - Blütenorgan

petal(s) - Kronblatt/Kronblätter

sepal(s) - Kelchblatt/Kelchblätter

carpel(s) - Fruchtblatt/Fruchtblätter

stamen(s) - Staubblatt/Staubblätter

male - männlich

female - weiblich

seeds - Samen

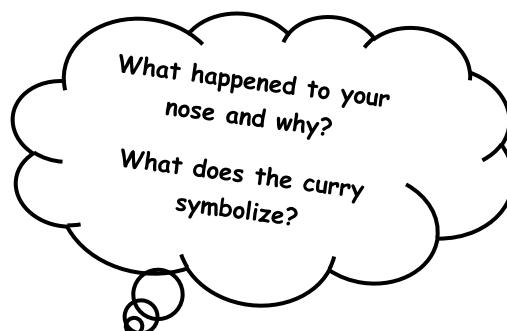
pollinator - Bestäuber

reproductive organs -
Fortpflanzungsorgane

Pollination



1. Take one of the flower models and a straw. Imagine you are an insect and drink the juice (nectar) from the flower. (GW)



2. Watch the video **What is pollination?** up to minute 1:40. Then bring the statements about pollination into the correct order. (PW)

	This is what we call pollination.
	When the insect flies away and lands on another flower, some pollen falls onto the stigma .
1	Flowers attract insects because of their scents or coloured petals.
	Insects land on flowers to feed on the flowers' nectar. Pollen sticks to the insects' body.

Language Tips



pollination - Bestäubung

stigma - Narbe

pollinator - Bestäuber

attract - anlocken

pollen grains - Pollenkörner

scents - Düfte

11.1.2 Parts of a flower – information cards

	petals (Kronblätter)	The purple petals attract pollinators. (Die violetten Kronblätter locken Bestäuber an.)
	sepals (Kelchblätter)	The green sepals protect the inner parts of the flower. (Die grünen Kelchblätter schützen die inneren Blütenorgane.)
	carpel (Fruchtblatt)	The carpel is the female reproductive organ. (Das Fruchtblatt setzt sich aus Fruchtknoten, Griffel und Narbe zusammen. Es ist das weibliche Blütenorgan.)
	stamens (Staubblätter)	The stamens are the male reproductive organs. (Die Staubblätter bestehen aus Staubfaden und Staubbeutel. Sie sind die männlichen Blütenorgane und beinhalten den Pollen.)

11.1.3 One of the flower models

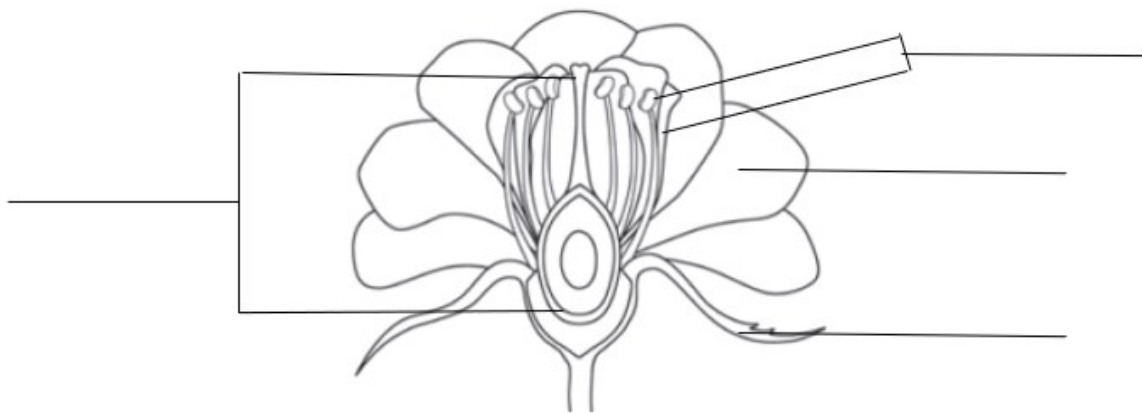


11.2 The pretest

Blüten und Bestäubung

1) Beschrifte die Blüte mit den Begriffen aus der Box.

Kelchblatt ♦ Kronblatt ♦ Fruchtblatt ♦ Staubblatt

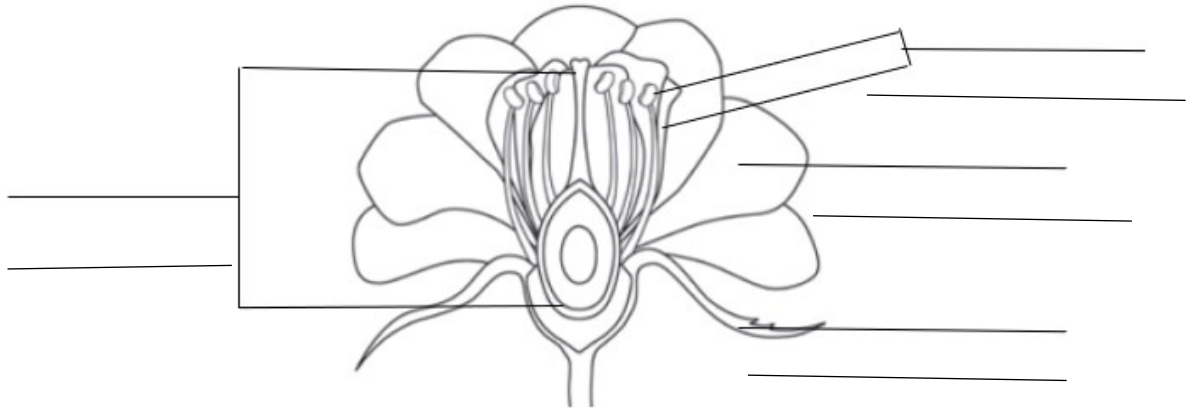


2) Erkläre in Stichworten, warum die äußeren Blütenblätter bunt gefärbt sind.

3) Welche Begriffe fallen dir zur **Bestäubung** ein? Schreibe sie auf! (Wenn du weißt, was bei der Bestäubung passiert, beschreibe sie kurz.)

11.3 The posttest

1) Label (=beschrifte) the parts of the flower with the correct **English and German** terms!

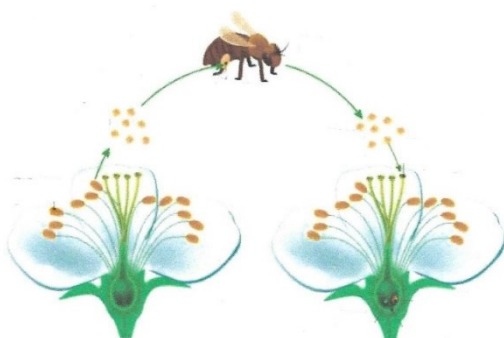


2) Match the flower parts with their functions. Draw lines!

1) sepals
2) stamens
3) petals
4) carpels

a) They are the male reproductive organs.
b) They are the female reproductive organs.
c) They attract insects.
d) They protect the inner parts of the flower.

3) Have a look at the picture and describe the **process of pollination**. You can do that in **English or German! Write short sentences.**



11.4 The student questionnaire

Liebe Schülerin, Lieber Schüler!

Durch das Beantworten des Fragebogens hilfst du mir dabei, meine Masterarbeit zum Thema „CLIL in biology lessons at middle school“ umzusetzen. Die Fragen beziehen sich auf die Biologieeinheit zur Bestäubung, die unter Verwendung von EAA durchgeführt wurde. Versuche die Fragen so genau wie möglich zu beantworten. Deine Antworten werden vertraulich und anonym behandelt. Ich weiß also nicht, wer was ausgefüllt hat. Die Antworten haben KEINEN Einfluss auf deine Note. Vielen Dank für deine Mithilfe!

***EAA** steht für Englisch als Arbeitssprache.

Informationen über dich:

1) Geschlecht: weiblich ☐ männlich ☐ 2) Klasse: ____ 3) Muttersprachen: _____

Teil 1:

Hier möchte ich herausfinden, wie dir Biologie und Englisch allgemein gefallen. Kreuze bei jeder Frage EINE Möglichkeit an.

		stimmt völlig	stimmt eher	weiß nicht	stimmt eher nicht	stimmt gar nicht
1.	Ich interessiere mich für biologische Themen.					
2.	Mir gefällt Biologie und Umweltkunde in der Schule.					
3.	Ich mag die englische Sprache.					
4.	Ich verwende Englisch nur in der Schule.					

Teil 2:

Hier möchte ich herausfinden, wie es dir mit der englischen Biologieeinheit gegangen ist. Kreuze bei jeder Frage EINE Möglichkeit an.

		stimmt völlig	stimmt eher	weiß nicht	stimmt eher nicht	stimmt gar nicht
5.	Die Biologiestunde mit EAA hat mir gefallen.					
6.	Ich kann mir vorstellen, weitere Biologiestunden mit EAA zu haben.					

7.	Gewöhnliche Biologiestunden gefallen mir besser als jene mit Englisch.					
		stimmt völlig	stimmt eher	weiß nicht	stimmt eher nicht	stimmt gar nicht
8.	Ich habe das behandelte Thema interessant gefunden.					
9.	Die Blütenbestandteile auf Englisch zu erarbeiten war für mich schwierig.					
10.	Die Bestäubung auf Englisch zu erarbeiten ist mir schwer gefallen.					
11.	Die Biologieeinheit hat meinen englischen Wortschatz erweitert.					
12.	Ich konnte der Biologiestunde gut folgen.					
13.	Ich konnte der Biologiestunde besser als jenen folgen, in denen nur Deutsch verwendet wird.					
14.	Ich konnte die Aufgaben ohne Schwierigkeiten erledigen.					
15.	Die Sprachhilfen (language tips) haben mir beim Erledigen der Aufgaben geholfen.					
16.	Das Video hat mir geholfen, um die Bestäubung zu verstehen.					
17.	Das Arbeiten in Gruppen hat mir beim Erledigen der Aufgaben geholfen.					

Teil 3:

Bitte beantworte die Fragen in Stichworten.

17. Was hat dir an der Biologiestunde mit Englisch am besten gefallen?

18. Was hat dir an dieser Biologiestunde nicht so gut gefallen?

Vielen Dank für deine Teilnahme!

11.5 Letter to the parents

Liebe Eltern und Erziehungsberechtigte!

Im Rahmen meiner Masterarbeit an der Universität Wien möchte ich in englischer Sprache abgehaltenen Biologieunterricht untersuchen. Dazu möchte ich mit den Schülerinnen und Schülern eine Einheit zur Bestäubung von Pflanzen mit Englisch als Arbeitssprache durchführen.

Im Zuge dieser Einheit wird es kurze Wissenschecks und einen Fragenbogen für die Schülerinnen und Schüler geben. Die Wissenschecks und der Fragebogen sind komplett anonym und die Ergebnisse werden ausschließlich für meine Masterarbeit verwendet. Der Name Ihres Kindes wird nicht in der Arbeit aufscheinen und die Teilnahme hat auch keinen Einfluss auf die Noten.

Die Teilnahme an der englischen Biologieeinheit und die Zustimmung zur Verwendung der Daten im Rahmen meiner Masterarbeit sind freiwillig und können jederzeit widerrufen werden.

Auf diesem Weg möchte ich Sie um Mithilfe durch Erteilung ihrer Zustimmung zu diesem Vorhaben bitten und bedanke mich bereits im Voraus sehr herzlich für Ihre Unterstützung.

Bitte ausfüllen:

Mein Sohn/Meine Tochter nimmt an der geplanten Biologieeinheit teil.

Unterschrift des Erziehungsberechtigten: _____

Ich bedanke mich sehr herzlich für die Zusammenarbeit!

Liebe Grüße

Christina Klein, BEd

11.6 Abstract (English)

CLIL (Content and Language Integrated Learning) is one of the most popular bilingual teaching approaches in Europe. CLIL practices usually combine the teaching of a content subject with the teaching of a foreign language, which is mostly English. As this approach is still underrepresented in many Austrian schools, particularly middle schools, this thesis investigates if and how CLIL can be beneficial to middle school students' content and vocabulary learning. For this purpose, a CLIL project with two 5th grades (34 students in total) of a middle school has been conducted during biology lessons. A pre-experimental study following a pretest/posttest design and a questionnaire were used to gain insights into the learners' development of content and vocabulary knowledge and their first experiences with CLIL. The analysis with SPSS and Excel has shown that middle school learners can profit from a CLIL approach as a growth of content and vocabulary knowledge could be noted. The findings also illustrate that not only learners' prior knowledge and their general attitudes towards a subject are essential for learners to follow a CLIL lesson, but also teacher support, peer interaction and scaffolding material are key to success in CLIL. All in all, it can be said that applying a CLIL approach in middle school can be successful if teachers plan, scaffold and conduct lessons based on the needs of their students.

11.7 Abstract (German)

CLIL (Content and Language Integrated Learning) ist einer der beliebtesten zweisprachigen Lehransätze in Europa. CLIL kombiniert für gewöhnlich das Lehren eines Sachfachs mit dem Lehren einer Fremdsprache, die meistens Englisch ist. Da dieser Ansatz in österreichischen Schulen, vor allem Mittelschulen, schwach vertreten ist, untersucht diese Arbeit, ob und wie CLIL vorteilhaft für das Lernen von Fachinhalten und Sprachkenntnissen von Mittelschülerinnen und Mittelschülern sein kann. Zu diesem Zwecke wurde ein CLIL-Projekt mit zwei 5. Schulstufen (insgesamt 34 Schüler/innen) einer Mittelschule im Zuge des Biologieunterrichts durchgeführt. Eine vorexperimentelle Studie im Vortest- Nachtestdesign sowie ein Fragebogen wurden verwendet, um Einblicke in die Entwicklung von Fach- und Sprachwissen der Schülerinnen und Schüler sowie Eindrücke über ihre ersten Erfahrungen mit CLIL zu erhalten. Die Analyse mit SPSS und Excel hat gezeigt, dass Mittelschülerinnen und Mittelschüler von einem CLIL-Ansatz profitieren, da ein Zuwachs an Fach- und Vokabelwissen verzeichnet werden konnte. Die Ergebnisse haben auch gezeigt, dass nicht nur das Vorwissen der Lernenden und ihre allgemeine Einstellung gegenüber einem Unterrichtsfach wesentlich sind, um einer CLIL-Stunde zu folgen, sondern auch Unterstützung durch die Lehrperson, Interaktion mit Klassenkolleginnen und -kollegen sowie Unterstützungsmaterial der Schlüssel zum Erfolg mit CLIL sind. Zusammenfassend kann gesagt werden, dass das Anwenden des CLIL-Ansatzes in einer Mittelschule erfolgreich sein kann, wenn Lehrpersonen ihre Stunden nach den Bedürfnissen der Lernenden planen, anleiten und durchführen.