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Biology.
An analysis and evaluation of an Austrian textbook
for 10-year olds.”

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for their support during the years that I studied and
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“All the forces in the world are not so powerful as
an idea whose time has come.” *Victor Hugo*

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1. Introduction

I'm sure the reason such young nitwits are produced in our schools is because they have no contact with anything of any use in everyday life. (*Petronius 'The Satyricon'*)

Even though this statement is about 2000 years old, it relates perfectly to the present situation in many education systems all over the world. Students frequently need to learn contents of school subjects which are not related to their everyday life. This often happens in so-called content subjects such as Geography, Philosophy or Biology. In foreign language learning, another problem can be found: foreign or second languages (L2s) are often taught out of context, because in traditional language teaching languages are taught for their own sake. If students cannot relate a new L2 to their own life and the L2 is not taught in connection with authentic context, students might have problems. They may find it difficult to understand why they need to learn the foreign language if it is not related to their lives in any way. However, if language and also content learning demonstrated more relevance to the everyday lives of students, their motivation for learning an L2 and their general interest in a particular subject might increase (cf. Van de Craen et al. 2007: 73).

The whole art of teaching is only the art of awakening the natural curiosity of young minds for the purpose of satisfying it afterwards. (*Anatole France*)

The question which arises here is how this can be achieved. Is there any teaching approach which fulfils the above-mentioned requirements? One teaching approach which has tried to answer these questions is CLIL. There is an innovative teaching approach which has developed in education systems throughout the world over the last few decades – Content and Language Integrated Learning (CLIL) (cf. Dalton-Puffer 2007: 1). CLIL is an approach which combines foreign language learning with subject content learning (cf. Dalton-Puffer 2007: 1); i.e. students are taught content subjects such as History, Geography or Biology but in a foreign language (L2). This innovative teaching method aims to add more meaning and relevance to foreign language learning. As mentioned above, foreign languages are often learned for their own sake in traditional teaching, and students often need to learn them out of context. In CLIL, however, students are expected to learn an L2 in a more naturalistic and realistic environment (cf. Dalton-Puffer 2007: 2). This teaching approach should increase students' level of proficiency in the particular L2 and it

should additionally enhance their subject matter understanding. The latter is also intended to be encouraged by the use of authentic teaching materials in CLIL subjects.

Since CLIL is such a new teaching approach, there are still many aspects of its theory which are not yet elaborated completely. Such aspects are, for example, appropriate teacher education or the implementation of CLIL in class. The main focus of this thesis, however, is on a different aspect: CLIL teaching materials development. The development of any type of teaching materials greatly depends on the methodological and didactic principles of the school subjects for which the materials are needed. At present, only very little research has been carried out by linguists, which would have established a satisfying methodology of CLIL teaching (cf. Gierlinger 2007: 80-81). As a consequence, this lack of methodology has a great impact on the development of suitable teaching materials for CLIL subjects. To this day, only a few CLIL-specific textbooks have been developed according to the national curricula of subjects in certain countries. Some examples of these materials are the following books:

- *Discover Biology 1* (Mathews & Olmesdahl 2009, Germany)
- *Cross-Curriculum Creativity – Geography (Books 1-4)* (Fierling & Machotka 2005, Austria)
- *Cross-Curriculum Creativity – Biology (Books 1-4)* (Fierling & Machotka 2008, Austria)

Since hardly any teaching materials exist, only a few linguists and teachers such as Mathews (2005) or Massler, Steiert & Storz (2007) have been engaged in the examination of such CLIL subject-specific materials. As I am myself a teacher of Biology and English, I am very interested in teaching Biology in English. Therefore, I decided to examine the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* in order to find out if they are appropriate and good enough for the use in CLIL. The little theoretical background on CLIL materials development mentioned above that actually does exist served as the basis for the development of a textbook analysis checklist and a textbook evaluation checklist. The checklists consist of criteria which cover the most important aspects of teaching Biology, English and CLIL. I believe that this thesis provides a better understanding of *Cross-Curriculum Creativity – Biology (Books 1-4)* for CLIL teachers and linguists.

2. Content and Language Integrated Learning (CLIL) – an Innovative Teaching Approach

2.1 The Theory behind CLIL

This first chapter will give an insight into Content and Language Integrated Learning (CLIL) and it will aim at building up a basic understanding of this teaching approach. Therefore, the main points of the history of and concepts underlying CLIL will be looked at in more detail.

Over the last few years, multilingualism and its positive effect on cultures and nations has been stated by linguists as the overall aim of language policies, especially in the European Union (cf. Dalton-Puffer 2007: 1; Dalton-Puffer & Smit 2007: 7-8; Van de Craen et al. 2007: 70). As a result, a new teaching approach combining subject and language teaching has been developed: Content and Language Integrated Learning or CLIL. It is

consider[ed] [...] [to be] an innovative approach to language pedagogical practices in line with modern research about language learning and teaching as well as motivational aspects, cognitive development and learning and the brain.
(Van de Craen et al. 2007: 70)

Dalton-Puffer (2007: 1) defines CLIL as a term which “refers to educational settings where a language other than the students’ mother tongue is used as medium of instruction”. CLIL or “Enseignement d’une matière par l’intégration d’une langue étrangère (EMILE)” (Guest Editorial 2007: 541) emerged out of the greatly-discussed question of whether the separation of language and content classes in schools is suitable for pupils or if a combined approach of teaching languages via subjects would be more efficient (cf. Dalton-Puffer & Smit 2007: 7). Not only in Europe, but also in “Asia, Africa, South America and the Far East” this new educational practice is spreading (Maley 2007: 5). The name CLIL is used as an umbrella term referring to other similar ways in which bilingual teaching can be integrated into content classrooms (cf. Dalton-Puffer & Smit 2007: 8, Coyle 2007: 545). The following terms are often used interchangeably with the concept of CLIL:

Content-Based-Instruction (CBI), Bilingual Teaching, Dual Language Programs, English Across the Curriculum,

“Immersion Education, [...], and Language X as Medium of Instruction” are also used to describe basically the same approach (Dalton-Puffer & Smit 2007: 7). In this academic paper I will always use the term CLIL when describing combined subject and content teaching, as it is the most common term for this innovative form of education for Europe (cf. Dalton-Puffer & Smit 2007: 1).

2.1.1 The history of CLIL

CLIL appears to be a very recent phenomenon which first appeared in the early 1990s, when it began to be promoted by the European Commission and the Council of Europe, and has been evolving ever since (cf. Dalton-Puffer 2007: 1, Coyle 2007: 543-545 and Marsh & Frigols 2007: 33-34 for more details on how CLIL was established). The main reasons for the urge to teach students not only in their first language or mother tongue (L1), but also in a second language (L2) are socio-political. Over the last few decades, people have become more eager to travel, live and work in a foreign country, which necessarily results in more contact between cultural and linguistic groups. The European Union is the main reason in central Europe which makes it easier for people to move to different countries, and this immigration process consequently imposes pressures upon those countries, their economies and in particular their education systems (cf. Dalton-Puffer 2007: 1; Dalton-Puffer & Smit 2007: 7). One response in answer to “internationalization and globalization”, which enables students of all levels of education to compete on an international level, is the concept of CLIL - combining a school subject with an L2 (Dalton-Puffer 2007: 1-2). This concept is not new, as it used to be “a feature of European schooling in medieval times and for a considerable time thereafter, when Latin was the language of instruction.” (Dalton-Puffer 2007: 1-2). Coyle (2007: 543-544) also gives other examples of early bilingual education:

Luxembourg has had bilingual education since 1843 (Davis, 1994) and trilingual education since 1913 (Berg, 1993). According to the Eurydice Report (2006), Malta introduced bilingual education in the 19th century, Bulgaria in the 1950s, Estonia in the 1960s as well as the first French-

German bilingual schools in Germany in 1969 and so on. Moreover, a multilingual European School network was started in 1953 (Swan, 1996) to take account of linguistic diversity for children of mobile European civil servants.

CLIL can also be seen as being an ecological educational approach, as it developed as a reaction to the changes in the environment of the world's societies (cf. Marsh & Frigols 2007: 34).

2.1.2 Characteristics and aims of CLIL

All CLIL classes have one feature in common, which is the use of a non-L1 as the language of instruction. It is possible to use CLIL at all levels of education (i.e. kindergarten, vocational and professional level, compulsory education level) and it can be practised in a variety of ways, ranging from single use of spoken or written texts, projects in specific subjects, or sometimes even “covering the whole curriculum” (Dalton-Puffer 2007: 2). CLIL has many different faces depending on its development within the education systems in various countries. On the one hand, some people call for a universal concept of CLIL because of its variability, but on the other hand, Lamsfuß-Schenk & Wolff (1999: 2) believe that this diversity is the key factor which makes CLIL flexible for numerous learners, and this flexibility turns it into a strong pedagogical approach.

Die Stärke von CLIL liegt in seiner Vielfalt. Dieses Argument ist eng verwandt mit einem anderen, das wir zugunsten der sprachlichen Vielfalt in Europa vorbringen. Die Stärke Europas liegt in seiner sprachlichen und kulturellen Vielfalt [...]. Wir sollten an der Vielfalt von CLIL festhalten und sogar noch mehr mit unterschiedlichen Sachfächern experimentieren, unterschiedliche methodische Zugänge erproben und Lernern verschiedener Altersstufen verschiedene Angebote machen.
(Lamsfuß-Schenk & Wolff 1999: 2)

The main aim of CLIL is to enable learners to grasp the contents of a subject via a target language, and to enhance productive skills – writing and speaking and, here especially, interacting. Students should learn to use the language rather than merely

understanding how it works on a theoretical basis. Practice in a communicative sense has to be the objective of every CLIL lesson (cf. Maley 2007: 8).

Since CLIL evolved out of the afore-mentioned factors concerning peoples and their cultures, intercultural learning is one of the aims of this teaching approach which consequently influences the didactics of subjects used for CLIL (cf. Lamsfuß-Schenk & Wolff 1999: 3-4).

So what are the rationales for CLIL now? The first argument in favour of CLIL is that you can ‘kill two birds with one stone’, namely teaching a subject and a foreign language at the same time. This combination transforms two subjects into one, but is it worthwhile? Is it not better for students to learn a second language (L2) separately from a content subject (e.g. Maths, Biology), so that they can concentrate on it properly as it was done in the past? This is exactly the point at which a huge problem in the traditional method of language teaching in classrooms seems to emerge. Languages are generally used for communication and being able to express one’s opinion, but L2s are often taught out of context, which makes them less useful, less authentic and more difficult to learn, especially when it comes to oral production. However, teaching a subject such as Biology in English puts the language into a context which is more realistic and natural than its isolated use in a traditional language classroom (cf. Dalton-Puffer 2007: 2). Therefore, this concept of CLIL is generally seen as the ultimate implementation of the communicative approach to language teaching, where language is given a meaningful purpose when taught in connection with a subject (cf. Dalton-Puffer & Smit 2007: 8).

Especially in situations where the L2 is a foreign language, CLIL classrooms appear to be a clever and economical way of turning classrooms into ‘streets’ [the place where language is being picked up in the most natural way], as it were. When there are no ‘streets’ around the school in which the language could be picked up, one may try to convert school life, or parts of it, into a naturalistic environment where the toils of the foreign language classroom can be left behind.
(Dalton-Puffer 2007: 2)

Additionally, in the European context it is important that the content subject and its curriculum are in the foreground in CLIL classes, and that language only serves as “the medium through which [the] content is transported” (Dalton-Puffer 2007: 3; also cf. Dalton-Puffer & Smit 2007: 12, Maley 2007: 6; Hemmelgarn & Ewig 2003: 50).

Maley (2007: 6) says that according to the main subject, the appropriate language support is chosen. Furthermore, this language support should be part of the didactics of all subjects being taught in CLIL (cf. Lamsfuß-Schenk & Wolff 1999: 2).

The content subject provides the natural environment in which the L2 can be used and where real communication – the main goal of language teaching – can take place (cf. Dalton-Puffer 2007: 3; Dalton-Puffer & Smit 2007: 8; Hemmelgarn & Ewig 2003: 49).

[CLIL] encourages naturalistic language learning and enhances the development of communicative competence. [...] [It] provide[s] opportunities for learning through acquisition rather than through explicit teaching.
(Dalton-Puffer 2007: 3)

I found Maley's (2007: 6) description of which different roles the four skills – reading, writing, listening, speaking – play in language and in content-driven classes very striking:

In a language class the four skills [...] are part of the end product and are also a tool for introducing new language and practising and checking linguistic knowledge. In the content classroom the four skills are a means of learning new information and displaying an understanding of the subject being taught. So the language is a means to an end, rather than an end in itself, and the structure and style of the language is often less colloquial and more complex.

Clearly this statement shows that CLIL adds more purpose to learning a foreign language than the traditional approach, where language has to be learned for its own sake. Furthermore, it shows that an even distribution of all language skills ought to be aimed at in CLIL teaching. According to Van de Craen et al. (2007: 71), language proficiency seems to improve in CLIL classrooms. However, this improvement appears to vary depending on when CLIL is introduced. Better results in language proficiency are believed to be achieved where CLIL is introduced earlier – at the primary as opposed to the secondary level (cf. Van de Craen et al. 2007: 71-72 for more information on this topic). Koch & Bänder (2006: 68) also encourage the introduction of bilingual classes – in their case bilingual Biology classes – at lower secondary levels, as it seems to make learners more sensitive to language:

[E]ine erhöhte Aufmerksamkeit in Bezug auf sprachliche Lernprozesse und Verständnisschwierigkeiten, wie sie etwa durch die Einbeziehung von Wortschatzübungen im bilingualen Unterricht notwendig sind, [können] eine

Bereicherung und Sensibilisierung von Verständnisprozessen des Naturwissenschaftsunterricht darstellen. Es gibt Hinweise darauf, dass durch die sprachlichen Hürden und die damit einhergehende Verlangsamung im fremdsprachlichen Fachunterricht ein stärkeres Bewusstsein und eine bessere Vertiefung beim Erlernen von fachlichen Begriffen erreicht werden können (Bonnet 2004; Koch 2005).

A common question arises when researchers of CLIL argue for the improvement of the students' target language: What about the mother tongue? Will pupils also be able to develop and improve their first language? Van de Craen et al. (2007) found that the effects of CLIL on the development of the mother tongue were only positive. "[M]igrant worker's children" were excluded from his findings (Van de Craen et al. 2007: 72). Researchers say that "where a majority and a minority language compete, fear for language loss is frequently expressed as an argument against CLIL education" (Van de Craen et al. 2007: 72).

A related question is whether CLIL improves the learning of the contents of the subject being taught. Again results vary between primary and secondary level. "In primary education subject matter knowledge seems to be boosted more than in secondary education" (Van de Craen et al. 2007: 73). A study conducted by Koch and Bänder (2006) has brought forward further evidence in support of arguments for introducing CLIL in lower secondary classes, despite the low level of proficiency learners might have in the target language. The authors of the study tried to investigate how bilingual teaching in Biology influenced the success of subject matter learning by students. The main finding of their research was that "there are no signs for [sic] a hindrance of subject matter learning in lessons taught mainly in a foreign language" (Koch & Bänder 2006: 67).

The opportunity for language-heavy input in CLIL is also called "language bath", because the students are immersed in language in the classroom (Dalton-Puffer 2007: 3; also cf. Dalton-Puffer & Smit 2007: 8). What should be noted here is that CLIL lessons focus more on meaning and the ability to communicate, rather than on form and accuracy which are still the central goal of many foreign language classes. This method of dealing with language should take away some of the anxieties learners often feel when it comes to actively using the L2, and positive feelings should be connected with it (cf. Dalton-Puffer & Smit 2007: 9). Even though only a few studies have dealt with the attitudes and motivations of learners towards CLIL, Van de

Craen et al. (2007: 73) state that CLIL is thought to have a positive effect on the attitudes of pupils towards foreign language learning. I believe that this positive attitude might also result from students' awareness of the importance of foreign language competencies for the employment market. Further positive effects of implementing CLIL have been mentioned by Coyle (2007: 548) summing up the main findings of studies performed by Baetens Beardsmore (1993), Coyle (1999), (2000), (2002), Dalton-Puffer (2005), Gajo & Serra (2000), Ullmann (1999) and Wolff (1997).

[The studies] demonstrated that in certain contexts and under specific conditions CLIL can and does raise learner linguistic competence and confidence; raise teacher and learner expectations; develop risk-taking and problem-solving skills in the learner; increase vocabulary learning skills and grammatical awareness; motivate and encourage student independence; take students beyond 'reductive' foreign language topics; improve L1 literacy; encourage linguistic spontaneity (talk) if students are enabled to learn through the language rather than in the language; develop study skills, concentration (learning how to learn through the foreign language is fundamental to CLIL); generate positive attitudes and address gender issues in motivation; and put cultural awareness back on the agenda.
(Coyle 2007: 548)

Another obvious argument in favour of CLIL is the aspect of efficiency. Being able to learn two subjects in one not only saves time but, moreover, it means that students who learn an L2 which is also used in their CLIL classes are more exposed to the target language. This clearly leads to more opportunities to get into the L2 and gives learners the chance to improve their language skills more quickly (cf. Dalton-Puffer & Smit 2007: 8-9).

As mentioned above, language learning is given more meaning when combined with a content subject. Not only does CLIL help to improve language learning, but it also changes structures in the brain. This is because learners use more cognitive functions during CLIL classes, resulting in an increased number of neural connections (cf. Van de Craen et al. 2007: 71, 73-74). However,

[c]ognitive advantages [over traditionally taught pupils] seem related to early (foreign) language learning independent of the methodology. Hence, there is no doubt that young children exposed to CLIL cognitively benefit from this.
(Van de Craen et al. 2007: 74)

2.1.3 Problems with the implementation of CLIL

2.1.3.1 General problems

Gierlinger (2007) conducted a research project which was intended to find out more about how CLIL was being taught in Upper Austria. He wanted to gain a deeper insight into the everyday teaching life of CLIL teachers by investigating their current work and teaching progress. What is striking about Gierlinger's project is the general feedback he got from most of the teachers, who were mainly struggling with mainly the same problems: He found that:

[s]upport structures hardly exist at all and the following issues are rather the rule than the exception:

- There is very little, if any, methodological support for CLIL teachers.
- CLIL teachers will mostly work on their own without any language assistants.
- There are no external incentives for CLIL teachers, such as extra money or increased status.
- There is hardly any suitable material around; on the contrary, teachers have to create their own materials at their own costs.
- Introducing CLIL usually involves extra administrative effort on behalf of the teacher, such as briefings, information materials and parent-teacher conferences.
- There is hardly any support from the pedagogical authorities.

(Gierlinger 2007: 80-81)

When reading these statements, one wonders why teachers attempt CLIL at all if it seems to have hardly any advantages. In my opinion, those teachers who are open to experiment and who see a chance to motivate their pupils on a different level than in the past do not give up simply because CLIL is still more difficult to implement than traditional teaching. However, I would like to highlight some of the problems teachers can encounter when approaching CLIL and they should demonstrate that plenty of research will still have to be done to explore further aspects of this innovative teaching approach.

2.1.3.2 The research problem

The lack of cooperation between “national education systems” and general “research” on CLIL represents a big problem not only in CLIL, but also in other areas of language teaching pedagogy. For CLIL this situation is particularly difficult

as it is still such a recent phenomenon and research therefore is still in its infancy (cf. Chapter 2.1.1 for the history of CLIL). What this basically means is that politicians and researchers do not yet work together in order to enable the development of didactical and methodological approaches for CLIL:

Initiatives should be made to include a wider range of expertise in CLIL than has previously been the case. Such expertise, generally research-driven, is needed to explore the multi-disciplinary and holistic features of CLIL. Objective empirical data are increasingly required to substantiate claims made for and against CLIL. The analysis of such data is instrumental in allowing informed decision-making on future development.

(<http://www.clilcompendium.com>¹ 2009, quoted in Dalton-Puffer 2007: 4)

By further investigating existing CLIL structures, methodological basic approaches and practical implementations, this teaching approach needs to be further developed professionally so that more teachers dare to try it. It would be a shame if CLIL had to make way for other approaches simply because research failed to provide the necessary information needed to develop CLIL pedagogies.

It is intended that my thesis fits into the research area of CLIL materials development, and therefore becomes a contribution to CLIL research.

2.1.3.3 *The teacher problem* (also see Chapters 2.1.3.6 and 2.2.2)

One big difficulty CLIL is facing already is the lack of sufficiently-trained and educated teachers. The demand for CLIL is becoming greater, but what is not yet being pushed is the appropriate teacher education which would equip future CLIL teachers with the appropriate language skills and necessary theoretical background (cf. Maley 2007: 6; Lamsfuß-Schenk & Wolff 1999: 4). An example of this is provided by Appel (2003), who demonstrates that not only subject knowledge but also target language skills are important for teaching CLIL. He conducted a teacher training trial in Freiburg, Germany where student teachers were trained in how to become bilingual Biology teachers. Via translation, English was slowly introduced as the language of instruction until a native speaker took over, in order to teach didactics. The final stage of the trial was a mock teaching situation where the student

¹ There is no separate URL for the site where the quote can be found. Therefore, I give the link path: CLIL Compendium – CLIL Potential – Focus on other Stakeholders: g. Testing and Evaluation Innovation.

teachers were able to try out teaching Biology in English (cf. Appel 2003: 126). The overall conclusion of Appel's project was that even though there might be at present a boom in CLIL, it has to be borne in mind that teachers will need to be able to convey their subject in a foreign language. It is not enough simply to be an average speaker of an L2 as a teacher of a bilingual subject, because you need to have knowledge of technical and subject-related vocabulary as well as the ability to lead conversations and discussions. There are two types of vocabulary items in language teaching, which ought to be defined here. In the field of medicine, Salager (1985: 6 quoted in Fraser [dpu]²: 63) defines technical vocabulary as "high-frequency, context-bound, or topic-dependent, terms particular to a given medical speciality". This definition can also be used for other disciplines and areas of work such as law, or economics. There is also semi-technical vocabulary, which is regarded as more important when learning a language for specific purposes (cf. Fraser [dpu]: 63-64). According to Cowan (1974) and Trimble (1985), who are both mentioned in Fraser ([dpu]: 64), semi-technical terms are those which can occur frequently in more than one disciplines and these common words have more "specific meanings in particular scientific and technical fields". Examples of technical words in Biology include *eardrum*, *cochlea*, or *stigma*, while semi-technical terms are expressions like *to produce* (pollen, nectar), *to grow straight*, *to attract* (insects, animals).

Returning to the point mentioned before, the subject knowledge must not be neglected in CLIL teaching (cf. Appel 2003: 130). Finding a balance between subject and language can therefore be identified as the big issue in CLIL teaching. Davison & Williams (2001) and Mohan (2001) state more detailed information on the difficulties with, and different views on how language and content can be integrated equally into teaching.

Here it should be mentioned that in Austrian grammar schools, the only teachers allowed to teach CLIL in particular subject are teachers who have actually studied those subjects. The only exception to this rule is when there are not enough, or no teachers for a specific subject. They are, however, not yet required a certain level of proficiency in the foreign language of instruction. By contrast, secondary modern school teachers can theoretically teach subjects in an L2 other than that which they studied as part of their education. This could lead to considerable problems, as they might not be competent in either of the two components of CLIL,

² [dpu] = date of publication unknown.

content or language, whereas subject teachers are at least experts in their subject (cf. Maley 2007: 6-7 for more detail on subject and language teachers). All of these loose regulations about who can and cannot teach CLIL reflect its novelty, and the fact that a long path of development still lies ahead.

There are many additional problems for teachers who want to teach this approach, since there are hardly any suitable CLIL materials available for the different levels of the Austrian education system, and other European education systems in general. In Biology, which is a very young CLIL subject, it is difficult to find textbooks which are appropriate in terms of language and the national curriculum. It is not only Biology that faces this problem – all subjects which have been taught in CLIL suffer from a lack of suitable materials, subjects which include History and Geography. Many teachers who are teaching or who want to teach a subject in CLIL need to be aware that by necessity they will have to dedicate a huge amount of time to preparation work for their classes (cf. Dalton-Puffer & Smit 2007: 16). More information on materials used in CLIL will be given in Chapter 2.1.3.6. , and a focus on materials for Biology can be found in Chapter 2.2.2.

In order to allow CLIL teachers to get in touch with one another, a variety of societies and groups have been established on the internet over the last few years. On an international basis, teachers exchange materials (e.g. lesson plans or worksheets) and the findings of recent studies on CLIL on various platforms. In addition, the European Union and the Council of Europe are trying to get more involved in this new teaching approach by funding networks and organisations (cf. Dalton-Puffer 2007: 3). One of the most important websites is the CLIL Consortium website (<http://www.clilconsortium.jyu.fi>), which provides very detailed information on CLIL methodology, recent research projects and teaching resources. Furthermore, it is linked to one of the biggest CLIL networks, the CLIL Cascade Network (CCN) (<http://www.ccn-clil.eu>), which is co-financed by the European Commission. Darn (2006: 5-7) provides lists of further international organisations such as EuroCLIL (<http://www.euroclil.org>) and of many websites of networks where more details on CLIL can be found.

2.1.3.4 The language vs. content problem

The relationship between content and language has been a major issue in CLIL ever since the approach was introduced into the classroom. Teachers are concerned that the foreign language makes it difficult for students to fully understand the subject matter, which can consequently lead to fewer topics being covered in the classroom. Furthermore, language and science teachers seem to fight an ongoing battle over which subject is more important (cf. Dalton-Puffer 2007: 5; Dalton-Puffer & Smit 2007: 11). In CLIL teaching, the subject is in the foreground and the language is simply used to transport the subject content. Nevertheless, “language-related goals” should not be neglected in CLIL, as otherwise it would not make any sense to teach in CLIL at all (Dalton-Puffer 2007: 6). Even though the content of the subject is focused on to a greater extent in the classroom, the target language is still the important mediator between the content and the learner (cf. Dalton-Puffer 2007: 263-264). Therefore, the main language goals of CLIL are communication, and the production of speech and writing. This might not yet seem so distinct from normal language classes, but there is one important difference: in the CLIL classroom grammar mistakes in general are not considered to be as important as they are in a normal language classroom (cf. Dalton-Puffer 2007: 265).

In this context, one foreign language teaching approach closely linked to CLIL should be mentioned: English for Specific Purposes (ESP). This learner-centred teaching approach also tries to teach second languages through specific contents and for specific work fields (e.g. law, economy, engineering, medicine). ESP has a language focus in each work-related area in which it is taught because, after all, language is the means by which we communicate with and understand those around us (cf. Darn 2006: 4; Howatt & Widdowson 2005: 343). The big difference between ESP and CLIL, however, is that the former is mainly relevant for adults who are working in a specific field. The latter, as discussed earlier, is a teaching approach for school pupils. For more information on ESP, see García Mayo (2000).

2.1.3.5 The target language problem

A problem purely concerning the language used in CLIL is that it is mainly English which is used as the target language (cf. Dalton-Puffer 2007: 1). Van de Craen et al. (2007: 70-71) point out that – despite what many teachers think – improving the

proficiency level of English is not the overall aim of CLIL and that other regional languages or other foreign languages (e.g. Italian, French, Spanish) should not be neglected. Despite English being widely used as the language of instruction in CLIL, countries such as the UK, Belgium, Finland and Sweden obviously also focus on many other languages such as French, Flemish, Dutch or Russian. This is because of their neighbouring countries, or because they have more than one official language (e.g. cf. papers by Coyle or Lochman for examples of non-English CLIL teaching).

Moreover, there is one question which arises when it comes to teaching subjects in a foreign language generally: which age group is the best to start at? Obviously, many people might believe that learning a subject in an L2 cannot be attempted before a certain level of proficiency in the target language has been reached by the learners. Hainschink (2007: 155), however, does not share this view as she says that there is one distinctive factor motivating young pupils:

Jedoch einen wesentlichen Motivationsfaktor gibt es nur hier:
den Stolz der SchülerInnen darauf, dass sie nach kurzer Zeit
Englischunterricht bereits fähig sind, Sachfachinhalte mit
einer Fremdsprache als Arbeitssprache durchzunehmen.

The ability to understand any subject matter in a foreign language is supposed to boost learners' urge to get involved in the subject. I believe that everybody has experienced the motivating feeling of success, or of being able to perform tasks in a foreign language. Combining this feeling with authentic content from the real world in a subject like Geography, History or Biology further increases this feeling. This knowledge ought to turn CLIL into a goal to be striven for in the modern classroom.

There are also other concerns in CLIL that are bound in with language generally. Nowadays, teachers face multilingual classrooms in which the number of migrants has increased over the last few years. This does not necessarily have to be a problematic situation, as there is one interesting advantage that CLIL claims for itself when it comes to the simultaneous teaching of native and non-native L1 speakers in one classroom:

Englisch [oder eine andere Zweitsprache] ist für (nahezu) alle
Schüler/innen eine Fremdsprache. Dies ist im Sinne einer
Chancengleichheit von Schüler/innen mit unterschiedlichen
Muttersprachen begrüßenswert.
(Langer et al. 2006: 7)

This comment should demonstrate that CLIL could be one way of improving the integration of migrant children within our classrooms.

Furthermore, Langer et al. (2006: 7) claim that emotional appeal towards a subject used for CLIL can be fostered by looking more favourably upon the use of German or a different mother tongue (e.g. Turkish or Croatian). If making use of the mother tongue assists the learner in clarifying contents, and if this leads to a better understanding of the subject matter then it should not be denied the student. Therefore, just because CLIL teaching takes place in an L2, there is no reason why mother tongues or other second languages cannot be used for clarifying and other purposes. The use of the mother tongue not only creates a more relaxed atmosphere in the classroom; from time to time it might also be necessary because, for example, one feasible reason for switching between the target language and the mother tongue(s) is that pupils will then also be able to express the subject matter in both languages by using the correct technical terms (cf. Hainschink 2007: 160). The aim of CLIL should not be that students are able solely to demonstrate their knowledge in the foreign language. Possessing the appropriate vocabulary for contents in the first language as well is also an important goal.

2.1.3.6 The lack of materials (also see Chapters 2.1.3.3 and 2.2.2)

The last problem discussed here deals with the enormous lack of teaching materials that teachers face in any CLIL subject. Mathews (2005: 1) points out that there are hardly any suitable materials currently available which fulfil the criteria for national curricula in some countries. CLIL teachers still do not get a huge amount of support from publishing houses. The supply of suitable and useful materials for teaching bilingual subjects is more the exception than the rule. However, even when suitable materials do exist it does not always include teacher support such as an extra book introducing work methods, didactics, or further information and tips on how to implement certain activities.

Only recently, teachers like Machotka & Fierling (2005; 2008) have developed CLIL-specific teaching materials, for example, for the subject of Biology in Austria:

- *Cross-Curriculum Creativity – Biology – Book 1: The Human Body*
(see Appendices I 1 a&b)

- *Cross-Curriculum Creativity – Biology – Book 2: Mammals* (see Appendices I 2a&b)
- *Cross-Curriculum Creativity – Biology – Book 3: Plants* (see Appendices I 3a&b)
- *Cross-Curriculum Creativity – Biology – Book 4: Birds, Reptiles, Amphibians & Fish* (see Appendices I 4a&b)

An interview with one of the authors of these textbooks, Mag. Sheena Machotka, is enclosed in Appendix V.

The retired teacher Mathews together with Olmesdahl (2009) also developed a CLIL Biology textbook for secondary education in Germany called *Discover Biology 1* (see Appendix III). The materials just-mentioned are both developed for German native speakers and with regard to the national curricula of the two countries (cf. Mathews 2005: 2).

2.1.4 CLIL pedagogies – theory and methodology

2.1.4.1 *Language teaching models reflected in CLIL*

CLIL is not backed up by much theoretical background, but one system widely known in language teaching is “Krashen’s monitor model” (Krashen 1985, Krashen & Terrell 1983 quoted in Dalton-Puffer & Smit 2007: 9). Its connections with CLIL were briefly summed up by Dalton-Puffer & Smit (2007: 9-10):

A decisive influence in the area has definitely been Krashen’s monitor model [...], several elements of which have figured prominently in CLIL rationales. These are the primacy of acquisition over learning (CLIL as naturalistic learning environment), emphasis on the importance of comprehensible and meaningful input (emphasis on subject content rather than linguistic form), as well as the notion of the affective filter (CLIL as reducing foreign language anxiety). Despite the critique which Krashen’s ideas have received in SLA over the last 20 years, they continue to be of major significance as a conceptual reference point for CLIL [...].

Furthermore, CLIL fits into the combined concept of “socio-cultural and constructivist approaches to language learning”, which has become more and more important over the last few years (Dalton-Puffer & Smit 2007: 10; also cf. Dalton-Puffer 2007: 7-8). This concept focuses on the belief that learning takes place in

social situations where individuals practise social interaction (socio-cultural approach). Simultaneously with this social learning, knowledge that has just been absorbed is being integrated into old structures of memory which necessarily leads to a process of re-structuring of knowledge in the brain (constructivist approach).

As a consequence, the CLIL classroom as a social setting with specific participant roles, purposes and discourse rules moves considerably more to the centre of the learning process [...].
(Dalton-Puffer & Smit 2007: 10-11)

In recent years, CLIL has become one of the most effective and modern ways of teaching subjects and languages, and yet no satisfying basic methodological approach has been elaborated. Unfortunately, CLIL classes are still taught according to traditional language and/or subject methodologies. Lamsfuß-Schenk & Wolff (1999: 5) express their dissatisfaction with the lack of a common methodology in bilingual subject and content teaching as follows:

[...] [D]er Unterrichtsmethode, wird unserer Überzeugung nach bislang viel zu wenig Beachtung geschenkt. Dies ist bedauerlich, denn die Unterrichtsmethodik ist von höchster Bedeutung gerade im Kontext eines solchen neuen Unterrichtskonzepts wie dem bilingualen Sachfachunterricht. [...] Dies ist vor allem deshalb ein bedauerlicher Umstand, da der bilinguale Unterricht im Allgemeinen bessere Lernbedingungen sowohl für das Fremdsprachenlernen als auch für das Sachfachlernen bieten könnte (vgl. hierzu vor allem Wolff, 1997). Neue und überzeugende pädagogische Konzepte wie Projekt- oder Prozessorientierung könnten in einen solchen Lernzusammenhang sehr viel besser eingebettet werden. Gruppenarbeit ist authentischer im bilingualen Unterricht als im traditionellen Fremdsprachenklassenzimmer, und Lernerautonomie ist ein überzeugenderes Erziehungsziel in solch einer Lernumgebung.

The authors argue for a suitable methodology because they believe that pupils are already overloaded by the equal demands that the language and subject impose on them. Moreover, they fear that these excessive demands could lead to a more instructive approach to teaching, i.e. ex-cathedra teaching, and it is exactly this form of instruction that overstrains pupils. This vicious circle has to be prevented by the adoption of the afore-mentioned measures. The trend has to move towards a learner-centred classroom where learners are given more responsibility and freedom when working on the subject matter, which will consequently take pressure off them (cf.

Lamsfuß-Schenk & Wolff 1999: 6). Students will therefore still need the help of the teacher, but in the end they as the receivers of knowledge are the focus of interest.

Learners will need help in the areas of lexis, cognitive functions and study skills.

At the lower grades the emphasis is likely to be more on receptive than productive skills. However, learners will also need to write and to speak in the foreign language and will need support and help to do this.

(Maley 2007: 9)

Teachers can support students in their learning and their progress of understanding by adding variety to their teaching methods (e.g. aids, activities). Examples of recommended teaching aids are visuals (pictures, charts, diagrams), small language tasks and different classroom arrangements (individual, pair, group work) combined with the repetition of contents and language items on a regular basis (cf. Maley 2007: 9). All these aids are especially suitable for the project-oriented and process-oriented teaching approach of CLIL.

As mentioned earlier (see Chapter 2.1.3.5), a common false assumption shared by many teachers is that the mother tongue has to be completely banned from the CLIL classroom. However, the L1 should be used to assist in clarifying task instructions, and correcting misunderstandings, and sometimes even when students need to know the content and specific vocabulary in the mother tongue first – especially important at lower-grade levels (cf. Maley 2007: 9).

2.1.4.2 Assessment in CLIL classes

How CLIL subjects should be assessed is a very vague area. At the moment, no common system of assessment has been developed which would be suitable specifically for CLIL. There are some points, however, on which most people involved in CLIL agree: both language and content have to be taken into consideration as well as the age group and level of the learners (cf. Maley 2007: 9; Poisl 2007: 43). One step towards an answer to this difficult question could be “formative assessment” (Poisl 2007: 43). This type of assessment includes all kinds of feedback (e.g. portfolios, feedback provided by fellow students and teacher) that will help the students to determine where they still have weak areas. Any method of assessment will have to be explained and introduced very carefully by the teacher, as most pupils are not used to carrying out self-assessment. I personally think that self-

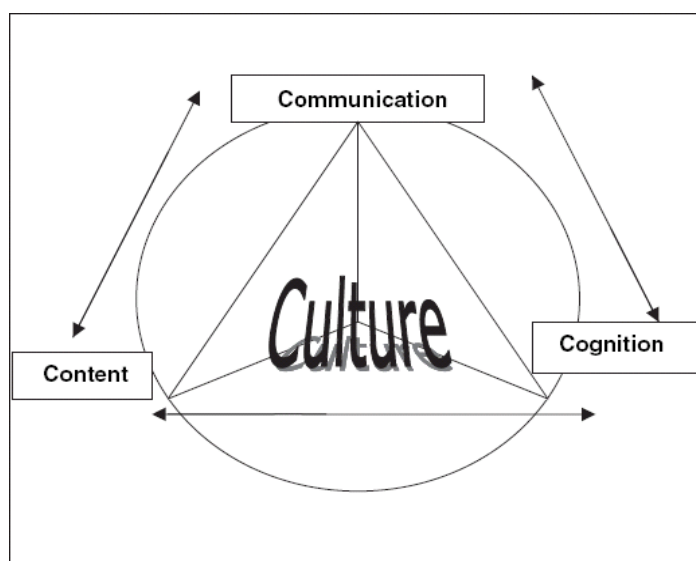
assessment will also encourage autonomous learning as students are asked to work towards their individual needs, and they need to act in a responsible way if they want to progress in the subject. Only they themselves can influence how carefully and intensely they work for the course. In addition, this development is central to education generally, because helping learners to become autonomous in studying is one of the main goals that national curricula state for every subject in Austria (cf. Bundesministerium für Unterricht, Kunst und Kultur [BMUKK] (2000a&b) for two examples of curricula which encourage autonomous learning), and autonomy should be the main goal of all teaching. It should guide learners to a situation where they are no longer dependent on the teacher and are able to make their own decisions (cf. Malinovska & Zeidmane [dpu]: 4).

2.1.4.3 The role of culture in CLIL

As mentioned in 2.1.1, CLIL is a phenomenon which emerged from the increasing mobility of people and the progression of globalization. Consequently, this content and language integrated teaching approach is heavily influenced by the different cultures of people coming together. Therefore, culture and cross-cultural relationships have developed as the central focus of CLIL (cf. Coyle 2007, Malinovska & Zeidmane [pdu]). Coyle (2007: 549-556) tried to connect factors which influence CLIL and which go beyond the subject and language. She wanted to integrate the idea of culture into this innovative teaching approach. By developing the “4Cs Conceptual Framework” (*Figure 1*), the author has tried to make one of the first steps towards a common basis for CLIL pedagogies (Coyle 2007: 549). The idea behind this concept is the understanding that CLIL is more than just the combination of language and content

but rather positions content in the ‘knowledge for learning’ domain (integrating content and cognition) and language, a culture-bound phenomenon, as a medium for learning (integrating communication and intercultural understanding). (Coyle 2007: 549-550)

Figure 1 The 4Cs Conceptual Framework for CLIL. *Source:* Coyle (2007: 551)



The concept is meant to illustrate the four most important components which fuse in the CLIL classroom: “content (subject matter), communication (language), cognition (learning and thinking) and culture (social awareness of self and ‘otherness’)” (Coyle 2007: 550). As *Figure 1* shows, culture is the central idea connecting the other three. Douglas Brown (1980: 138 quoted in Coyle 2007: 550) claims that culture is the combination of language and thought, resulting in communication and different views on the world:

Culture is really an integral part of the interaction between language and thought. Cultural patterns, customs, and ways of life are expressed in language: culture specific world views are reflected in language [...] language and culture interact so that worldviews among cultures differ, and that language used to express that world view may be relative and specific to that view.

CLIL is probably the first teaching approach which focuses this much on culture and intercultural relationships. It tries to consciously integrate the opinions of the learners into the classroom, while a target language is used as the medium for discussion and the expression of views. Simultaneously, there should also be an attempt to relate subject matters and students’ viewpoints to other cultures. In addition, learners should try to be aware of the role they play in society when discussing subject matter. This importance of culture will have to be emphasized not only by the teacher but also represented by the teaching materials devised for CLIL purposes.

Coyle (2007: 550) further lists a variety of events which are intended to lead to the implementation of efficient CLIL in the modern classroom (e.g. “[...] progression in knowledge, skills and understanding of the content, interaction in the communicative context, [...]”). There are six principles on which the 4Cs Conceptual Framework is built on (cf. Coyle 2007: 550-551). The most important points are that

- pupils generate their own and relevant knowledge according to the subject input they get;
- in order to be able to understand and grasp contents of a subject, appropriate language constructions have to be looked at and explained. This will further cognition, the development of skills and comprehension;
- language requires context if it is to be learned effectively, and therefore, the topics of the subject need to be constructed accordingly;
- interaction in the classroom (written or oral) is the key to long-term and effective learning, especially when subject matter in an L2 is involved;
- finally, culture is at the heart of the 4Cs framework and together with intercultural learning it opens the way forward to “transformative pedagogies, global citizenship, student voice and identity investment” (Coyle 2007: 551).

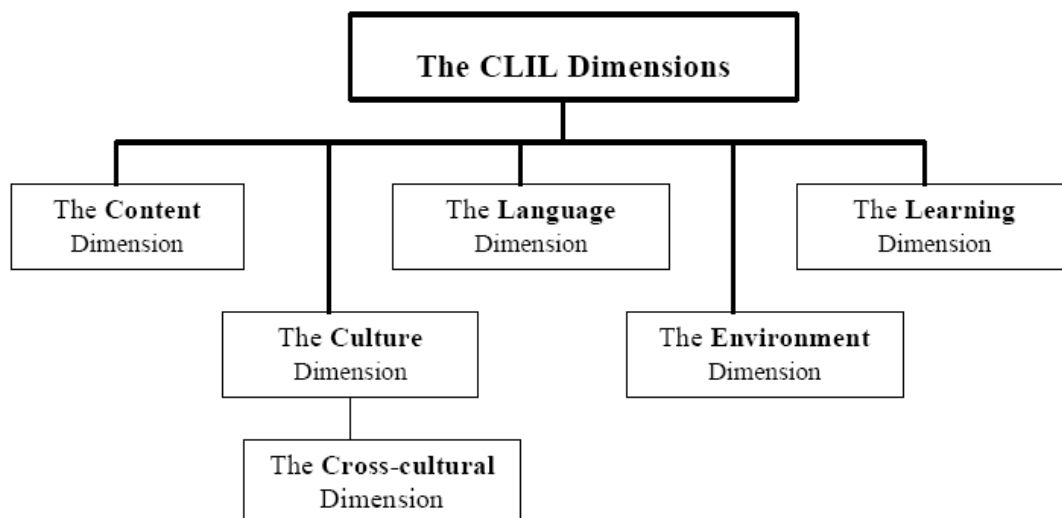
Cultures are not supposed to be looked at in a separated way in CLIL. By relating subject contents with culture, this teaching method tries to focus on cross-cultural communication and relationships (cf. Malinovska & Zeidmane [dpu]: 1). Malinovska & Zeidmane ([dpu]: 1) define cross-cultural communication as follows:

Cross-cultural communication means communication among individuals representing different identities and culture. There can be cultural, political, religious etc. barriers. Cross-cultural communication requires the competencies that ensure the knowledge of the world that is very various. It depends upon the persons, groups of persons, regions, age, sex, experience, traditions, politics, race etc.

The authors further state that nowadays the ability to understand other cultures and identities is necessary for children, because this has become increasingly important in the work place and everyday life (cf. Malinovska & Zeidmane [pdu]: 1-2).

Figure 1 is a similar diagram to Figure 2, but the latter gives a more detailed breakdown of dimensions which have an impact on CLIL.

Figure 2 CLIL Dimensions. *Source:* Malinovska & Zeidmane ([dpu]: 2).



CLIL is supposed to provide learners with communication skills which should reflect their own culture, in order for them to be able to interact on a cross-cultural basis; this means having the ability to understand and tolerate other people's views and notions (cf. Malinovska & Zeidmane [pdu]: 1-2). As has been discussed already in the theoretical background (cf. Chapter 2.1.2), CLIL is an approach to teaching which focuses on the main goal of language teaching generally – communication. Communication and culture are combined in CLIL to form cross-cultural communication, and there are three aspects of communication this term is assembled of: “language, identity and culture” (Malinovska & Zeidmane ([pdu]: 2). This definition fits perfectly into the concept of CLIL.

Finally, I believe that this quote by Savignon (1983) sums up perfectly how language and culture are connected to each other:

Learning to speak another's language means taking one's place in the human community. It means reaching out to others across cultural and linguistic boundaries. Language is far more than a system to be explained. It is our most important link to the world around us. Language is culture in motion. It is people interacting with people.
(Savignon 1983: 187)

Summing up, CLIL opens up a whole new world of opportunities for how education can be improved for both learners and teachers in the future. However, there are still many unanswered questions regarding the language and subject side

which will demand further study over the next few years. If not enough research is carried out, this innovative and brilliant teaching approach might be doomed to disappear. Coyle (2007: 546) puts it as follows:

In order for CLIL to earn its rightful place in the pedagogic arena of contemporary and future curricula, it has to demonstrate rigorous theoretical underpinning, substantiated by evidence in terms of learning outcomes and capacity building.

In order to make a contribution towards a more elaborated methodology of CLIL, this study is intended to give an insight into the CLIL teaching materials currently used for teaching Biology in the Austrian education system. A set of Biology textbooks mentioned in Chapter 2.1.3.6, *Cross-Curriculum Creativity – Biology (Books 1-4)* (2008), for the 1st form of lower secondary grammar or secondary modern schools has been analysed and evaluated against a set of specially-designed criteria. These criteria have not only been influenced by the theoretical background of CLIL (see Chapter 2), but also by the Austrian national curricula with specific regards to didactical approaches to English and Biology (cf. *Table 1* for the main crossovers of the curricula BMUKK 2000 a,b&c).

All of the above-mentioned arguments for CLIL, and all of the problems that teachers, pupils and researchers encounter at the present time can be identified in all subjects which are taught using this bilingual subject-oriented method. The following chapter will give an insight into the subject combination of Biology and English for CLIL, which should demonstrate that the natural sciences are perfectly suited to this approach.

2.2 The Rationale for CLIL in Biology

Biology has only recently become one of three most popular CLIL subjects in Austrian secondary schools. According to Gierlinger (2007: 100), Biology, along with History and Geography, is one of the most popular school subjects currently being taught bilingually, but it appears to be more common in secondary modern schools than in grammar schools. The reasons for this phenomenon are still rather unclear and would need further investigation.

The first argument for CLIL in Biology refers to a study showing that nowadays there is a demand for this new combination of subjects, and that this tendency will continue to increase over the next few years. The following chapters are intended to give more legitimate reasons than personal preferences for Biology. Therefore, the next sections are aimed at identifying features of this subject for this innovative teaching approach.

2.2.1 Seven good reasons qualifying Biology in English for CLIL

Appel (2003: 124-126) states seven feasible reasons why Biology qualifies as a CLIL subject. I have summarised these reasons in the following paragraphs:

- I) English is used as the lingua franca in natural sciences, which means that scientists with different L1s use English to communicate. English facilitates the exchange of research data and fresh knowledge in sciences. Scientists and laypeople interested in this discipline rely on using this language every day.
- II) Science lessons in Great Britain are very practice-oriented, which implies that teachers employ student-centred teaching methods, for example, experiments or field trips. This might be a useful guide to how teaching natural science in CLIL can be approached. First-hand practice combined with successful performances in science tasks might encourage and motivate students to participate more in lessons. Moreover, this motivation might arouse further personal interest in the subject.
- III) Language teaching can exploit the contents of science. As mentioned in the previous paragraphs, natural sciences are practice-oriented and highly communicative, and are certainly no text-based discipline. Experiments, current research results or explanations of mysterious natural phenomena could be effective impulses for discussions in the classroom.

- IV) One result of the combination of English and Biology could be the convergence of the two academic disciplines of sciences and humanities. This convergence could result in a less tense relation between them. Furthermore, this might support a more interdisciplinary approach to teacher education.
- V) Children, teenagers and adults seem to show a high level of interest in nature and biological topics (e.g. animals, plants or the functions of the human body). Therefore, one can conclude that Biology is not only fascinating for scientists, but also for laypeople. Its popularity seems to be a convincing argument for the use of Biology in CLIL.
- VI) Other academic disciplines, such as physics or chemistry, are often employed to describe biological phenomena. This argument could therefore be used to enhance interdisciplinary teaching in Biology, because this integrated form of teaching has recently become a focus within education.
- VII) Additionally, Biology offers contact points to social sciences. This means that biological findings often have effects on society (e.g. findings related to health and diseases) and are furthermore used to discuss social questions.

In order to confirm Appel's reasons II, III, V and VII, Mathews (2005: 1) provides the following arguments. One of the main characteristics of research in natural sciences is the drawing of conclusions from experiments and field studies. The subject of Biology therefore benefits from this practical approach to research, and can make use of this. In CLIL Biology, this practice-oriented approach, moreover, gives pupils a chance to simultaneously gain first-hand experience in natural sciences and foreign language practice. More generally, this practical teaching approach further appears to build the basis for professional subject-related discussions in CLIL classes.

In general, a wide range of additional teaching support for both learners and teachers is available in CLIL Biology. Various teaching aids such as visuals,

audiovisuals, illustrations and statistics help to implement the teaching of the subject. Furthermore, Mathews argues that the internet has become increasingly accessible and important for pupils. Computers are therefore often used in lessons to save and handle data, or to consult encyclopaedias for scientific terms. Altogether, all of the above-mentioned reasons justify the use of a foreign language – in this case English – in the school subject of Biology (cf. Mathews 2005: 1).

Lastly, I briefly want to sum up the most important reasons why I consider CLIL as being appropriate for the subject Biology, with English as the language of instruction. Firstly, English is the language of sciences today, and therefore each significant research study in this academic discipline is published in this language. As a result, I believe that teaching Biology in English is a viable way of introducing learners into the actual real world of sciences.

Secondly, CLIL aims at employing subjects that are significantly relevant for many people. As the natural sciences affect everyone's life, I am convinced that this relevance in particular qualifies Biology for CLIL.

Finally, I should reference findings by Koch and Bänder (2006: 67; mentioned in Chapter 2.1.2), in which they claim that bilingual teaching in Biology increases subject matter learning, and does not hinder it. Therefore, this discovery should help to encourage current and future CLIL teachers and pupils to get involved with CLIL in Biology.

2.2.2 Support for the implementation of bilingual Biology (also see Chapters 2.1.3.3 and 2.1.3.6)

Mathews (2005) has made a remarkable contribution to CLIL. He is a retired Biology teacher from Essen in Nordrhein – Westfalen, Germany who taught bilingual Biology for 34 years. He established a bilingual path in the Maria-Wächter-Gymnasium (Essen, Germany) where school subjects were generally taught in a foreign language from the 1st until the 8th form (pupils aged 10-18 years). Additionally, Mathews was active in the field of further education for teachers who teach subjects bilingually. As he was himself a CLIL teacher for many years, his practical experience in this field will be used here to support the use of CLIL in

Biology. Even if we know that materials development is still a highly underdeveloped area, Mathews (2005) describes the availability of aids and how they can be employed to implement CLIL in the classroom.

Mathews (2005: 4-5) specifies basic criteria for CLIL Biology materials:

- Biology lessons in English need to follow the same national curriculum and methodology as lessons in the mother tongue.
- Only materials which are appropriate for the learners' level of proficiency in the L2 need to be employed. Furthermore, the pupils' stage of development ought to be reflected in the materials and their level of difficulty.
- Teachers should aim at using authentic materials derived from English-speaking countries. Texts edited by native speakers are also appropriate. Furthermore, pupils should be aware of the actual usage of those materials in realistic work settings. This awareness may add to the motivation of learners to study the subject in English.
- Materials need be devised, that constantly enlarge subject knowledge. Simultaneously to this enlargement, the foreign language competencies ought to be enhanced and expanded as well.
- The teaching materials need to contain didactical support for the teacher. Moreover, scientific vocabulary in the L1 and L2 with phonetic transcriptions of the target language needs to be included in the materials.

These criteria will now be explained in more detail in the following paragraphs:

The usage of text materials in bilingually-taught Biology

Mathews (2005: 1-2) argues the importance of text materials for Biology classes when taught in a foreign language. He states that in lower secondary classes, text materials are less important for traditionally-taught Biology when compared to CLIL Biology. Text materials appear to be more an essential teaching tool in CLIL classes. Among other reasons, texts help pupils to adapt, for example, to the spelling of the L2. Generally, text materials are used to teach and consolidate new subject knowledge. Here it should be mentioned that Mathews (2005: 2) advises teachers to use textbooks both in the mother tongue and the target language simultaneously at all

levels of education. This is supposed to help students to grasp the contents in both languages more easily. Furthermore, reading about biological facts and phenomena in German and English should enhance pupils' abilities to lead scientific discussions in both languages. Additionally, this use of both languages should ensure that pupils know the most important technical terms in both their mother tongue and the foreign language (cf. Mathews 2005: 2).

While accuracy is less important than communication in CLIL, spelling and pronunciation can also be focused upon by employing texts. Moreover, texts might further serve as the basis for follow-up tasks, such as productive writing tasks. As a result, teachers are able to assess their learners by employing such tasks in which the progress of the subject and the target language can be tested together (cf. Mathews 2005: 1-2).

Later, in upper secondary grades, Mathews (2005: 2) argues that texts become even more essential for the subject. This increased use of texts occurs due to the more autonomous methods by which pupils should acquire knowledge, such as self-study or student presentations on topics. The importance of such texts is the same for bilingually-taught and monolingually-taught Biology.

Authentic teaching materials: chances and limitations in CLIL Biology

As mentioned in Chapter 2.1.3.6, appropriate teaching materials are not available yet for various CLIL subjects in a number of countries, including Germany and Austria. Teachers have to rely on materials from the UK or America, or have to develop their own (cf. Mathews 2005: 1-4). The main types of teaching aids available for Biology need to be explained further:

Images, pictures and illustrations are fairly easy to find and to use in bilingual Biology classes. Almost no problems are found in this area of teaching aids (cf. Mathews 2005: 2).

Statistics such as graphs, tables or diagrams are equally easy to adapt. If they originate from textbooks in German, the teacher only has to change the legend and headings into English (cf. Mathews 2005: 3).

Furthermore, **instructions for experiments** are not difficult to find, but occasionally the experiments might take too long when used in an Austrian or German context as they were designed to serve the British or American timetable.

Teachers are asked in this case to tailor the experimental work to fit their available time (cf. Mathews 2005: 3).

When employing **audio visuals** from the United Kingdom or the United States, teachers will find that several problems might reveal themselves. Problems with the language itself, in terms of speed, accents, registers and dialects might be experienced, not only by the students but also by the teachers themselves. There might further be problems with the content, as hardly ever does a whole film fit the topic of the national curriculum. Nevertheless, selected sections of films can be shown, and listening to native speakers is good training for listening comprehension, which gives pupils the opportunity to prepare themselves for encounters with English speakers (cf. Mathews 2005: 2). Often, teachers have to fall back on films in German. However, this is sometimes not necessarily a disadvantage, because pupils also need to know the scientific terminology in their L1. Films in German only become problematic when there are absolutely no audio visuals available in the target language, and pupils cannot therefore be exposed to the L2. Overall, an increase in preparation work and time has to be accepted when converting this information for use in the foreign target language (e.g. worksheets, tasks, vocabulary) (cf. Mathews 2005: 2-3).

Working with **authentic Biology textbooks** seems to offer one of the biggest set of problems to teachers, particularly when they have to fall back on materials from countries such as Britain or the USA. Mathews (2005: 3) describes that even though authentic texts might deal with the same topics as the L1 textbooks, they often lack a sufficient amount of content that is obligatory for to the national curriculum of Biology in Germany. Teachers will have to round off the texts with their own additional passages taken from textbooks in German. Moreover, the language has to be adjusted so that it is suitable for the target learners (cf. Mathews 2005: 3).

Tier- und Pflanzengruppen werden oft in generalisierender Weise anhand ihrer allgemeinen Kennzeichen vorgestellt, während deutsche Lehrbücher das induktive Erschließen der Merkmale einer Tier- oder Pflanzengruppe anhand von Monographien einzelner Tiere und Pflanzen ermöglichen. Englischsprachige Lehrbücher behandeln ökologische Themen meist in sehr globaler Form, wohingegen der deutsche Lehrplan eine differenzierte, die heimische Flora und Fauna als Grundlage nehmende Untersuchung fordert. (Mathews 2005: 3)

Even though Mathews refers specifically to the German Biology curriculum, the same problem occurs when it comes to the Austrian curriculum (cf. BMUKK 2000a&b), as it is structured in a similar way.

Despite the problem of the insufficient coverage of topics which still remains in higher secondary classes (cf. Mathews 2005: 4), it is generally easier and advisable to use authentic texts than non-authentic texts in CLIL. The reason for this is that the learners' ability to understand and process new information in the brain has developed further, so that they can also handle more abstract concepts in Biology. Furthermore, it is obvious that being instructed in bilingual Biology after having already experienced it in the lower secondary level will be easier, when compared to pupils who are being exposed to Biology in English for the first time in their life. The latter will not be used to dealing with the subject matter of sciences in a foreign language.

Proficiency tests are mainly designed as multiple choice or short answer questions. Rarely do pupils have to write critical statements on biological facts. Once again, the teacher needs to make sure that testing fulfils the requirements of the curriculum (cf. Mathews 2005: 3).

According to Mathews (2005: 4) one of the biggest problems a teacher faces when working with authentic materials from America or Britain is the recently-undertaken change in didactics in the teaching of natural sciences. A new principle was introduced which focuses on multidisciplinary teaching in sciences. This principle is called “[i]ntegrated Science” or “[c]ombined Science”, and means that subject contents of Physics, Chemistry and Biology are combined in science teaching (Mathews 2005: 4). This approach to Biology is rather different from the German or Austrian approach. Clearly, aspects of Physics and Chemistry appear in Biology because of their closeness to the natural sciences. Therefore, these features can easily be integrated into the subject matter of CLIL Biology. Even though multidisciplinary teaching should be enforced (cf. BMUKK 2000a&b), teaching praxis, however, shows that most of the time these three subjects are treated individually within the Austrian education system. Mathews (2005: 4) therefore claims that textbooks following this new didactical approach can currently only be employed in a limited way.

2.2.3 Curricula crossovers in English and Biology which justify them for CLIL

A central guideline in CLIL is that both subjects being taught via this approach have to be considered equally. Besides the reasons for the use of Biology in CLIL which have been advanced by teachers, linguists or scientists, Biology itself features many crossovers with foreign language teaching. In order to identify similarities between the subjects Biology and English, for example, a closer look has to be taken at the national curricula. Therefore, the curricula for the first form of grammar and secondary modern schools (pupils aged 10-12) need to be consulted. In *Table 1*, I have tried to identify the main crossovers of the curricula of both subjects. The theory behind this comparison is based on one carried out by Hemmelgarn & Ewig (2003: 56-57) on the curricula of Biology and English in Nordrhein-Westfalen. Each statement below confirms that Biology and English are suitable for combination without any loss of the major didactical or methodological aspects of either of the two subjects. The statements in bold are extracts from the curricula and those in the normal type face are my comments.

The most important and striking parallels between both curricula will be summed up by the following points:

- Both subjects claim to be important for society.
- Both subjects foreground an authentic use of language, connected with a focus on communication.
- An interdisciplinary approach to teaching is regarded as essential for both Biology and English.
- Both subjects aim to encourage students' creativity.
- Both Biology and English attempt to assist learners in the development of social skills.
- Finally, the two subjects encourage the development of students' autonomous character.

Table 1 Comparison of the aims of the curricula of Biology (BMUKK 2000a&b) and English (BMUKK 2000c) in the first form of grammar and secondary modern schools in Austria.

<u>Biologie</u>	<u>Englisch</u>
<i>Bildungs- und Lehraufgabe:</i> Erwerben eines biologischen Grundverständnisses (Werte, Normen), das gesellschaftliche Entscheidungen erleichtern soll.	<i>Beitrag zu den Aufgabenbereichen der Schule:</i> Bei der Vermittlung der Fremdsprache ist wertorientiertes Denken und Handeln im politischen, sozialen, wirtschaftlichen, kulturellen und weltanschaulichen Umfeld zu fördern.
Two basic principles of Biology and English can be combined. Both subjects state that they have an influence on society. Biology claims to have an impact on social decisions with respect to cultural values and norms, and English argues that it encourages value-oriented thinking and acting. In my opinion, both subjects aim for the education of pupils in a way which enables them to develop the social skills needed to take part in and become a member of society.	
<i>Bildungs- und Lehraufgabe:</i> Erwerb und Förderung personaler und sozialer Kompetenzen (Kommunikations-, Konflikt- und Teamfähigkeit, Kooperation, emotionale Intelligenz)	<i>Sozialkompetenz und interkulturelle Kompetenz:</i> Der Fremdsprachenunterricht hat einen Beitrag zur Entwicklung sozial angemessenen Kommunikationsverhaltens der Schülerinnen und Schüler - sei es in der Muttersprache oder in einer Fremdsprache - zu leisten.
This comparison point attaches additional importance to the developing of social competencies with special regards to communication behaviour. The significance of communicative competencies is rather obvious for English, because the overall goal of learning a language is always the ability to communicate. Additionally, Biology also makes this claim. The reason for this is that natural sciences generally rely on written and oral communication in order to defend, explain and discuss hypotheses, experiments and findings. All this is necessary to make sciences accessible for other researchers, students and the public. Therefore, I think that this point shows how much English can complement the communicative side of Biology.	

Natur und Technik: Vernetzung belebter Systeme, Auswirkungen von menschlichem Handeln auf Natur, Ethik und Naturwissenschaften	Gesundheit und Bewegung: Kommunikative Anlässe über gesunde Lebensführung und den harmonischen Umgang mit dem gesellschaftlichen Umfeld bzw. der natürlichen Umwelt sind auch im Fremdsprachenunterricht zu nutzen bzw. herzustellen.
Both subjects emphasise the importance of nature and the environment for humans. Accordingly, students should learn how to take care of nature and treat it with respect, because it serves as the basis for life. Therefore, pupils need to be taught how to deal with this responsibility they have. The curriculum of English argues that the subject ought to indicate the harmonious handling of the social and natural surroundings of learners. Accordingly, Biology intends to make students aware of the effects of human actions on nature because they are both closely connected.	
Sprache und Kommunikation: Förderung der Sprachkompetenz im Bereich der Alltags- und Fachsprache.	Natur und Technik: Fremdsprachenkenntnisse erleichtern den Zugang zur internationalisierten Präsentation von Fachinformationen. Deshalb sind [...] gelegentlich gezielt ausgewählte und dem Lernniveau entsprechende fachsprachliche Texte zu bearbeiten. Kommunikative Fremdsprachenkompetenz: [D]ie Entwicklung der kommunikativen Kompetenz [...] soll die Schülerinnen und Schüler befähigen, Alltags- und Unterrichtssituationen in altersgemäßer und dem Lernniveau entsprechender Form situationsadäquat zu bewältigen.
The importance of technical terminology and everyday language in both Biology and English is a crucial finding in this comparison. As mentioned above, language is an essential instrument for expressing opinions and clarifying problems in English as well as in Biology. I regard this connection on the topic of language usage between the two subjects as fundamental for CLIL in Biology. Reasons for this are stated in the curriculum for English (see "Natur und Technik"), which says that it is necessary to show pupils the connection between the English language and technical texts on an international basis. As the international language in natural sciences is English, Biology can be regarded as especially qualified for its use in CLIL.	

Didaktische Grundsätze: Bei der Erarbeitung aller Themen ist stets die Lebenswirklichkeit der Schülerinnen und Schüler zu berücksichtigen, sowohl bei der Auswahl der Inhalte und Methoden als auch durch Anwendung des Wissens auf den eigenen Bezugsrahmen.	Didaktische Grundsätze – Förderung authentischer Begegnungen: Direkte persönliche Begegnung (z.B. Einsatz von „native speakers“ [...]) sowie die Nutzung von audiovisuellen Medien [...] sind im Sinne möglichst großer Authentizität zu empfehlen.
The use of authentic materials (in English) and the relevance of topics, contents and methods for the lives of students (in Biology) reveal another big match between the two subjects, which actually forms the basis for CLIL. Learning a language can often be a very dry matter which can easily “lose touch” with reality, but if a language serves as the means of transporting the knowledge and information of another content subject then it is of more use. It is not difficult to facilitate direct contact with native speakers and the language as British and American films and documentaries can be found for Biology with too many problems.	
Didaktische Grundsätze: Fächerübergreifendes und projektorientiertes Arbeiten ist zu fördern.	Didaktische Grundsätze - Fächerübergreifende Aktivitäten: Das Erleben der Fremdsprache als authentisches Kommunikationsmittel in fächerübergreifenden Aktivitäten ist anzustreben.
English and Biology aim at interdisciplinary education, which is supposed to integrate two or more subjects. The curriculum explicitly states that English should be used as an authentic communicative device, and I believe that Biology would also fulfil this requirement completely.	
Didaktische Grundsätze: Die Schülerinnen und Schüler sind zu selbstständigem Arbeiten und zur Problemlösefähigkeit unter Anwendung [...] [von biologischen] Arbeitstechniken anzuregen[.]	Erwerb von Lernstrategien: Der Fremdsprachenunterricht hat darüber hinaus die Aufgabe, fachliche Grundlagen, Lernstrategien und Lerntechniken für den weiteren selbstständigen Spracherwerb, insbesondere im Hinblick auf lebensbegleitendes und autonomes Lernen, zu vermitteln und zu trainieren.
A clear goal of both subjects is to provide pupils with strategies to help them to study autonomously in both subjects. Furthermore, the learners should be introduced into the various types of learning techniques and working methods based on basic subject knowledge.	

<i>Kreativität und Gestaltung: Förderung der Kreativität durch Umgang mit Lebewesen und Naturobjekten, Einsatz von kreativitätsfördernden Methoden.</i>	<i>Kreativität und Gestaltung: Der Fremdspracheunterricht soll zu kreativen Aktivitäten wie z.B. zu Rollenspielen, fremdsprachlichen Theateraufführungen und kreativem Schreiben, anregen.</i>
Both subjects claim to employ activities that are supposed to encourage creativity. Creative writing or role plays, for example as mentioned for English, can easily be integrated into Biology by giving students the chance to combine these creative actions with biological knowledge (e.g. write about your pet, draw your pet). Animals or plants can be touched, and often evoke stronger emotions in pupils than merely reading about them. As follow-up tasks, creative activities could be employed to process this gain in experience, for example.	

As I have shown through the juxtaposition above, Biology and English exhibit many crossover characteristics which further demonstrate and justify their suitability for CLIL.

As previously mentioned, no agreed common methodology so far exists for implementing CLIL (see Chapter 2.1.4), but perhaps *Table 1* above could be seen as a first step towards a common didactical and methodological approach for CLIL in Biology.

In the following chapters I will introduce textbooks from the series *Cross-Curriculum Creativity – Biology (Books 1-4)* (Fierling & Machotka 2008), which are the subjects of the content and textbook analysis I have undertaken. Furthermore, the analysis will then be followed by an evaluation of one unit from each book, leading to a better understanding of the books for anybody who intends to use the materials in practice.

3. Textbook Analysis and Evaluation Criteria – Theoretical Background

At the beginning of this chapter, I would like to point out that my textbook scrutiny will consist of two parts, an analysis and an evaluation. In general, the main difference between materials analysis and evaluation should be indicated first. The first part, the analysis of the teaching materials, will aim to present a largely objective and fact-based overview of *Cross-Curriculum Creativity – Biology (Books 1-4)* (cf. McGrath 2002: 22). The second part, the evaluation, will provide a deeper and more critical examination of the books, because a set of criteria is devised to measure the importance and value of materials for teaching (cf. Tomlinson 2007: 15). Compared to the analysis, materials evaluation is argued to be much more subjective, because evaluators judge the quality of the teaching materials according to their understanding of which requirements materials need to fulfil for teaching (cf. Tomlinson 2007: 16). Furthermore, it intends to assess the influence materials have on learners and teachers (cf. Tomlinson 2007: 16). For the analysis as well as for the evaluation, I had to choose suitable methodology for an extensive investigation including appropriate assessment criteria in order to provide a good overview of the Biology teaching materials. The next paragraphs will introduce the investigation method used, followed by a detailed explanation of the criteria in the forthcoming chapters.

When conducting an analysis of teaching materials, the “checklist method” is widely used (McGrath 2002: 26). As mentioned above, this method tries to present facts about the materials in an objective way, and one big advantage of this “systematic”, “effective”, “convenient” and “explicit” method is its uncomplicated format, which is based on ticking off items if they are identified in the materials (McGrath 2002: 26-27).

Generally, there are three types of evaluations which are commonly used in teaching materials evaluation: “pre-use”, “whilst-use” and “post-use” evaluation (Tomlinson 2007: 23-26). In my investigation, I will employ pre-use evaluation, because it enables the evaluator to assess a textbook without actually using it in practice. In this respect, it is possible to assess various aspects and features of the book while bearing hypothetical learners, teachers and institutions in mind. Therefore, the evaluator has to create an artificial teaching situation which will be

highly influenced by his own experience. Consequently, this also implies that if different evaluators approached one evaluation, it is very likely that they change some evaluation parameters in favour of others which would be more important and essential for them.

The pre-use evaluation is limited in scope, since it can only estimate “the potential value of the materials” (Tomlinson 2007: 23). It cannot give a full picture of the teaching materials being tested, because it does not consider any practical experience which could be gained from the actual implementation of the materials in a class. However, this type of evaluation can help teachers to find the appropriate textbook(s) for their class, for example (by simply looking at the table of contents, checking if the language level is appropriate for the learners or if the materials employ teachers’ favoured teaching methods). When choosing from a variety of materials for a course, pre-use evaluation is necessary to assist in helping teachers to make a decision about which book to use.

The above-mentioned checklist technique is not only used for the rather objective materials analysis, but also for materials evaluation. As mentioned earlier in this chapter, the evaluation intends to provide the evaluator with a deeper and more subjective understanding of the materials. McGrath (2002: 27), however, states that there is one disadvantage with the checklist approach, especially for the evaluation. The designer’s beliefs will always be reflected in the categories and criteria. The choice of the checklist items will strongly depend on the evaluators, because they will select which criteria are important and necessary for them, and which and how many units will be analysed. Additionally, evaluators can influence the representation of the whole materials by the selected units from the teaching materials. This is a serious aspect to consider, because it is possible that only one unit could influence the results of the entire evaluation – positively or negatively. It is up to the evaluators to rule out any possibilities of incorrect results. In order to avoid this problem, analyses and evaluations are generally carried out by groups of examiners who are tested in advance to deliver similar and therefore more representative judgements of the teaching materials. As a result, this method of conducting materials analysis minimizes subjectivity. Furthermore, subjectivity can also be reduced by the development of evaluation criteria:

Making an evaluation criterion-referenced can reduce (but not remove) subjectivity and can certainly help to make an evaluation more principled, rigorous, systematic and

reliable. This is especially true if more than two evaluators conduct the evaluation independently and then average their conclusions.
(Tomlinson 2007: 23)

However, it has to be said that subjectivity can never be ruled out completely (cf. Tomlinson 2007: 23).

3.1 Criteria for the Analysis of CLIL Textbooks for Biology

In this chapter, I will present the criteria I have developed and adapted from other linguists for the detailed analysis of the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)*. In order to provide an overview of the materials, the checklist method will be used as described by McGrath (2002: 26). This checklist ought to serve two particular purposes:

- a) It should provide the evaluator with a sufficiently objective overview on the books by stating all the factual information which can be obtained from the materials themselves (e.g. intended level of education or price).
- b) The criteria used for the analysis might further influence the subsequent evaluation and all the conclusions finally drawn from its results. The results will furthermore have an impact on the practical usage of the books.

The analysis aims at describing the materials objectively, and compared to the rather subjective evaluation which follows will not judge or rate the books (cf. McGrath 2002: 22, Tomlinson 2007: 16-23). According to McGrath (2002: 18; 22), any actual analysis should consist of two parts: a “context analysis” and a “textbook analysis”. The following sections will explain both analyses in more detail.

3.1.1 Context analysis

The context analysis is concerned with the surroundings within which materials are embedded. As mentioned earlier, this covers external factors such as the intended learners, the teacher and the educational institution in which the course materials are intended to be used (cf. McGrath 2002: 18-21). Since I will carry out a pre-use

analysis and an evaluation without the actual implementation of the materials, I need to define an average hypothetical target learner group and an educational institution. Hypothetical teachers will be disregarded here, because the materials will not be implemented.

3.1.1.1 Learner factors

The first and most important factor which influences the choice of teaching materials for a school subject is the target learner group. McGrath (2002) presents the following list of learner factors which aims at informing teachers and evaluators about the intended learner group. Mainly, these aspects refer to the learners themselves, and factors such as their “specific wants”, “preferred learning styles”, “reasons for studying the target language”); however, they also include factors concerning their environment, for example the pupils’ “socio-cultural background” (McGrath 2002: 19):

1. age range
 2. proficiency level in the target language (and homogeneity within the learner group)
 3. first language (all the same?)
 4. academic and educational level
 5. socio-cultural background
 6. occupation (if relevant)
 7. reasons for studying the target language (if applicable)
 8. attitudes to learning (including attitudes to the language, its speakers, the teacher, the institution)
 9. previous language-learning experience (of the target language and any other languages)
 10. language-learning aptitude
 11. general expectations (of the course/textbook/teacher/ own role)
 12. specific wants
 13. preferred learning styles
 14. sex distribution (single sex? If mixed, what proportion of M/F)
 15. interests (insofar as these are generalisable)
- (McGrath 2002: 19)

All of these learner factors will strongly affect teachers’ choices of teaching materials, because they will need to choose suitable materials for their specific target learner group.

Many of these factors are relevant for language teaching classes (e.g. 2., 7., 9., 10.). However, there are also other elements which are relevant for content

subjects, such as Biology (e.g. 1., 4., 5., 8, 11., 12., 13., 14., 15.). As referred to several times already, one of the major goals in CLIL is to find a balance between teaching the subject and teaching the language. In order to meet this requirement, I will employ an adapted version of McGrath's learner factors' list for my analysis. The following factors will be used in my learner factors' analysis:

- Age range
- Proficiency level in English
- Proficiency level in Biology
- First language (of most learners in the class)
- Socio-cultural background
- Experience in studying Biology in English (CLIL)
- Previous language learning experience (of the target language and/or any other languages)
- Interest in Biology

These factors and their reasoning will be presented in the next few paragraphs:

Age range

It is important to know the age of the target learners, because the teaching materials ought to be devised accordingly. One reason for this is the difference in language learning and cognitive abilities for children of different ages. Robinson (2001) wrote an interesting article on this. He describes learner differences, cognitive abilities and other variables which influence learners when it comes to second language acquisition. Besides aptitude and awareness, he claims that age will greatly influence the learning progress of pupils. Therefore, these aspects should be considered when making the choice of the language for and general design of teaching materials (cf. Robinson 2001: 369).

Proficiency level in English

Effective teaching of students greatly depends on the level of proficiency in the target language of instruction. Therefore, information about their proficiency level is assumed to help teachers to judge if materials are suitable for pupils. For my analysis, it is necessary to know the learners' proficiency level in English, because

this is the language of instruction in *Cross-Curriculum Creativity – Biology (Books 1-4)*.

In this respect, information on the Austrian foreign language education policy in primary schools (Volksschule, VS) needs to be given. The following quote from the website of the Austrian education ministry BMUKK (Bundesministerium für Unterricht, Kunst und Kultur) gives information on the obligatory introduction of a foreign language into primary school education since 2003/2004.

Seit Beginn des Schuljahres **1998/99** ist im Grundschnullehrplan **ab der 1. Schulstufe eine lebende Fremdsprache** (Englisch, Französisch, Italienisch, Kroatisch, Slowakisch, Slowenisch, Tschechisch oder Ungarisch) verbindlich vorgesehen; jedoch ohne Benotung. [...] Ab dem Schuljahr **2003/2004 ist der Fremdsprachenunterricht an allen Volksschulen ab der 1. Schulstufe verpflichtend**. [...] Die verbindliche Übung "Lebende Fremdsprache" wird in der Grundstufe I integrativ geführt, ohne dass es zu einer Ausweitung des Stundenausmaßes kommt. Pro Schulstufe sind im Rahmen der grundschulgemäßen Unterrichtsplanung 32 Jahresstunden aus dem Zeitbudget der einzelnen Pflichtgegenstände, mit Ausnahme von "Deutsch, Lesen, Schreiben" dafür zu verwenden. [...] Der Unterricht kann phasenweise fächerübergreifend in der lebenden Fremdsprache erteilt [...] werden.
(BMUKK 2008a)

Most primary schools choose to teach English. In 1998/1999, 73.85 % of primary schools already taught English, and only 1 % taught French (De Cillia 2008: 2. Unterrichtspraxis). If pupils have been instructed in English during primary school, this might influence the teaching situation in the subsequent first form of secondary modern school (Hauptschule, HS) or grammar school (Allgemein bildende höhere Schule, AHS). However, even if English was taught, the level of proficiency is likely to vary not only between children, but the level may also depend on the primary school attended. No two teachers have the same method of instruction, and the language level of proficiency might therefore be influenced by this. Furthermore, some pupils might have been more exposed to English due to their family background or personal interests (e.g. English parent(s), music, TV, holidays, the internet). As a result, I conclude that even if English had not been introduced in some Austrian primary schools, most first graders will probably already have experienced English in some way before starting secondary education level.

Education level in Biology

In the national curriculum of Austrian primary schools, a variety of subjects have to be taught. One of them is called “Sachunterricht” [general science]. It includes the areas “Gemeinschaft“ [community], “Natur” [nature], “Raum” [region], “Zeit” [time/history], “Wirtschaft” [economy] and “Technik” [technology] (BMUKK 2006: 1). Among these, the field of “Natur“ deals with biological topics. Its aim is to bring pupils closer to nature and to teach them responsibility for their own body. In addition, students are expected to learn that humans are a part of nature and it is essential for their existence. Furthermore, basic biological knowledge is required to be introduced via subject-specific working methods:

Die Arbeit im Erfahrungs- und Lernbereich Natur geht von der Begegnung der Schülerinnen und Schüler mit der Natur und den Erfahrungen mit dem eigenen Körper aus. Anzustreben ist ein Verständnis für die Natur als der Lebensgrundlage des Menschen und für den Menschen selbst als einen Teil der Natur. [...] Die Unterrichtsarbeit muss über das Gewinnen von Grundkenntnissen zum Erlernen fachspezifischer Arbeitsweisen und schließlich zu verantwortungsbewusstem Verhalten gegenüber der Natur und dem eigenen Körper führen.
(BMUKK 2006: 1)

In order to secure a good start into the subject of Biology at the secondary level, it is useful for teachers to be informed about learners’ knowledge in natural sciences. An obvious reason for this is that already-existing knowledge can be exploited to bring about a further knowledge build-up.

First language (of most learners in the class)

Information about the first language of most pupils can be very useful for teachers and evaluators. As mentioned in Chapter 2.1.3.5, CLIL classes should also employ the L1 when appropriate. Examples of the suitable use of the mother tongue are the comparison of words that have the same form and meaning in both L1 and L2, or clarifications of language difficulties. If there are, however, several different L1s in one class, this could lead to serious language difficulties. This is a real and pressing situation, which teachers in Austria are facing today. Knowledge about this might have an impact on which demands teachers make of the materials.

Socio-cultural background

The cultural background of the pupils might potentially lead to problems in some areas of Biology. In this respect, I would like to introduce Jürgen Micksch, who works for the organisation “Interkultureller Rat”. The aims of this organisation are equality, and the peaceful cohabitation of different communities, religions and cultures in Germany. In an interview with WDR (Westdeutscher Rundfunk), Micksch talks about several widely-known problems that Muslim families sometimes have with sexual education in Biology classes. Some very traditional Muslim parents, for example, do not want their children to see pictures of naked boys or girls, but drawings would be acceptable (cf. Tenta 2006). Furthermore, excursions or field trips of several days’ duration are also often seen as problematic due to the fact that both boys and girls take part. Without doubt, there will be other potential difficulties for children from other socio-cultural backgrounds. Without going into too much detail, I want to indicate, however, that awareness of such problems could be used to overcome them before they even begin to evolve.

Experience in studying Biology in English (CLIL)

Some children attend bilingual primary schools, and therefore they might have experienced “Sachunterricht” [general science] in English (see the above-mentioned criterion “Education level in Biology” for further details on “Sachunterricht”). Furthermore, if the primary school introduced English as the pupils’ first L2, they may have already come across terms related to the subject of Biology, such as names of animals, plants or body parts. Again, this information can be used to further build new biological knowledge.

Previous language learning experience (of the target language and/or any other languages)

Every pupil finishing primary school will have language-learning experience (cf. BMUKK 2008a; cf. the above-mentioned criterion “Proficiency level in English”). On the whole, English is introduced at the primary level of education (cf. De Cillia 2008: 2 “Unterrichtspraxis”). In addition to this, children whose mother tongue is not German and who attended an Austrian primary school will also have experience of learning German. Either way, pupils will quite likely know some general concepts and methods of language learning such as the repetition of new language items in

different contexts or the content filtering in listening comprehensions. I believe that this knowledge might help pupils to study Biology in English, even if the CLIL classroom does not explicitly teach the foreign language.

Interest in Biology

If learners show particular interest in Biology, I believe that this could positively influence their motivation to study the subject. If learners have a positive attitude towards Biology, it may not worry them so much that it is taught in English.

In general, there are several topics in the natural sciences in which learners aged between ten and twelve seem to be particularly interested. Baram-Tsabari et al. (2006) did a survey on those interests by collecting data which derived from questions submitted online by children from English-speaking countries. This survey demonstrated that pupils tend to show more interest in the human body, which might be explained by being due to the approach of puberty at this age. Moreover, it was demonstrated that interest in zoology seems to decrease at the same time (cf. Baram-Tsabari et al. 2006: 1059). I assume that the interests of children from English-speaking countries are similar to those of any other child, and therefore are also representative of pupils in Austrian schools. These interests should influence both the development of materials and also teachers themselves. Furthermore, pupils' interests ought to be borne in mind when developing the curriculum for Biology.

3.1.1.2 Learner needs

McGrath (2002: 19) further includes “learner needs” in his analysis checklist for language teaching materials:

1. [variety] (e.g. British versus American English)
2. language-skill emphasis
3. contexts and situations of use, which may require different levels of formality or different registers
4. subskills
5. notions
6. functions
7. language-system (grammar, vocabulary, phonology) emphasis
8. language forms (e.g. structures, vocabulary items, features of stress of intonation)
9. whether language systems will be used productively, receptively or both
10. attention given to mechanics (handwriting, spelling, punctuation)

Since learners of foreign languages need to reach a certain level of proficiency as defined by the Common European Framework of Reference [CEFR] (2001), a language-learning class has to fulfil obligatory linguistic and language-related requirements, such as the teaching of accurate grammatical structures. The aim of these requirements is to guarantee that all Austrian pupils have been taught up to a certain level upon completing a particular grade.

For my CLIL textbook evaluation, I do not regard McGrath's list as essential, because it only relates to language-learning classes. The main focus of CLIL, and CLIL teaching materials such as *Cross-Cultural Creativity – Biology (Books 1-4)*, however, should be on the study of Biology (cf. Chapter 2.1). Therefore, I will try to balance the learner factors of the analysis for both English and Biology with the curricular crossovers as found in *Table 1* (cf. Chapter 2.2.3).

3.1.1.3 Teacher factors

A list of teacher factors is stated in McGrath (2002: 20). As earlier mentioned, I will not actually implement the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* in a CLIL Biology class. As a result, I cannot give reliable information on this factor for the context analysis. It would be too hypothetical to go into any detail regarding the teacher's language competencies in English or scientific knowledge in Biology. Therefore, this point will not be considered in the analysis.

3.1.1.4 Institution and specific programme

The last section in the context analysis deals with the educational institution in which the subject is intended to be taught. It should give an insight into the operation of education system generally, and the teaching situation of an average school. McGrath (2002: 21) devised the following list for this particular section:

1. level within the educational system (e.g. kindergarten, primary, secondary, tertiary)
2. public sector (state) versus private
3. role of the target language (e.g. English-medium versus English as curriculum subject)
4. time available for the study of the target language (per week/per academic year)
5. timetable (whether the language is typically taught in single or double lessons or after lunch/at the end of the day)
6. class size

7. physical environment (e.g. classroom size, flexibility of seating, acoustics)
8. additional resources available (e.g. cassette recorder, video recorder, overhead projector, photocopier, computers)
9. aims of the programme
10. syllabus
11. form of evaluation
12. decision-making mechanisms and freedom given to teachers

Once again, this list only accounts for language classes. Therefore, I will try to change the above-mentioned points into relevant factors for CLIL Biology in English. The following factors will be used for this part of the analysis:

- Education level within the system (e.g. kindergarten, primary level)
- Time available for the subject of English
- Time available for the subject of Biology and CLIL Biology
- Class size
- Additional resources available for teaching Biology
- Syllabus and aims of Biology in English (CLIL)
- Form of assessment in CLIL Biology

The following paragraphs will discuss the factors just-mentioned:

Education level within the system (e.g. kindergarten, primary level)

In general, teaching materials are chosen according to the education level, and education system of the country. Suitable teaching materials are devised for each grade in the system. As a result, this factor greatly influences the choice of appropriate materials for classes.

Time available for the subject of English

Overall, English language learning classes provide further practice for pupils who are instructed in CLIL. These additional classes might have an effect on how fast learners progress in the target language in both the English and CLIL Biology classes. Therefore, this extra language support is beneficial and can be seized upon for any kind of language difficulty which students might encounter in the CLIL Biology lessons.

Time available for the subject of Biology and CLIL Biology

I believe that pupils' learning success in a subject is heavily dependent on how much time there is available for the subject per week. Furthermore, this is also influenced by which time of the day it is taught (e.g. morning, afternoon, lunch time). In addition, the number of lessons that take place a day can be influential.

Biology and its contents offer many opportunities for projects on. Therefore, blocked lessons would be ideal for projects, because there is more time available to spend on experiments or tasks. From my own experience, however, I believe that too many double lessons in lower secondary grades are probably not so advisable. My reason for this is that younger learners might not yet have the ability to concentrate on one topic or subject for too long a period of time.

Depending on how the mornings are structured, it is possible that afternoon lessons become rather exhausting for both pupils and teachers (e.g. many language, Maths and Physical Education classes). The longer the day, the lower the concentration level might sink. In their paper, Leitner and Reinhold (2004) discussed current teacher complaints regarding students who have difficulties concentrating at school. The authors mention that in general, various types of concentration problems can be distinguished (cf. Leitner & Reinhold 2004: 124-125). At present, one disorder seems to be diagnosed rather frequently and it is called Attention-Deficit Hyperactivity Disorder (ADHD). Pupils affected by this condition or any other concentration or language disorder need special learning support. If teachers have to provide this type of support, it may well overwhelm them, because only a small amount of attention was paid to these areas during their pedagogical teacher education at university in Austria (e.g. cf. University of Vienna 2000 for more detail on the pedagogical curriculum teacher education).

Class size

In general, class size is a crucial factor when it comes to teaching any subject, and has always been heavily discussed by teachers. Smaller classes are seen as being better for teaching languages, for example, especially since they often involve intense teacher support for students. Obviously, teachers need much more time to help pupils with individual problems when there are 25 pupils in the class compared with 30. My own experience from working in language teaching only confirms that

it is more intense for teachers, but more worthwhile for students, when classes are smaller.

The official maximum class size in any Austrian school is 25 pupils, and must not fall below 20 in any lower secondary level class (cf. BMUKK 2008b: §21, §43). At present, and as happened during my time at school in the late 1990s, many schools split their classes into two groups in “Hauptfächer” [main subjects] like Maths, English or French, when there are more than 25 pupils in the class. This does not happen so frequently in “Nebenfächer” [minor subjects] such as Arts, Physical Education or Biology. In CLIL Biology, it might be an advantage for the language progress, however, to divide the class. Fewer pupils in a group would consequently mean that teachers have more time to help students with individual problems.

Additional resources available for teaching Biology

Additional resources (e.g. CD and DVD player, video recorder, computers) are essential in order to enable teachers to teach in accordance with modern teaching standards. Resources such as these offer teachers the opportunity to teach contents via a variety of media, and they are consequently able to address various learner types, such as aural, kinaesthetic or visual types (cf. Lightbown & Spada 1999: 58 for the learner types). In my opinion, each school should have the following standard equipment:

- CD player
- DVD player
- video recorder
- overhead projector
- wipe board or blackboard
- photocopier
- computers with internet connection
- printers
- laboratory equipment for Biology (microscopes, dissecting instruments, test tubes, etc.)

Syllabus and aims of Biology in English (CLIL)

Generally, teachers are required to teach their subjects according to the relevant national curriculum. Subjects taught in CLIL, however, represent an exception to this

rule because this teaching approach is still too new and therefore does not yet have a separate national curriculum. Additionally, there is almost no methodological and didactical support for the implementation of CLIL subjects (cf. Chapter 2.1.3).

Usually, German is the classroom language in Austrian schools, but the BMUKK (2008c: §16) states that schools can choose a foreign language as the language of instruction, if they have good reasons for it:

Schulbehörde erster Instanz auf Antrag des Schulleiters, bei Privatschulen auf Antrag des Schulerhalters, die Verwendung einer lebenden Fremdsprache als Unterrichtssprache (Arbeitssprache) anordnen, wenn dies wegen der Zahl von fremdsprachigen Personen, die sich in Österreich aufhalten, oder zur besseren Ausbildung in Fremdsprachen zweckmäßig erscheint und dadurch die allgemeine Zugänglichkeit der einzelnen Formen und Fachrichtungen der Schularten nicht beeinträchtigt wird. Diese Anordnung kann sich auch auf einzelne Klassen oder einzelne Unterrichtsgegenstände beziehen.

(BMUKK 2008c: §16 (3))

Form of assessment in CLIL Biology

Up to now, there are no special guidelines as to how CLIL classes should be assessed. This is probably a result of the lack of methodology and didactics (cf. Chapter 2.1.3). For CLIL Biology, I will therefore draw on the usual assessment of students' achievement in the subject of Biology. Basically, the half-term and final grades that students receive at school depend on various types of assessments of performance which are chosen by the teachers (cf. BMUKK 2008d: §2 (3)). The numerous forms of assessment are stated by the BMUKK (2008d: §3). One common way of assessing pupils' performance is a method called Educational Goals Achievement Monitoring. This assessment type basically looks at learners' classroom contributions, such as participation in discussions and exercises, and smaller written and oral knowledge checks, in order to confirm their understanding of the subject matter.

3.1.2 Textbook analysis

The next step after the context analysis is the textbook analysis. As stated in the introduction to this chapter, such an analysis ought to provide an objective overview of a course book. McGrath (2002: 23) provides a very useful table, based on Littlejohn (1998: 195-202), which presents three levels of textbook analysis:

Table 2 Textbook analysis at three levels

Source: McGrath (2002: 23; based on Littlejohn 1998: 195-202)

<i>Level</i>	<i>Focus of analysis</i>	<i>Examples of features to be considered</i>
1	‘what is there’	publication date; intended users; type of materials; classroom time required; intended context of use; physical aspects, such as durability, components, use of colour; the way the materials are divided up across components; how the student’s book is organised, and how learners and teachers are helped to find their way around
2	‘what is required of users’	tasks: what the learner has to do; whether their focus will be on form, meaning or both; what cognitive operations will be required; what form of classroom organisation will be involved (e.g. individual work, whole class); what medium will be involved; who will be the source of language or information
3	‘what is implied’	selection and sequencing of content (syllabus) and tasks; distribution of information across teacher and student components; reconsideration of information collected at levels 1 and 2

Level 1 describes all information and facts which can easily be obtained by simply looking at the materials, such as the date of publication or the costs. Level 2 briefly analyses what the materials demand from the students and teachers; for example, what tasks they have to perform, or how the classroom ought to be organised. Even if this level already provides a deeper understanding of the materials, it is still descriptive and not judgmental. For this part of the textbook analysis I have chosen one unit of each of the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)*:

- “Senses” (Book 1: *The Human Body* [HB], pp.41-45; see Appendix I 5a)
- “The Cat” (Book 2: *Mammals* [M], pp.18-22; see Appendix I 6a)
- “Plants and Flowers” (Book 3: *Plants* [P], pp.9-17; see Appendix I 7a)
- “Snakes” (Book 4: *Birds, Reptiles, Amphibians & Fish* [BRAAF], pp.51-55; see Appendix I 8a)

Finally, Level 3 intends to give more details on the topics the textbooks cover, and in which sequence the topics are dealt with. This is the first step which connects the analysis with the evaluation, because it already investigates particular parts of the materials, in the same way that the evaluation does (cf. McGrath 2002: 23-25). However, I will not include Level 3 in my analysis. This is because I do not believe it is necessary, due to the detailed examination of the textbooks which will be provided later by the evaluation. Nevertheless, “the selection and sequencing of content” (McGrath 2002: 23; based on Littlejohn 1998: 195-202), i.e. the tables of contents of all four textbooks of *Cross-Curriculum Creativity – Biology (Books 1-4)*, are included in Appendix (see Appendices I 1-4b).

For Level 1, McGrath (2002: 24) offers a very useful checklist (*Table 3*), since it divides the information into sections and leaves furthermore room for additional analysis points. My textbook analysis will be a combination of the most important aspects of *Table 2* and *Table 3*.

Table 3 Towards a level 1 materials analysis checklist

Source: McGrath (2002: 24)

Components/support for teacher What do the materials consist of in addition to the student's book? • teacher's book • tests (may also be in student's book, sometimes 'disguised' as 'Review') • workbook (may also be integrated with student's book) • cassettes (may be available as CD, packaged with student's book) • video • pictorial materials (e.g. flashcards, wallcharts) • CD-ROM • other
Date of publication When were the materials published? Are all the components available?
Cost What does the student's book cost? What do the other items cost?
Target learners What kinds of learners are the materials intended for? • age • level • interests
Target teaching context What kind of teaching situation is it intended for? • type of course (e.g. general English, exam-oriented) • total time available • lesson length • syllabus • self-study

Before listing the criteria for my textbook analysis, I would like to provide useful advice for teachers who have to choose a suitable course book from a large quantity of materials: some of the descriptors above might already lead to the exclusion of certain materials without the need to evaluate the books further. This form of analysis, used to “make an initial selection of [...] materials”, is also called “first-glance evaluation” (McGrath 2002: 29). In essence, evaluators decide upon an essential set of criteria by which to evaluate teaching materials. If one or more of these minimum criteria cannot be fulfilled, the materials should be dismissed.

3.1.2.1 Textbook analysis checklist

I have chosen the checklist criteria below for my textbook analysis in order to give an overview of the materials intended use and composition. Furthermore, all tasks of one unit of each of the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* will be analysed.

The first part of the textbook analysis presents general information on the materials, such as the intended target learner group, what the materials are composed of or how much they cost.

The first list (*List 1a*) provides evaluators and teachers with a quick overview of the materials' composition.

List 1a

1. General description of the materials

a)	In which target language are the materials written, and for which target group and first language (L1) are the materials intended?	
Target language		
Target group and L1		
b)	What do the materials consist of?	
<i>Materials</i>	<i>Yes/No</i>	<i>Commentary</i>
Student's book		
Teacher's book		
Workbook		
Knowledge checks/tests/quizzes		
CDs		
DVDs		
Pictorial materials (e.g. flashcards)		
Others:		

List 1b presents the date of publication and the costs of the teaching materials. This information is important, because some schools have a limited budget, and money might therefore be an excluding factor for some teaching materials. In addition, the materials need to be up to date. Frequently, course materials consist of more than one component (e.g. student's and teacher's book, CDs), and in this case, the availability to students of all components is crucial.

List 1b

c) Date of publication and purchase price	
Where were the materials published?	
When were the materials published?	
Are all the components available?	
What do the materials cost?	

The intended target learner group is a crucial aspect of decision-making for teachers. *List 1c* therefore provides them with information on the age group and education level as two important factors affecting the choice of course materials. In general, when a schoolbook claims to be suitable for a certain level of education, it usually is appropriate. The reason for this is that most teaching materials published for the Austrian education system need to be devised according to the curriculum of the school subject, and they have to be approved by the BMUKK (cf. Eurydice 2007: 3).

List 1c

d) What kinds of target learners are the materials intended for?	
Age	
Level of education	
Students' interest in Biology	

In my opinion, the success of teaching materials depends, among other things, upon the appeal they hold for their users – the learners. The layout and quality (e.g. durability, binding method) of the materials ought to be influenced by the target learners. A good example of how to attract attention is the use of coloured pictures, photographs and illustrations. The use of pictorial materials in picture books is widely known by researchers to have a positive influence on learners. Sasse (2005: 6) claims that these books have a substantial effect on children, because they help to inspire their imagination and enhance the development of their speech. Furthermore, images may more generally have a positive effect on children and their understanding of their environment and surroundings. Preissler (2008: 231) further adds that this effect seems to facilitate children's comprehension of the world. Therefore, I believe it is necessary to seize upon this positive effect when teaching pupils.

List 1d has been therefore devised for the textbook analysis in order to examine the just-mentioned aspects.

List 1d

e) How durable are the materials, and what kind of layout do they have?		
<i>Layout features</i>	<i>Yes/No</i>	<i>Commentary</i>
Pictures/images/illustrations		
Quality of graphical materials		
Colours or black and white		
Text		
Graphs and tables		
Different font types and sizes		
Durability (quality of paper, binding method)		

Finally, this first part of the textbook analysis addressed the intended teaching context which should be specified in the materials. *List 1e* has been devised to give information of this aspect. This list will provide basic information for the teacher on the situation in which the textbooks are intended to be used. This information is often stated on the first few pages of textbooks. A crucial factor for teachers when they have to decide on teaching materials for classes is the geographical region and cultural background in which the materials were developed. This aspect influences the choice of topics and the contents of the teaching materials, as well as the teaching approaches reflected in them. In addition, materials are ideally based on the national curriculum, because it is necessary for teachers to cover the whole curriculum for one form in a school year.

List 1e

f) What teaching situation/context are the materials intended for?	
<i>Context</i>	<i>Commentary</i>
Type of course supported by the materials	
Total time available	
Syllabus	
Country	

For the second step in the textbook analysis, some representative sections of the textbooks were chosen in order to provide a deeper understanding of the materials (cf. McGrath 2002: 26). A brief description of what the materials and their activities demand from the learners and teachers will therefore be provided by the last list of the textbook analysis (*List 2*). Information on classroom organisation and the skills involved in task performances are important information for teachers.

The tasks will be categorized according to the three general types of tasks distinguished in Prabhu (1987: 46-47 quoted in Ellis 2003: 213):

- **information gap tasks:** “a transfer of given information from one person[/form/place] to another [...] – generally calling for the encoding or decoding of information from or into language” (Prabhu 1987: 46)
- **opinion gap tasks:** “identifying and articulating a personal preference, feeling or attitude in response to a given situation” (Prabhu 1987: 47)
- **reasoning gap tasks:** “deriving some new information from given information through processes of inference, deduction, practical reasoning, or a perception of relationships or patterns” (Prabhu 1987: 46)

List 2

2. Information on the tasks

The tasks of the following units have been analysed: “The Senses” (Book 1: <i>The Human Body</i> [HB], pp.41-45; see Appendix I 5a) “The Cat” (Book 2: <i>Mammals</i> [M], pp.18-22; see Appendix I 6a) “Plants and Flowers” (Book 3: <i>Plants</i> [P], pp.9-17; see Appendix I 7a) “Snakes” (Book 4: <i>Birds, Reptiles, Amphibians & Fish</i> [BRAFI], pp.51-55; see Appendix I 8a)	
<i>Analysis Question</i>	<i>Commentary</i>
Which types of tasks have to be performed by the learner?	
What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair work)?	
Which media are involved in the tasks?	
Who/what will be the source of information?	
Do the tasks involve speaking, reading, listening, writing and interacting?	

Summing up, I believe that this analysis is a good approach of teaching materials examination which can be carried out by both analysers and teachers. As mentioned earlier in this chapter, this is a good method of inspecting materials for teachers, who have to choose one textbook from among many, and who want to avoid having to examine each book in detail in order to determine which is most appropriate for their requirements. I think that this kind of analysis provides an informative overview of the materials. It includes the most important factors which most teachers might want to know about textbooks. However, this analysis is not sufficient if a deeper understanding of tasks and activities is needed. In this case, an evaluation needs to be carried out which intends to judge the value of the materials (cf. the introduction of this chapter for details on the difference between analysis and evaluation). This point leads me directly to the main section of my thesis: the evaluation of the CLIL teaching materials *Cross-Curriculum Creativity – Biology (Books 1-4)*. Before actually conducting the evaluation, I had to elaborate upon a set of criteria for the textbooks. One unit from each book was selected for evaluation (cf. Chapter 3.1.2). Each unit was felt to be representative of the book from which it was taken. A copy of all the four units is enclosed in the Appendix (see Appendices I 5-8a). Furthermore, teachers who are interested in trying the analysis presently discussed also find a blank context and textbook analysis checklist in a table in Appendix IV 1.

3.2 Evaluation Criteria for CLIL Textbooks in Biology

At present, CLIL is one of the most innovative teaching approaches currently in use in Europe. Even if the European Union, education ministries and universities are trying to push this combination of language and subject-integrated teaching, they neglect some important factors, for example:

- bilingual teacher training and education;
- guidelines for didactics and methodology for each subject that is taught in an L2 or L3 (third language);
- materials development guidelines for CLIL teaching materials.

A textbook evaluation checklist should consist of a comprehensive set of criteria based on the basic linguistic, psychological, and pedagogical principles underlying modern methods of language learning.
(Skierso 1991: 440 quoted in McGrath 2002: 27)

So far, however, it seems as if linguists and researchers have not put enough effort into the elaboration of basic evaluation criteria for CLIL textbooks. Therefore, it was difficult for me to find articles and research papers which would provide at least some basic criteria which I could use for my textbook evaluation. I found only two academic papers which explicitly stated general criteria for bilingual teaching materials. The first one was written by Mathews (2005). He is a retired Biology teacher and taught the subject of Biology bilingually for 34 years. He also wrote one of the few existing bilingual textbooks for Biology, *Discover Biology 1* (2009; see Appendix III). The criteria he regards as being important in an evaluation of CLIL teaching materials have already been mentioned in Chapter 2.2.2. The principles elaborated by Mathews are very similar to those developed by Massler, Steiert & Storz (2007). This group based its criteria on the “EU-project *Pro-CLIL – Providing Guidelines for CLIL Implementation in Primary and Pre-primary Education*” (Massler, Steiert & Storz 2007: 2). This project was founded in 2006 and aimed to investigate guidelines for “Best Practice” in the implementation of CLIL in elementary and primary education in Germany, Spain, Turkey and Cypress (Massler, Steiert & Storz 2007: 2). Massler, Steiert & Storz (2007: 2) collected then currently-available CLIL teaching materials in English throughout Germany, and tried to establish evaluation criteria, as well as criteria for future materials development. Special attention was paid to subject content and specific methodology.

Until now, no criteria for materials development and evaluation for CLIL materials in primary or secondary education have been established. Therefore, Massler, Steiert and Storz invited student teachers from the University of Education in Weingarten, Germany to make one of the first contributions to the development of evaluation criteria for CLIL primary schools teaching materials. The students devised materials which were then tested in school classes, evaluated against criteria for CLIL, which they had developed, and the materials were subsequently adapted and improved according to the results of the evaluations (cf. Massler, Steiert & Storz 2007: 3).

In the following paragraphs, I will present the following textbook evaluation criteria as elaborated by Massler, Steiert & Storz (2007):

- Proportion of the target language to the mother tongue (German) in CLIL materials
- Focus on early foreign language acquisition methodology
- Focus on content-based methodology of the subject
- Diversity in facilitating learning
- Comprehensibility and clarity of information and instructions in combination with visual support
- Intercultural learning
- Accuracy
- Teacher support

After each criterion, I will then introduce the criteria that I have adapted from this work for my own evaluation of the textbook *Cross-Curriculum Creativity – Biology (Books 1-4)*. According to the checklist method (cf. McGrath 2002: 26; mentioned in Chapter 3), the criteria can first simply be answered with yes or no, and then there is an additional section for further comments where necessary.

Proportion of the target language to the mother tongue (German) in CLIL materials (cf. Massler, Steiert & Storz 2007: 4)

The overall aim of CLIL is the exposure of pupils to the target foreign language, and a reduction in the use of the mother tongue in teaching materials. Sometimes, it might be helpful for learners, especially at the elementary level, if the teacher clarifies the goals of tasks in the mother tongue. This is intended to lead to a better understanding of contents when then further instructions are given in the target language (cf. Massler, Steiert & Storz 2007: 4).

I have chosen the following evaluation criteria according to the above-mentioned aspect of CLIL materials:

- German or English: which language is used more often, in which situations is it used and is its usage justified?
- Is the choice of the target language appropriate for the level of proficiency (A1; cf. CEFR 2001) of the pupils? If possible, give

examples for each of the following skills: speaking, reading, listening, writing and interaction instructions!

Focus on early foreign language acquisition methodology (cf. Massler, Steiert & Storz 2007: 5)

Massler, Steiert & Storz (2007: 5) argue that the principles of early foreign language acquisition should be employed by CLIL materials to ensure continuous learning of the target language and subject content. This is supposed to be done with all levels of learners, and it should also help teachers to minimize the use of the mother tongue in CLIL classes. Unfortunately, Massler, Steiert & Storz (2007) do not explain these principles in much detail, and therefore I will not fully incorporate them in my evaluation. I will only draw on those principles which have been stated in their article; for example the necessity to provide learners with technical vocabulary, or useful phrases for topics so that tasks are easier to complete. Additionally, repetition and integration of new vocabulary and contents in different contexts ought to be aimed at, and the use of old and new language items needs to be balanced in tasks (cf. Massler, Steiert & Storz 2007: 5).

Despite early language acquisition methodology and its intentions not to encourage writing tasks too early for learners, teachers involved in Pro-CLIL favour short written exercises like the labelling of pictures or writing instructions (cf. Massler, Steiert & Storz 2007: 5). This is supported by Diehr and Rymarczyk (2008: 6), who argue that some young learners in particular already have a general interest in writing at this early stage of learning.

Generally speaking, CLIL materials ought to push task-based language learning with an additional focus on follow-up tasks. This methodology aims to encourage independent learning in CLIL, which is strongly recommended by the *Common European Framework of Reference for Languages* [CEFR] (2001). The CEFR (2001) lists a variety of tasks for language teaching and states that there are various different “creative”, “skills based” and “problem solving” tasks which can further serve a “real-life” or “pedagogic” purpose (CEFR 2001: 157). What this basically means is that real-life tasks should be of immediate use for learners as soon as they leave the classroom, and pedagogical tasks aim at preparing the learner for social interaction. The only difference between these two categories of tasks is that pedagogical tasks focus more on social aspects than real-life tasks.

For my evaluation, the criteria regarding the above-discussed requirements will be:

- Do the materials give language support (e.g. technical terms, useful phrases, glossary) which makes approaching a task easier for the pupils?

If they give language support: What type of support is given (e.g. technical vocabulary, phrases, German translations, etc.)?

Is the language support appropriate for the proficiency level of A1?

- Are language items, such as technical terms and phrases introduced in various ways in the unit (e.g. on their own, related to previous knowledge/personal experiences of the pupils)?
- Is there further repetition of new technical vocabulary or contents after their introduction in the unit?

If so, how is it done (e.g. put into different contexts, repeated in exercises)?

- How do pupils have to respond to productive tasks, orally or by writing, and are the demands appropriate considering the proficiency level of A1?
- Does each unit employ a variety of tasks?

What tasks are used (e.g. communicative, group or pair work, writing, etc.)?

Are the aims of the tasks in a unit clear?

Focus on content-based methodology of the subject (cf. Massler, Steiert & Storz 2007: 6)

CLIL materials ought to aim at the curriculum of the content subject (cf. Chapter 2.1.2) when it comes to the choice of topics and methodology. The curriculum of the target language should be secondary. The materials ought to be an aid for teachers to go deeper into the subject matter which is presented in the foreign language. Furthermore, the communicative competencies of learners should be developed in every CLIL subject by linking subject knowledge with everyday language which needs to be combined with scientific terminology. At the same time, multidisciplinary competencies need to be developed. This is a method where

teachers of a CLIL subject should try to integrate contents of other school subjects. Such subjects should basically show connections to the CLIL subject (e.g. Biology is connected to Physics and Chemistry).

The Austrian curricula for Biology are the same for both the first form of lower grammar school and secondary modern school (cf. BMUKK 2000a&b). In the first four years (1st to 4th grade) of secondary education, the overall topics “**Mensch und Gesundheit, Tiere und Pflanzen sowie Ökologie und Umwelt**” [the human being and health, animals and plants as well as ecology and environment] need to be covered in the subject of Biology (BMUKK 2000a&b: 1). These topics build the core content of each year in lower secondary classes. In each year, the topics are approached differently and the demands on the contents become more for the pupils. Within the “[d]idaktische Grundsätze” [didactical principles] (BMUKK 2000a&b: 2) for education in Biology the following basics for teaching are stated:

- a) The topics and methods of teaching should always be closely related to the everyday life of pupils, in order for them to relate to the contents directly.
- b) Frequently, lessons ought to focus on biological findings that matter to society. This focus should prepare pupils to develop the ability to act responsibly in social situations, and to participate in society.
- c) As pupils need to be educated to develop the ability to solve problems and to work autonomously, the following methods should be employed in Biology:
 - o Observation – comparison – grouping
 - o Working with appropriate aids (e.g. microscopes, magnifying glass, computers with internet connection, scientific literature)
 - o Searching for, processing and displaying information
 - o Identifying and solving problems
 - o Executing simple experiments and measurement processes
- d) Enhancing multidisciplinary and project-oriented work.
- e) Bringing pupils into contact with nature (e.g. excursions, field trips, sympathetic interaction with animals and plants).
- f) Enhancing social, personal and emotional competences:
 - o Group work
 - o Social learning

- o Open learning

According to the above-mentioned arguments, I have developed the following criteria for my textbook evaluation:

- Are the didactic principles of teaching Biology in the foreground of the materials?

If yes, select from the following principles:

- a) The topics and methods of teaching are always closely related to the everyday life of pupils, in order for them to relate to the contents directly:
- b) Frequently, lessons focus on biological findings that matter to society. This focus prepares pupils to develop the ability to act responsibly in social situations, and to participate in society:
- c) As pupils ought to be educated to develop the ability to solve problems and to work autonomously, the following methods are employed in Biology:
 - o Observation – comparison – grouping
 - o Working with appropriate aids (e.g. microscopes, magnifying glass, computers with internet connection, scientific literature)
 - o Searching for, processing and displaying information
 - o Identifying and solving problems
 - o Executing simple experiments and measurement processes
- d) Enhancing multidisciplinary and project-oriented work:
- e) Bringing pupils into contact with nature (e.g. excursions, field trips, sympathetic interaction with animals and plants):
- f) Enhancing social, personal and emotional competences:
 - o Group work
 - o Social learning
 - o Open learning

Diversity in facilitating learning (cf. Massler, Steiert & Storz 2007: 7)

Massler, Steiert & Storz (2007: 7) claim that the employment of a variety of teaching methods and tasks is one of the most important criteria for CLIL teaching materials. They argue that this diversity in instruction is intended to facilitate learning by the students, because this style of teaching addresses various different learner types and their individual needs for learning. Furthermore, materials ought to be flexible, which means that teachers should be able to easily adapt original tasks and activities to suit their learners' interests and wishes. In this respect, textbook tasks ideally ought to integrate a variety of aids, such as visuals, text and audio materials, in order to fulfil the demands of CLIL teaching materials (cf. Massler, Steiert & Storz 2007: 7). Massler, Steiert & Storz (2007: 7) further argue that well-designed materials need to focus on encouraging the communicative competencies of pupils, for example by providing activities in which learners can practise subject-related discussions in the target language.

Considering the information above, the subsequent criteria have been formulated:

- Are tasks designed to integrate more than one aid (e.g. visuals, text or audio materials)?
- Do the tasks enhance pupils' interactive and communicative competencies which should help them, for example, to lead subject-related discussions in English?

Comprehensibility and clarity of information and instructions in combination with visual support (cf. Massler, Steiert & Storz 2007: 7)

In order to overcome certain language difficulties, visuals can often be employed within teaching materials to clarify and facilitate task instructions or subject matter for the learners. Therefore, the use of visuals such as graphs, pictures or schematic drawings can be a good alternative or an addition to written texts of any kind. The reason for this might be that visuals are often understood without language support, and they are therefore self-explanatory (cf. Massler, Steiert & Storz 2007: 7). I believe that both pupils and teachers are generally attracted to visuals and find them good to work with. In addition, the use of authentic materials in class, such as photographs or illustrations, is desirable because students are able to establish connections between the subject content and its actual use in real life (cf. Massler,

Steiert & Storz 2007: 7-8). This ought to have a positive and motivating effect on the students' learning progress in the subject.

In order to evaluate CLIL teaching materials against the justifications for visual support just mentioned, the following criteria have been designed:

- Is any visual support (e.g. pictures, drawings, graphs, photos) used in the texts, tasks or instructions?

If yes, which visuals are employed? Are they used appropriately and what purpose do they serve?

- Are the visuals used related to the pupils' everyday life?
- Is the visual support appealing to 10 to 12 year-old pupils (e.g. considering the layout, or how easy the information is to process)?
- Is visual support missing from the CLIL teaching materials?

Intercultural learning (cf. Massler, Steiert & Storz 2007: 8)

Cultural awareness and intercultural learning should be focused upon and fostered in CLIL classes whenever a topic is suitable. Socio-cultural differences and similarities are always good initial points for communicative tasks in teaching (cf. Massler, Steiert & Storz 2007: 8). Furthermore, Mathews (2005: 2) adds that the parallel use of materials in English and German might provide a basis for intercultural learning, because comparisons between the presentations of contents in both languages could be further discussed. For more information on the importance of culture, cross-cultural learning and communication in CLIL, see Chapter 2.1.4.3.

For this particular aspect of CLIL, the following criterion for the materials evaluation has been designed:

- Is intercultural learning encouraged by the topics?

If yes, in which topics and how is it done?

In addition to the above-mentioned CLIL evaluation criteria, as elaborated by Massler, Steiert & Storz (2007), I have added further requirements which I believe that CLIL materials also need to fulfil.

Accuracy

- Is the content of the materials factually correct?
- Is the subject matter scientifically formulated?
- Are there any language mistakes in the materials?

This criterion might appear to be a minor aspect in the evaluation, but I believe that it should not be neglected. In general, and even more so in CLIL, teaching materials should ideally be accurate in order that students are able to learn the correct subject contents and language structures. However, it is always possible that materials can include all kinds of mistakes, and there are various reasons why mistakes can occur. Mistakes can occur due to insufficient editing, and such mistakes could be words which miss letters, or repetitions of words in series. There are other errors, however, which are more serious, such as the use of the wrong technical and semi-technical term when describing and explaining biological processes. Summing up, good teaching materials should include as few mistakes as possible.

Teacher support

Massler, Steiert & Storz (2007: 8-9) suggest in their paper that CLIL teaching materials need to assist teachers with the planning and implementation of this innovative approach. In order to fulfil this necessity, teaching materials need to include detailed background information on the subject contents. Since CLIL is a content and language-integrated teaching approach, teachers will need further support, such as subject-related didactics, methodological principles and, moreover, information on the basic principles of foreign language learning.

The following criteria are concerned with the evaluation of teacher support materials:

- Do the materials include a teacher's book?
If not, would it be helpful to have one?
- Do the materials include any additional language help for teachers?
- Is there any help for teachers regarding the content, didactics or methodological principles according to which the subjects of Biology and the L2 English need to be taught?

In Appendix IV 2, a blank evaluation checklist for my particular CLIL Biology textbooks is enclosed. CLIL teachers who are interested in evaluating CLIL teaching materials which they currently use can adapt this list of criteria for their own materials.

4. CLIL Teaching Materials Analysis

The following results, from the context and textbook analysis, provide teachers with an overview based on all the information which can be retrieved from the teaching materials *Cross-Curriculum Creativity – Biology (Books 1-4)*. This overview should assist teachers in deciding on whether or not to use these textbooks in CLIL Biology classes. The blank context and textbook analysis checklist tables are attached in Appendix IV 1 for teachers who want to use and adapt the criteria for their materials analysis.

The context analysis (cf. Chapter 4.1) will provide information on the target learner group with which, and educational institution in which the textbooks are intended to be used. The textbook analysis (cf. Chapter 4.2) then gives teachers information on the design of the materials, and it presents an overview of the books (e.g. layout, costs). In addition, one unit from each textbook was analysed in more detail so as to provide a better understanding of the book and its activities. In order to facilitate the analysis, and the subsequent evaluation, I have referred to the textbooks throughout in an abbreviated form:

- o Book 1: *The Human Body* [HB]
- o Book 2: *Mammals* [M]
- o Book 3: *Plants* [P]
- o Book 4: *Birds, Reptiles, Amphibians & Fish* [BRAAF]

4.1 Context Analysis

The context analysis which I conducted before the textbook analysis (*Table 4*) supplies teachers with more information on the context in which the CLIL Biology textbooks are intended to be used. The target learner group and the educational institution of the books might be the most influential factors for teachers in this part of the analysis. Since I did not actually use the materials for teaching CLIL Biology, I have chosen hypothetical aspects. I devised an average teaching situation for this analysis, and this situation was also used in the later evaluation.

Table 4 Context analysis

Context Analysis		
<u>Learner factors</u>		
	<i>Aspects</i>	<i>Commentary</i>
1.	Age range	Students who attend the first form of secondary level in Austria are ten to twelve years old.
2.	Proficiency level in English	In the first form, the students' language proficiency level in English is likely to range from complete beginners to A1/A2 level learners (cf. CEFR 2001 for more details of A1/A2). Most learners learned English at primary school. As mentioned earlier in Chapter 3.1.1.1, De Cillia (2008) stated that English was taught in most primary schools in 1998/1999 (73.85% of primary schools).
3.	Education level in Biology	Before entering the first form of secondary education, pupils are taught the following aspects of Biology and nature in the subject of "Sachunterricht" [general science] (cf. BMUKK 2006: 1): • Learners need to develop a basic understanding of nature. • Learners should realize that all human beings are a part of nature. • Learners are should experience their own bodies, which ought to lead to a responsible attitude towards their bodies, and consequently towards nature.
4.	First language (of most learners in the class)	Mainly German is the mother tongue of pupils in Austria. However, Turkish, Croatian or Slovenian are also common L1s in Austrian schools, because 15% of children do not have German as their mother tongue (cf. BMUKK 2008e).
5.	Socio-cultural background	The students mainly come from a western or eastern European background. The average Austrian classroom is therefore likely to comprise a number of religions, such as Roman Catholicism or Islam. On average, all social levels will be present in a class.
6.	Experience in studying Biology in English (CLIL)	Most pupils will not have experience in learning the subject of Biology in English, due to CLIL being a very recent teaching approach. Biology in particular is still a very new subject in CLIL. In general, Biology as a subject on its own is only introduced in the secondary level of Austrian education. The reason for this is that in primary schools, biological

		topics are part of the subject of “Sachunterricht” [general science] (cf. Chapter 3.1.1.1). Therefore, I believe that CLIL Biology is rarely taught before the secondary level, and pupils will consequently have no experience in Biology being taught in English.
7.	Previous language learning experience (of the target language and/or any other languages)	Austrian pupils will have experienced foreign language education at primary school. They will have learned an L2 for 32 teaching units per year, equalling 128 units within the four years of elementary education. Usually, one teaching unit is 50 minutes in an Austrian school (cf. Infoplattform Wissenswertes 2009). At present, the following languages can be used as the language of instruction in Austrian schools (cf. BMUKK 2008a): • English • French • Italian • Croatian • Slovakian • Slovenian • Czech • Hungarian Most Austrian primary schools introduce English as the first L2 (cf. De Cillia 2008).
8.	Interest in Biology	In their survey, Baram-Tsabari et al. (2006: 1059) revealed that ten to twelve year old pupils from English-speaking countries seem to shift their interests in Biology from zoology to the human body during puberty. I believe that Austrian pupils of the same age show the same interests in Biology as pupils from English-speaking countries.
<u>Institution and specific programme</u>		
<i>Analysis criteria</i>		<i>Commentary</i>
1.	Level within the education System (e.g. kindergarten, primary level)	In Austria, students aged ten to twelve attend the first form of secondary modern school (Hauptschule, HS) or grammar school (Allgemein bildende höhere Schule, AHS) This is the first level of secondary education, which is compulsory for every student.
2.	Time available for the subject of English	On average, there are four units per week available for teaching English in the first form of secondary education (cf. ÖPU-NÖ 2009). This means that during one school year, which has about 40 to 42 weeks, 160 to 168 units of English are taught.

3.	Time available for the subject of Biology and CLIL-Biology	For teaching Biology, there are two units available per week, which result in 80 to 84 units per school year, because one year has about 40 to 42 weeks (cf. ÖPU-NÖ 2009).
4.	Class size	In Austrian lower secondary schools such as grammar or secondary modern schools, the maximum number of pupils permitted in a class is 25 (cf. BMUKK 2008b: §21 and §43).
6.	Additional resources available for teaching Biology	In my opinion, every schools has to have the following resources nowadays: • CD and DVD player, • video recorder, • overhead projector, • blackboard or whiteboard, • laboratory equipment (e.g. microscopes, magnifying glasses, petri dishes, dissecting instruments), • photocopier • computers with internet connection.
7.	Syllabus and aims of Biology in English (CLIL)	So far, no syllabus which has been specifically designed for CLIL Biology is in place. Therefore, the national curriculum for Biology for the first form of secondary schools is used in bilingually-taught Biology (cf. BMUKK 2000a&b).
8.	Form of assessment in CLIL Biology	As mentioned earlier in Chapter 7, there are no guidelines which state how to implement CLIL Biology or assess pupils' learning progress in the subject. I would suggest that Educational Goals Achievement Monitoring (cf. Chapter 3.1.1.4) is used to ensure that pupils have understood the subject matter. This form of assessment looks at pupils' classroom contributions such as participation in discussions or exercises, and it also takes into account smaller written and oral knowledge checks.

4.2 Textbook Analysis

Table 5 lists the textbook analysis which I conducted before the textbook evaluation. The first part of the analysis lists the general composition of the materials and describes them briefly. After that, the second part gives information on the tasks from each unit analysed.

I had to add all the task numbers to the tasks in the units, because they were not labelled in the books. The reason for the labelling of the tasks was that it facilitated the analysis whenever I had to refer to any specific activities. All units with their numbered tasks are attached in the Appendix (see Appendices I 5-8a).

In order to understand the format of *Table 5*, it has to be explained that all the criteria which the materials fulfil are ticked off by stating “Yes” in the checklist. If they are not fulfilled, the criteria are ticked off with “No”. The column for “Yes/No” is directly next to the criteria. Furthermore, there is a comment section for each criterion where more detailed information on this aspect was needed.

Table 5 Textbook analysis

Textbook Analysis		
<u>1. General description of the materials</u>		
a)	In which target language are the materials written, and for which target group and first language (L1) are the materials intended?	
Target language	The target language is English.	
Target group and L1	The materials are aimed at Austrian pupils whose L1 is German.	
b)	What do the materials consist of?	
<i>Materials</i>	<i>Yes/No</i>	<i>Commentary</i>
Student's book	Yes	The material consists of four books: 1) Book 1: <i>The Human Body</i> [HB] 2) Book 2: <i>Mammals</i> [M] 3) Book 3: <i>Plants</i> [P] 4) Book 4: <i>Birds, Reptiles, Amphibians & Fish</i> [BRAf]
Teacher's book	No	
Workbook	No	
Knowledge checks/tests/quizzes	Yes	Knowledge checks such as worksheets or quizzes are included for the students in the materials (see Appendices II 1a&b for examples).

CDs	No	
DVDs	No	
Pictorial materials (e.g. flashcards)	Yes	The textbooks employ four types of pictorial materials: • diagrams • drawings • cartoons • clip-art pictures See Section e) for examples of these four types.
Others:	Yes	The four books also incorporate: • information pages for teachers or advanced students (e.g. see the first pages of the four units in Appendices I 5-8a) • a dictionary section at the back of each book (see Appendices I 5-8b), • blank quizzes and wordsearch grids for teachers and advanced students (see Appendices II 2a&b) • solutions to the worksheets and quizzes, • and sources (only in Book 4).
c) Date of publication and purchase price		
Where were the materials published?	The materials were published by: GS-Multimedia Verlag Dr. M. Lemberger Franz Glaser Gasse 10 A-1170 Wien	
When were the materials published?	The latest (6th) edition was published in 2008.	
Are all the components available?	Yes, all four textbooks are available in Austria.	
What do the materials cost?	The books can be purchased at the publishing company (see first point) at the following prices: Book 1: <i>The Human Body</i>: €19.70 Book 2: <i>Mammals</i>: €25.40 Book 3: <i>Plants</i>: €19.70 Book 4: <i>Birds, Reptiles, Amphibians & Fish</i>: €27.20 The set price is €82.80.	

d)	What kinds of target learners are the materials intended for?		
Age	The textbooks are aimed for students aged ten to twelve (first form of compulsory secondary education).		
Level of education	The materials are intended for the first form of secondary modern (Hauptschule, HS) or grammar schools (Allgemein bildende höhere Schule, AHS) in the secondary level of compulsory education.		
Students' interest in Biology	Biology is a compulsory subject in secondary education in Austria. Therefore, the materials are designed to fit the curriculum of the first form of this education level. Consequently, the students' personal interest in Biology might not be represented in the books, because they may not like the topics which have to be covered in this year. Following the curriculum of the first form of secondary education (cf. BMUKK 2000a&b), the materials cover the following biological topics: • the human body • mammals • plants • birds, reptiles, amphibians and fish One textbook is dedicated to each of the above-mentioned topics.		
e)	How durable are the materials, and what kind of layout do they have?		
<i>Layout features</i>	<i>Yes/ No</i>	<i>Commentary</i>	
Pictures/images/illustrations	Yes	The materials comprise various types of illustrations: • drawings (e.g. p.7 HB, p.21 M; see Appendix II 3a) • schematic drawings and diagrams of organs, body parts, animals, plants, etc. in 2D and 3D (p.11, 25 HB; p.9 P; see Appendix II 3b) • clip-art images (p.50, 56 HB; p.28 M; p.31 P; p.65 BRAF; see Appendix 3c) • cartoons (p.18, 65 BRAF; see Appendix II 3d) No photographs are used in the books.	

Quality of graphical materials	Yes	The majority of the graphical materials are high-quality pictures (e.g. p.42, 48 HB; p.9 P; p.63 BRAF; see Appendix II 4a for examples), but some of the materials are very low-resolution pictures (p.17, 27, 31 HB; p.16, 56, M; p.54 P; p.15, 28 BRAF; see Appendix II 4b for examples). Several schematic drawings are not presented appropriately, because the lines in the drawings do not provide a clear picture (e.g. skeleton p.28, ribs and heart p.30 HB, p.59 M; see Appendix II 4c). No colours are used in the materials and some images are therefore difficult to look at. Moreover, it is not easy to understand, for example, which parts of a cat or plant belong together in a picture or which parts have to be labelled for a task (p.27, 34, 52 HB; p.16, 41 P; p.58 BRAF; see Appendix II 4d for examples).
Colours or black & white	Yes	Colours are only used for the covers (see Appendices I 1-4a), and the rest of the graphical materials and texts in the books are black and white.
Text	Yes	The books incorporate large pieces of texts, such as the “Information Sheets” at the beginning of (nearly) each unit (see Appendices I 5-8a for examples). These information pages are supposed to be used by the teachers. Furthermore, the worksheets for the students also use texts, but considerably less than the information sheets.
Graphs and tables	No	
Different font types and sizes	Yes	The font type COMIC SANS MS is used throughout the whole materials and it only varies in size in the texts (from 12 to 36). The font size of the headings is much larger (36 and outline) when compared to the size of the normal text (cf. for example p.63 BRAF; see Appendix II 5). Most of the longer pieces of text are size 12 or 14 (e.g. p.41 or 57 HB) and some are size 16 (e.g. p.55 M).
Durability (quality of paper, binding method)		For the front and back cover, the materials use cardboard-like paper. These two pages are covered with transparent sheets which protect the textbooks. The rest of the books is printed on regular paper (80g/m ²). Standard spiral binding with metal spirals is used. However, I see a problem with this standard binding method and the young learners. The holes for the spirals are punched 3mm from the left edge of each page, which could cause the pages to fall out over time when used by learners.

f)	What teaching situation/context are the materials intended for?	
	<i>Context</i>	<i>Commentary</i>
	Type of course supported by the materials	The textbooks are intended for a student-centred CLIL Biology class in English. A large number of tasks, worksheets and quizzes are given in the materials.
	Total time available	The four books have to be covered by the subject in one school year. One school year consists of about 40 to 42 weeks. One unit is 50 minutes. Biology is taught twice a week, so the total amount of units would be 80 to 84 units per school year. The public holidays (~ 10 to 15 days per year) have to be deducted from these units. Therefore, a total amount of about 78 to 80 units of Biology are taught per school year.
	Syllabus	The national curriculum for Biology in the first form of grammar or secondary modern schools applies for CLIL Biology (cf. BMUKK 2000a&b; also cf. Section d) for the intended target learner group).
	Country	The materials are intended for use in Austria.

<u>2. Information on the tasks</u>	
The tasks of the following units have been analysed: “The Senses” (Book 1: <i>The Human Body</i> HB, pp.41-45; see Appendix I 5a) “The Cat” (Book 2: <i>Mammals</i> M, pp.18-22; see Appendix I 6a) “Plants and Flowers” (Book 3: <i>Plants</i> P, pp.9-17; see Appendix I 7a) “Snakes” (Book 4: <i>Birds, Reptiles, Amphibians&Fish</i> BRAF, pp.51-55; see Appendix 8a)	
“The Senses (Book 1: <i>The Human Body</i> HB, pp. 41-45; see Appendix I 5a)	
<i>Analysis Question</i>	<i>Commentary</i>
Which types of tasks have to be performed by the learner?	p.42: Task 1 is a matching exercise where body parts and senses have to be connected (information gap activity). Task 2 is an open cloze task, where the students have to read, identify and fill in the appropriate words which are missing. The focus of this task is on coherence (information gap activity). p.43: Task 3 uses multiple choice sentences where the correct answer has to be chosen. Then, a solution word has to be found which consists of specific letters from the answer words (information gap activity). p.44: Task 4 is a labelling task which asks students to label a diagram of the eye (information gap activity). Task 5 is a short answer activity which is linked to the previous task. Statements have to be allocated to parts of the eye mentioned earlier in the text (information gap activity). p.45: Task 6 is another labelling task of a diagram of the ear (words are given). Furthermore, particular parts of the ear have to be coloured in (information gap activity). Task 7 is a crossword puzzle which is connected to the previous task (information gap activity).
What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair work)?	The classroom organisation required for the various tasks is not clearly mentioned. I believe that the imperative and the personal pronoun “you” used in most task instructions address one (individual work) or two people (pair work). • “Label the parts of the eye.” (p.44) • “Can you do this simple crossword puzzle?” (p.45) Individual work, however, is more likely than pair work because the tasks are short and not very complicated.
Which media are involved in the tasks?	Only the textbooks and no additional media are used.

Who/what will be the source of information?	The sources are the texts in the book and the teacher who will explain the content in more detail.
Do the tasks involve speaking, reading, listening, writing and interacting?	Only reading tasks (Task 2, 3, 4, 5, 6, 7) and writing tasks (Task 2, 4, 5, 6, and 7) are used in the unit.
“The Cat” (Book 2: <i>Mammals M</i>, pp. 19-22; see Appendix I 6a)	
<i>Analysis Question</i>	<i>Commentary</i>
Which types of tasks have to be performed by the learner?	p.19: Task 1 is an open cloze task, where the pupils have to read, identify and fill in the appropriate missing words. There is a special focus on coherence in this task (information gap activity). p.20: Task 2 is a binary-choice activity. Pupils have to decide if sentences are true or false, and then they have to colour in the numbers of the sentences in the table below (information gap activity). p.21: Task 3 is a short answer and labelling activity, because questions have to be answered by the pupils according to the text. Then the parts of a cat have to be labelled with words which are given in boxes (information gap activity). p.22: Task 4 is another labelling activity of the skeleton of a cat with words which are given in a list (information gap activity). Task 5 is a drawing activity and the learners need to draw the pupils (part of an eye) of a cat during day and night. This task is combined with a short answer activity describing the eye (information gap activity).
What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair work)?	The classroom organisation required for the various tasks is not clearly mentioned. I believe that the imperative and the personal pronoun “you” used in most task instructions address one (individual work) or two people (pair work). • “When you have coloured everything, which blue number can you see in the number puzzle?” (p.20) • “Label the parts of the cat, using the following words: [...]” (p.21) Individual work, however, is more likely than pair work because the tasks are short and not very complicated.
Which media are involved in the tasks?	Only the textbooks and no additional media are used.

Who/what will be the source of information?	The sources are the texts in the book and the teacher who will explain the content in more detail.
Do the tasks involve speaking, reading, listening, writing and interacting?	Only reading tasks (Task 2, 3) and writing tasks (Task 1, 3, 4, and 5) are used in this unit.
“Plants and Flowers” (Book 3: <i>Plants P</i>, pp. 9-17; see Appendix I 7a)	
<i>Analysis Question</i>	<i>Commentary</i>
Which types of tasks have to be performed by the learner?	p.9: Task 1 is a labelling and colouring-in activity where students have to identify the different parts of a flower (word-picture boxes are given for the students), and then they have to colour them in (information gap activity). p.10: Task 2 is an unjumble-words activity in which parts of a flower have to be ordered (information gap activity). p.11: Task 3 is another labelling and colouring in activity (information gap activity). p.12: Task 4 is a matching activity. Students have to match words with the letters of parts of a plant which have already been labelled (information gap activity). p.13: Task 5 is a crossword puzzle and the solutions have to be used to label a diagram of a plant (information gap activity). p.14: Task 6 is an open cloze exercise, where the students have to read, identify and fill in the appropriate missing words. The task focuses especially on coherence (information gap activity). p.15: In Task 7, appropriate answers, in this case plants, their parts and use have to be arranged in a list by the students (information gap activity). p.16: Task 8 is a labelling activity of different types of roots, and there is also a crossword puzzle (information gap activity). p.17: Task 9 is an open cloze task where students have to fill the gaps in sentences (information gap activity).

What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair work)?	The classroom organisation required for the various tasks is not clearly mentioned. I believe that the imperative and the personal pronoun “you” used in most task instructions address one (individual work) or two people (pair work). • “Look at the plant parts – they are labelled from A to L. Put the correct letter to ist [sic] task in the table.” (p.12) • “Think about plants you know and what they are used for.” (p.15) Individual work, however, is more likely than pair work because the tasks are short and not very complicated.
Which media are involved in the tasks?	Only the textbooks and no additional media are used.
Who/what will be the source of information?	The sources are the texts in the book and the teacher who will explain the content in more detail.
Do the tasks involve speaking, reading, listening, writing and interacting?	Only reading tasks (Task 2, 3, 4, 5, 6, 7, 8, 9) and writing tasks (Task 1, 2, 3, 5, 6, 7, 8, and 9) are used.
“Snakes” (Book 4: <i>Birds, Reptiles, Amphibians & Fish</i> BRAF, pp. 51-55; see Appendix I 8a)	
<i>Analysis Question</i>	<i>Commentary</i>
Which types of tasks have to be performed by the learner?	p.52: Task 1 is a crossword puzzle (information gap activity). p.53: Task 2 is an unjumbling-words exercise where students have to separate a long string of connected words, and try to identify the sentences (information gap activity). p.54: Task 3 is an open cloze task, where the students have to read, identify and fill in the appropriate missing words with a special focus on coherence (information gap activity). p.55: Task 4 is another open cloze exercise where students have to fill-in the gaps of sentences (information gap activity).
What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair	The classroom organisation required for the various tasks is not clearly mentioned. I believe that the imperative and the personal pronoun “you” used in most task instructions address one (individual work) or two people (pair work). • “Now complete the crossword to find out another name for the Northern Viper.” (p.52)

work)?	• “Find out what the snake has swallowed. Write it down.” (p.53) Individual work, however, is more likely than pair work because the tasks are short and not very complicated.
Which media are involved in the tasks?	Only the textbooks and no additional media are used.
Who/what will be the source of information?	The sources are the texts in the book and the teacher who will explain the content in more detail.
Do the tasks involve speaking, reading, listening, writing and interacting?	Only reading tasks (Task 1,2,3) and writing tasks (Task 1, 2, 3, and 4) are used.

5. CLIL Teaching Materials Evaluation

The main goal of the evaluation is to provide teachers with a better understanding of the entire teaching materials by looking deeper inside representative units of each textbook. In order to provide this overview, I examined further the four units which were previously looked at in the textbook analysis (cf. Chapter 4.2). Since all textbooks and their units are structured in a rather similar way, this chapter will sum up all four units in each evaluation criterion from Chapter 3.2. Each evaluation criterion examines an aspect of CLIL which needs to be fulfilled in CLIL teaching materials.

As mentioned earlier in the textbook analysis (cf. Chapter 4.2), the following units have been selected from the materials:

- “The Senses” (Book 1: *The Human Body* HB, pp.41-45)
- “The Cat” (Book 2: *Mammals* M, pp.18-22)
- “Plants and Flowers” (Book 3: *Plants* P, pp.9-17)
- “Snakes” (Book 4: *Birds, Reptiles, Amphibians & Fish* BRAF, pp.51-55)

Appendices I 5-8a contain all four units with their numbered tasks.

Before starting with the actual evaluation, I want to point out that I have not evaluated the “Information Sheet” of each unit (p.41 HB, p.18 M, p.51 BRAF; the unit in P does not contain a separate information section). This is because these information pages are intended to be used by teachers only, in order to obtain basic facts and vocabulary about the topic. I have numbered the tasks in order to facilitate the analysis and evaluation. The various types of tasks in each unit have already been described in the textbook analysis (cf. Chapter 4.2 “2. Information on the tasks”).

The evaluation below consists of all the evaluation criteria which I have been discussed in Chapter 3.2. All the tasks and quotes of a unit which are referred to throughout the evaluation can be found in the Appendix (see Appendices I 5-8a). I have made a comment below each criterion. The results of this evaluation will later be used in the discussion section of this thesis (cf. Chapter 6).

A blank evaluation criteria checklist has also been included in the Appendix for CLIL teachers (see Appendix IV 2). This list can be used when they intend to

examine their CLIL teaching materials more closely in order to find out if the respective materials fit this teaching approach.

The following section lists all the criteria elaborated in Chapter 3.2 and evaluates the four textbook units mentioned above. All four units have been evaluated together in each criterion.

1) Proportion of the target language to the mother tongue (German) in CLIL materials

1.1 German or English: which language is used more often, in which situations is it used and is its usage justified?

All four units focus on the target language English. German is only used once for one word in the unit “Snakes” when introducing two types of Austrian snakes (p.54 BRAF)

- “The Ringelnatter (Ringed Adder) is a good swimmer and likes living near water.”

Only in the dictionary sections of each textbook is German used to translate English words from the units. However, I believe that the language support provided there for the students is not sufficient, because many technical and semi-technical terms in the texts and tasks are not included in these word lists (cf. Results 1.2 and 2.1).

I consider the use of the mother tongue not to be a disturbing factor in CLIL classes (also cf. Chapter 2.1.3.5). On the contrary, the introduction of technical and semi-technical terms in both the L1 and L2 might help students to better understand subject contents and task instructions. Furthermore, CLIL should not only educate pupils to develop the ability to express their knowledge of, and opinions on a subject in the target language, but should also encourage pupils to do the same in the mother tongue. Therefore, basic terminology needs to be introduced in both languages and not solely in the target language. Keeping this methodological principle of CLIL in mind, there were two things that struck me during the evaluation. Firstly, that the level of German used in all units was lower than I expected. Secondly, that the authors only translate the one species of snakes in the text mentioned above and no other technical terms, such as e.g. *cochlea* (p.41 HB), *whiskers* (p.21 M) or *tulip* (p.10 P). I think that the use of English only is not too

problematic as such, because students need to get used to work in the target language. As mentioned above, I would prefer, however, if the units and their worksheets contained more German translations combined with technical terms for students.

Sheena Machotka, one of the authors, told me in an interview that the CLIL Biology teaching materials evaluated can also be used for more advanced students in the fourth form of grammar or secondary modern schools (see Appendix V for the whole interview). The reason she gives is that the curricula of both the first and fourth form are very similar. In my opinion, the use of German is less important for this target learner group compared to younger learners, since learners in the fourth form have already been exposed to English for three years during their secondary education. Students at this education level are 14-16 years old and at A2-B1 level (intermediate) in English (cf. Council for Cultural Co-operation/Modern Languages Division 2001). Due to their age and level of proficiency in English, their cognitive abilities – such as the understanding of new words from the context – are already further developed than those of students in the first form. Therefore, students at this level can also work with the information sheets which were originally only intended for the use of teachers.

1.2 Is the choice of the target language appropriate for the level of proficiency (A1; cf. CEFR 2001) of the pupils?: **partly**

If possible, give examples for each of the following skills:
speaking, reading, listening, writing and interaction
instructions!

All units consist of reading and writing tasks, but I could not find any listening, speaking or interaction activities. Therefore, examples demonstrating the appropriateness of the language level can only be given for writing and reading activities.

From my own teaching experience, I can state that teaching Biology both in my mother tongue and in English is a challenge. The reason for this is that the language of this school subject to a great extent involves the use of scientific terminology which is needed to describe, for example, processes or organisms. In my opinion, the authors have tried to keep the sentence structures of task instruction as simple as possible (cf. p.21 M, p.43 HB, p.52 BRAF, pp. 10 P). In

addition, the choice of words is on the whole appropriate for the level of proficiency of learners at A1 level. At this level, students should be able to understand the following language structures: “familiar names, words, and very simple sentences, for example on notices and posters or in catalogues.” (cf. CEFR 2001:26).

Examples of texts for reading:

- “Maybe a deaf person can smell very well.” (p.43 HB)
- “They can feel well with their whiskers.” (p.21 M)
- “Baby cats are called kittens and drink milk from their mothers.” (p.21 M)
- “The female part of the flower produces seeds – the stigma (stigma – ma for mama – female).” (p.10 P)

Even if the word stigma itself is not an easy technical term, the authors tried to create a mnemonic for the learners.

- “Some plants have one main root that grows deep into the ground – the tap root.” (p.16 P)
- “Their forked tongues are always used for “smelling” their surroundings and for orientation.” (p.52 BRAF)

Examples of reading and writing instructions:

- **Task 1 (p.42 HB):** “Which body parts do you need for which sense? Connect them.”
- **Task 7 (p.45 HB):** “Can you do this simple crossword puzzle? What’s the word in the middle?”
- **Task 4 (p.22 M):** “Use the words from the word bank to label the parts of the cat in the picture below.”
- **Task 5 (p.22 M):** “Draw the pupils in the cat’s eyes in the pictures below.”
- **Task 1 (p.9 P):** “What’s your favourite flower? What colour is it?”
- **Task 7 (p.15 P):** “Think about plants you know and what they are used for.”
- **Task 1 (p.52 BRAF):** “Now complete the crossword to find out another name for the Northern Viper.”
- **Task 2 (p.53 BRAF):** “Find out what the snake has swallowed. Write it down.”

However, I think that there are some structures which are too complicated for the target learner group, because complicated sentence constructions are used:

- “They also used the roots and leaves of certain plants to make tea which they drank when they were sick.” (p.15 P)

The use of three subordinate clauses in one sentence is too much.

- “Snakes swallow their prey whole – they can dislocate their jaw so their mouth can stretch over their prey – then they rest to digest their food.” (p.52 BRAF)

This sentence is too long with the hyphenated sentence in the middle. It should be split into three sentences.

- “It eats frogs and kills them by wrapping itself around the frog and squeezing – these snakes are called constrictors.” (p.52 BRAF)

This sentence is also too long and needs to be split into more sentences. The gerund construction “by wrapping [...] and squeezing” is probably too complicated for A1 learners and therefore might be easier for them to understand as a separate sentence.

- “They use carbon dioxide from the _ _ _ plus water from the roots and energy from _ _ _ sun to make a _ _ _ _ _ food.” (Task 6, p.14 P)

Students have to fill in the gaps in this task, but this sentence is clearly too long for them to understand it.

Another problem for students at such a low level of proficiency might appear in Tasks 3 (p.11) and 4 (p.12) in the unit “Plants and Flowers”. Two tables are displayed, and they are not appropriate for the students, because some content information which is needed to perform the task is given in shortened chunks of sentences:

- “Large centre stalk of ten looks like a water bottle.” (p.11 P)
- “Small leaf-like part at the bottom of the flower” (p.11 P)
- “takes water to leaf and flower” (p.12 P)
- “protects flower in bud” (p.12 P)

I do not think that learners who have just started to understand sentence structures in English should already be exposed to such shortened versions of language at such an early stage.

The last point I would like to mention here is the choice of words in the text sections of all four units. Clearly, students will be exposed to a large amount of new technical and semi-technical terminology throughout the textbooks. As a consequence, students need sufficient and appropriate language support in the form of a dictionary. However, I was surprised about by the finding, during my

evaluation, that the dictionary sections at the back of each textbook are missing many vocabulary items from the main texts and tasks. The lack of this type of language support is only referred to briefly at this stage, and is discussed in more detail in Result 2.1.

Summing up, the target language used throughout the four units is appropriate to the level of the target learner group (A1), because the sentence construction should be generally easy to follow for the target learner group. There is sometimes a problem, however, with the choice of words used, since the dictionary sections of the textbooks do not offer sufficient vocabulary (cf. Result 2.1).

2) Focus on early foreign language acquisition methodology

2.1 Do the materials give language support (e.g. technical terms, useful phrases, glossary) which makes approaching a task easier for the pupils?: **yes**

2.1.1 If they give language support: What type of support is given (e.g. technical vocabulary, phrases, German translations, etc.)?

Most of the time, the tasks give enough language support to enable pupils to finish tasks (also cf. Result 1.2):

- **Task 2 (p.42 HB), Task 6 (p.45 HB), Task 3 (p.54 BRAF) and Task 6 (p.14 P)** have a “Word Bank” with technical and semi-technical terms (e.g. *tongue, eyes, anvil, soil, air, jaw, ejected*) which facilitates the completion of the tasks. Some other tasks also offer the appropriate solution words, but these words are just stated loosely in the tasks (e.g. **M**: Task 1 p.19, Task 4 p.21 and Task 5 p.22; **P**: Task 5 p.13; **BRAF**: Task 4 p.55).
- **Task 3 (p.43 HB)** offers three possibilities which the pupils can choose from.
- **In Task 4 (p.44 HB)** the vocabulary which is needed for the task is marked in the information text above the task (written in block letters).
- **Task 1 (p.9 P)** combines the words needed for colouring-in and

labelling the plant with a picture.

- **Task 3 (p.11 P)** describes the flower parts needed to label and colour in the correct parts on the schematic diagram. A similar exercise is Task 4 (p.12 P), where the flower parts are labelled in the diagram with letters, and the letters have to be matched with the correct description and technical term of the part.
- **In Task 2 (p.10 P)**, the jumbled flower parts are described and mentioned in the short information text before the exercise.

The big problem with the tasks described, however, is that even though very often the correct solution words are provided for the students, these new technical terms are often not included in the dictionary sections of the textbooks. Therefore, students will have difficulties in completing the tasks, because they do not know the German meaning of these words. There is an English-German dictionary with technical and semi-technical terms for students at the back of each textbook. This dictionary section ought to offer students enough support to look up new and difficult words from texts or tasks in order to help them to understand the subject matter. As briefly mentioned in Result 1.2, there are however, many significant new language items introduced in the units which are not incorporated into the dictionaries. No specific examples are provided here, because this difficulty is further discussed in the next section.

2.1.2 Is the language support appropriate for the proficiency level of A1?: **partly**

The language support discussed above (e.g. dictionary, task instructions, solution words) is mostly appropriate, because it tries to offer students help in completing tasks or understanding texts. Sometimes, the solutions are given already or stated in a text related to the activities, and students only have to place or choose the right words, as mentioned in the previous point. Giving pupils the possibility to perform well in easier tasks might help them to develop more self-confidence, in order to help them perform more difficult activities in the future.

Considering the level of proficiency of the learners, however, some parts of the language support need to be adapted and improved. As briefly mentioned in the point above and Result 1.2, the dictionary sections of all four textbooks are not

sufficient and they do not cover enough of the new vocabulary which is used in the texts of each unit. Essential technical terms are not included in the dictionaries, and this will make the completion of a task difficult, if the meaning of words which need to be filled in are not clear. The enormous lack of translations of vocabulary used in the tasks of the all four units is illustrated here:

- **Task 6 (p.45 HB; see Appendix II 6a):** Students are asked to label the schematic diagram of an ear with words provided in the “Word Bank”. Seven terms are given: *pinna*, *anvil*, *hammer*, *stirrup*, *cochlea*, *auditory nerve* and *eardrum*. None of those seven words is explained anywhere in the unit or translated in the dictionary. It is therefore impossible for students to complete this task with the language support provided in the textbook.
- **Task 3 (p.11 P; see Appendix II 6b):** the descriptions of the technical terms *pistil*, *stamen* and *petal* consist of 31 words. I think that ten of these 32 words (e.g. *the*, *a*, *ten*, *of*, *with*) are not difficult. All remaining 22 words (*stalk* is only counted once, even though it is mentioned twice), such as *large*, *stalk*, *bottle*, *knobbed*, *grains*, *pollen*, and *insects* are not translated in the dictionary section (. Therefore, the description of these three terms is not understandable for students at this low level of English language learning.
- **In Task 5 (p.13 P; see Appendix II 6c),** there are six difficult words (*stem*, *root*, *leaf*, *flower*, *fruit*, *seed*) which have to be used by students to label a schematic diagram of a plant. However, half of them, namely *leaf*, *flower*, *fruit* are not included in the dictionary. Furthermore, the sentences to find the solutions in the crossword in this task are difficult to understand as well, because there are so many words which have not been included in the word list. One example is the following sentence: “I **carry water** from the roots to the **leaves** and **food back** to the roots.” The words in bold are the ones which are not in the dictionary.
- **Task 6 (p.14 P; see Appendix II 6d)** is similar to Task 5, because nine words have to be filled in to a gap-fill text, and seven of these nine words are difficult (*cold*, *soil*, *plant*, *light*, *air*, *slowly*,

sugary). Only the word *soil* is included in the dictionary. However, I believe that also *cold*, *light*, *air*, *slowly* and *sugary* need to be enclosed in the dictionary. Also, in the text, into which the solution words need to be inserted, some important technical terms are not translated in the dictionary (e.g. *energy*, *temperature*, *describe*, *enough*, *towards* or *brightly*).

- **Task 4 (p.55 BRAF; see Appendix II 6e)** demonstrates the same problem as the tasks just mentioned, because ten difficult words (*snakes*, *swallow*, *poor*, *markings*, *smelling*, *crocodiles*, *eggs*, *reptiles*, *mouth*, *venom*) need to be filled in to a text by students and half of the words (*poor*, *smelling*, *crocodiles*, *reptiles*, *mouth*) are not explained in the word list at the back.

The age group and education level of the pupils would suggest an incorporation of more visual support combined with new language items, such as picture dictionaries in the units (like Task 1, p.9 P), so that important new words can be read and visualized at the same time by the students. Furthermore, collocations or phrases could be added to texts or the dictionaries to facilitate students' understanding of the subject matter. Since language learning does not only work on the basis of learning single words, whole sets of words should be included as well. Moreover, providing students with this type of language support can help them to actually produce English speech and to communicate about biological topics in class. As there are no speaking or interaction tasks in the textbooks, however, useful phrases or simple structures for conversation are missing. If there were, however, activities which involved speaking and interacting it would be necessary and useful to provide learners with the language support just mentioned. I was very surprised that the units do not offer any productive oral exercises for the students. Furthermore, no useful phrases intended to act as impulses for the discussion biological topics and students' opinions on them are provided. CLIL Biology needs to enhance oral productive skills to enable pupils to express themselves on the subject matter. It appears as if the textbooks employ an old-fashioned style of teaching which involves less speaking but more reading and writing activities.

No phonetic transcriptions, word classes (e.g. noun, verb, adjective) or the various forms that a word can have (e.g. singular, plural, verb forms) are included

in the dictionaries. All this additional language support would be helpful for the students. It would assist them to find the right words that they might be looking for, and would offer them pronunciation guidance for these new words. I believe that these additional types of language support are important and necessary for the students, especially because they do not, for example, know much about verb forms at this early stage of foreign language learning. Students might desperately look for the word *squeezing* (p.52 BRAF), but all they find in the dictionary is *squeeze, to* (p.94) and they might not realize that the two verb forms are related. In my opinion, it will be difficult for students to know that *squeezing* derives from *squeeze, to*. This lack of language support might have happened due to pressure of time imposed on the authors before the first publication, but nevertheless the present textbooks are already in their 6th edition, and these points ought to have been addressed by now.

I also think that it is important to include German translations in the units every now and then. Examples of improving that are when a labelled plant or eye are depicted in a task, both the English and German terms could be stated. Students would then be able to directly compare the terms in the two languages. Employing both the mother tongue and the L2, especially when the learners are still very new to the foreign language, might create a more comfortable learning atmosphere for them compared to being exposed to just English at all times.

During the textbook evaluation, I also found that no additional language learning supports are pointed to anywhere in the units, which could facilitate students' progress in the subject. Such support could be an introduction for students on how to use bilingual or monolingual dictionaries, advice on how to use the internet as a research tool, or offering them various learning techniques which they could try and choose from. A textbook should provide these tools for its learners, so that they become more aware of the variety of ways in which knowledge and the meanings of words can be accessed.

- 2.2 Are new language items, such as technical terms and phrases introduced in various ways in the unit (e.g. on their own, related to previous knowledge/personal experiences of the pupils)?: **partly**

The texts try to connect the new information with the pupils' own experiences and knowledge:

- “You look out onto the world around you with your eyes.” (p.44 HB)
- “Your ears let you hear sounds.” (p.45 HB)
- “Plants in your garden and home need your care. They need water and sunlight. If they are inside, sometimes their leaves get dusty so it’s good to clean them. Flowers and plants make us feel good so we should make sure they feel fine too.” (p.15 P)

Also the tasks draw on knowledge and experiences:

- **Task 1 (p.42 HB):** “Which body parts do you need for which sense? Connect them.”
- **Task 2 (p.42 HB)** asks the learners to complete sentences like “1. We use our _____ to see with.” with words from the “Work Bank”.
- **Task 3 (p.43 HB)** is similar to task 2 but here the learner is asked to choose the correct word out of three possibilities, e.g. “You use your **tongue/skin/feet** to touch with”.
- **Task 3 (p.21 M):** “People sometimes say that a cat has nine lives! Is this true?”
- **Task 1(p.19 M):** “In ancient Egypt many families had c_____ like the ones in our homes.”
- **Task 6 (p.14 P):** “Think of the plants in the Rainforest – this is paradise for _____!”
- **Task 7 (p.15 P):** “Think about plants you know and what they are used for.”

The authors also use similes to explain what certain parts of animals or physical structures of plants look like or how they work:

- “The LENS is behind the pupil. It focuses the light onto the back wall of your eye – just like a camera.” (p.44 HB)
- “Large centre stalk often looks like a water bottle.” (p.11 P)

New technical terms are also introduced via a combination of

- texts and drawings (**HB:** p.42; **M:** p.21, 22; **P:** p.9, 12, 13, 16, 17; **BRAF:** p.54)
- or texts and schematic diagrams (**HB:** p.44, p.45; **M:** p.19, 22; **P:** p.10, 11).

I believe that this combination of text and graphical materials is very attractive for the learners, and it can assist them in visualizing the new information.

2.3 Is there further repetition of new technical vocabulary or contents after their introduction in the unit?: **yes**

2.3.1 If so, how is it done (e.g. put into different contexts, repeated in exercises)?

New language items are repeated in the texts of the worksheets throughout a unit. The tasks of each unit are also designed to repeat the new information of the topics for the pupils. Sometimes, nearly the same text as in the information sheet is used again in the texts of the worksheets. Some examples of this are the texts on pp.52 and 53 in the unit “Snakes”. The texts from the teachers’ information sheet (p.51) is modified slightly and used twice.

As all four units have a very similar format, the unit “The Senses” (p.41-45 HB) will be looked at in more detail as an example. It should illustrate the repeated use of the main technical vocabulary from the teachers’ information sheet throughout the whole unit, because this repetition of new information is essential for learners.

The most important technical terms which learners should know from this unit are mentioned in the introductory text for teachers (“Information Sheet”, p.41; see Appendix II 7) are:

- *sense(s)*
- *brain*
- *sight: eye(s), optic nerve, retina*
- *hearing: ear(s), outer ear, eardrum, middle ear, hammer, anvil, stirrup, cochlea, sound waves)*
- *smell: nose*
- *touch: skin, feel*
- *taste: flavour(s), sweet, salty, sour, bitter, tongue, taste buds*

The tasks on the following two pages (pp.42-43) introduce nearly all the words on the students’ worksheets at least once. The most important words for *sight* are not introduced on these pages, because a separate section for the eye follows later (p.44 “Body Windows”). In this section the new technical vocabulary is then further practised in Task 4 and Task 5. The same applies to hearing, with its own worksheet, “The Ear” (p.45).

In addition, some of the new language items, such as the five senses, are illustrated in drawings (p.42) or schematic diagrams (the eye on p.44, the ear on p.45). In this way, it is possible for pupils to establish connections between the repeated technical terms and the pictorial materials which increase the chances of remembering them faster. It is possible that emotional connections are also initiated, which could lead to students remembering language items longer.

2.4 How do pupils have to respond to productive tasks, orally or by writing, and are the demands appropriate considering the proficiency level of A1?

Pupils only need to perform written production tasks in all four units which have been evaluated. No task asks for oral response (i.e. completing a task by giving a spoken answer) except for Task 1 (p.9 P) which could imply that pupils have to answer verbally, because it asks: “What’s your favourite flower? What colour is it?”.

Nearly all the task from the four units are productive writing tasks (cf. Chapter 4.2 “2. Information on the tasks” for the descriptions of the various tasks and see Appendices I 5-8a for the actual tasks of the units from the textbooks):

- **HB:** Task 2 (p.42), Tasks 4 and 5 (p.44), Tasks 6 and 7 (p.45)
- **M:** Task 1 (p.19), Tasks 3 and 4 (p.21), Tasks 5 and 6 (p.22)
- **BRAF:** Task 1 (p.52), Task 2 (p.53), Task 3 (p.54), Task 4 (p.55)
- **P:** Task 1 (p.9), Task 2 (p.10), Task 3 (p.11), Task 5 (p.13), Task 6 (p.14), Task 7 (p.15), Task 8 (p.16), Tasks 9 and 10 (p.17)

The demands of these tasks are appropriate for the target learner group, because learners mainly have to respond to questions by using words from a previous text, matching given words with a schematic drawing, or filling in the gaps of sentences.

The exercises which students might find difficult are Task 7 (p.15 P) and Task 7 (p.45 HB). The task in P (p.15) is the only free production task where learners are asked to think about plants and which parts of plants can be used for medicine or dye, for example. This activity is probably too demanding for low level

English students, because they might not yet know the names of plants in English. The task in HB (p.45) does not offer any solutions for the crossword puzzle. The problem is that for Question 1: “What is the part of the ear called that looks like a snail. [sic]” the solution word *cochlea* is not explained in the text or in the dictionary. Also Question 3: “The name of the “musical instrument” in your ear!” is problematic, because its solution word *eardrum* has never been referred to as a “musical instrument” (p.45 HB) in the unit. Even though this crossword only consists of three words, it is not very suitable.

Overall, it can be said that the written production tasks, apart from the last few examples, are appropriate for learners at A1 level of English.

The reason for the general lack of speaking and interaction tasks in all four units is probably that teachers might think that learners at such a low level of language proficiency cannot yet handle communicative exercises. It may be true that at this beginner's stage difficulties in practising oral language skills might exist. Nevertheless, students are well capable of performing easy and less demanding speaking tasks when guided in the right way. This type of oral production is already practised in English lessons at primary school level (e.g. introduce yourself, sing a song, or tell something about your favourite pet). Therefore, useful phrases and sentence starters need to be provided for the students in the teaching materials in order to encourage speaking and interaction. These highly important aspects of language learning should not be neglected, because pupils will need to practise these skills. Further practice of communicative competencies should also be offered in English language learning classes. If speaking is not trained and encouraged, pupils might stop enjoying learning Biology in English, because if the subject was taught in German they would certainly be able to ask and answer questions or to discuss topics. With no oral communication taking place in CLIL Biology classes, students are denied the opportunity to express their opinions on topics in this school subject. Students with a low level of proficiency also need to get this chance to practise communicative skills.

2.5 Does each unit employ a variety of tasks?: **partly**

Reading and writing are the two skills the tasks encourage. The four units try to vary tasks by mainly switching between labelling, short answer and gap-fill

activities (cf. Chapter 4.2 - “2. Information on the tasks” for more details on the tasks of each unit).

Reasons for the lack of communicative tasks could either be the low level of proficiency of the learners (A1 – beginners) or, and this seems more likely to me, the textbooks reflect a highly-traditional language teaching approach. Even if the learners still have a limited knowledge of English vocabulary, communication and interaction need to be reinforced during the teaching of any subject in CLIL. As stated in Chapter 2.1.2, the main principle of CLIL, where subject content learning is combined with learning a foreign language, is the focus on communication in the classroom. The following comment should demonstrate why language is so important in CLIL:

The concepts of specialist subjects are conveyed to learners through language. Language is needed to be able to observe and describe situations, and language enables learners to exchange ideas and discuss controversial insights. [...] [I]f one teaches a subject in a language other than the learners’ mother tongue, raising an awareness of linguistic products and processes plays an even more important role.
(Wolff 2007: 4th paragraph)

CLIL aims for the education of pupils so that they become autonomous learners. This might only be achieved if the learners are the centre of the class, and not the teacher. They need to practise expressing contents in the L2. Only learners’ own emotional and cognitive experiences in the subject are expected to enhance their learning progress.

Unfortunately, speaking, listening and interaction are completely neglected in the units, or at least the tasks do not explicitly ask for them. However, teachers who would use these materials can easily turn some of the exercises into speaking or interaction tasks. Some example of tasks which could be adapted to become communicative are the following:

- **Task 3 (p.43 HB)** which consists of multiple choice sentences where the correct answer has to be chosen from three possible solutions. Here, teachers could ask learners to orally form correct sentences with the two words which are not the correct solutions for the sentence.
- **Task 6 (p.45 HB)** could be altered to become an interaction task by requiring the learners to work in groups of three. Then they are

asked to talk to each other about animals and the types of ears (long, short, fluffy, etc.) they have.

- **Task 1 (p.19 M)** and its gap-fill text about cats is a good introductory activity to further discussion about which students have a cat at home, what cats eat or what they like doing.
- **Task 7 (p.15 P)** might be turned into a communicative task by encouraging students to talk about which plants they know, and what part of a plant they think is used for a specific purpose. So far, this task seems to ask students to write these answers down, but not to talk about their responses.
- **Task 3 (p.54 BRAF)** could be used as an impulse text for discussing students' own experience with Austrian snakes and how students behaved when they saw one.

2.5.1 What tasks are used (e.g. communicative, group or pair work, writing, etc.)?

All the tasks in the four units ask students to respond in written form, except Task 1 in P (p.9) (cf. Result 2.4). Communication and interaction – two of the main principles of foreign language learning – are not at all in the foreground of the activities, because students are intended to do the activities on their own or maybe in pairs. Pair work, however, is not explicitly required in the task instructions. Furthermore, I would say that the tasks are too short for group work.

In general, group work is a very suitable form of classroom organisation, because it moves the pupils into the centre of attention. It means, furthermore, that teachers move into the background and the pupils have to be more active, because they have to work on the task themselves. Teachers guide pupils through the task and they are only there to provide help or additional information for the pupils on the respective task if required.

The language used in school books for younger learners often comprises simple structures and refers to contents which can easily be understood by them. Teachers and people working on the development of teaching materials seem to believe that simple language and contents are appropriate for young learners. Cameron (2005:

xii-xiii) states, however, that this is a completely false assumption, especially in language teaching. Teachers often do not dare to challenge their students with more demanding teaching materials, because they think that students cannot yet process complicated information and language. I suppose that these false assumptions are also the reasons why communicative tasks and interaction have been avoided in the textbooks presently under discussion. It is true that young learners are still developing and restructuring their cognitive functions, but Cameron (2005: xii) states that young learners “have a huge learning potential, and the foreign language classroom does them a disservice if we do not exploit that potential”. This statement also relates to exposing students to more challenging topics (Cameron 2005: xiii), and as CLIL is a combination of language and content, I strongly recommend that teachers keep the just mentioned language and topic challenges for learners in mind for teaching and materials developers.

2.5.2 Are the aims of the tasks in a unit clear?: **yes**

The aims are clear in all of the tasks and, moreover, they are not too long and demanding. The instructions are mainly written in simple and clear language, and therefore I assume it is possible for learners who use the textbooks evaluated to understand what they are asked to do in the tasks.

In addition, I would like to mention that Tasks 4 and 5 (p.44 HB) have very short instructions.

- **Task 4:** “Label the parts of the eye.”
- **Task 5:** “Use the above information to decipher [sic] the message.”

In Task 4, it would be a bit easier for the students if they knew that the words needed to label the schematic drawing of the eye are written in capital letters in the information text above the task. In Task 5, students have to insert the correct word for the sentence into an area with dashed lines (e.g. “I control the light _ _ _ _” – [solution: *iris*]). Some of these dashed lines are numbered, but the task lacks more information about what the numbers mean; namely that the respective numbered letters have to be used to find the solution sentence at the end of the task. Task 4 in BRAF (p.55) features the same problem as Task 5 in HB.

3) Focus on subject- and content-based methodology

3.1 Are the didactic principles of teaching Biology in the foreground of the materials?: **yes**

Even if the following list reveals that not all didactic principles of Biology have been fulfilled, the subject (Biology) and not the target language (English) is still in the foreground.

3.1.1 If yes, select from the following principles:

- a) The topics and methods of teaching are always closely related to the everyday life of pupils, in order for them to relate to the contents directly: **yes**

The topics and some of the tasks are relevant for the pupils (cf. Result 2.2). It is important for pupils to see this relevance of Biology for their lives, because it might enhance their motivation to learn more about this subject and its immediate use for them.

- b) Frequently, lessons focus on biological findings that matter to society. This focus prepares pupils to develop the ability to act responsibly in social situations, and to participate in society: **yes**

Unit “The Senses” in HB:

Knowing about the five senses (i.e. sight, hearing, smell, touch and taste), how they function and how important they are for everyday life is essential for pupils, because it should make them aware that they need to look after their senses in order to enjoy full participation in all aspects of life.

One section of the unit refers to people who have lost their sight or hearing (“Sense Surprises”, p.43). Here, the learners are informed about how these people can compensate for the lack of a sense:

- “People who lack one sense (blind or deaf people) often use other senses to make up for this loss. Maybe a deaf person can smell very well. Today blind and deaf people can receive lots of help: blind guide dogs, braille (where blind people use raised dots to read with), hearing aids to hear better with.” (p.43 HB)

I believe that it is important that pupils are aware of, and tolerant towards people who have physical and/or mental issues. Only by knowing more about illnesses and

defects in the human body can awareness and understanding be fostered, leading ideally to the development of tolerance.

Unit “Plants and Flowers” in P:

The second part of the text on p.15 requires learners to understand the importance of plants in American Indians’ society. Native Americans used (and probably still use) certain parts of plants to produce oil, dye or tea. This text tries to demonstrate learners that plants were/are not only important to Indians but also to us and our lives.

Unit “Snakes” in BRAF:

On p.51, the worksheet on “Austrian Snakes” informs pupils about snakes in Austria and that one snake in particular, the northern viper is poisonous. It is important that pupils know about dangerous animals such as snakes in Austria. In addition, it would be useful for pupils that teachers also combine this topic with advice how pupils should behave when they come across a snake. Also, first aid guidelines what needs to be done after a snake bite could be introduces in class.

- c) As pupils need to be educated to develop the ability to solve problems and to work autonomously, the following methods should be employed in Biology:
 - o Observation – comparison - sequencing: **no**

Since the units in the textbooks presently discussed to not employ a practice-oriented teaching approach, no experiments or tasks for practical work are included in the books. In order to be able to explain natural phenomena, Biology employs a variety of methods including the

- observation of the respective phenomenon in nature or an experiment;
- comparison of the results of the observation with results which already exist;
- grouping of the results of the comparison and placing them in the correct group or field in Biology.

This practice-oriented approach of teaching in the subject of CLIL Biology needs to be employed as often as possible, because it enhances the naturalistic

environment in which pupils ought to learn contents and the L2 more easily (cf. Chapter 2.1.2 and 2.2.1). In this point discussed, the textbooks evaluated will need plenty of improvement.

- o Working with appropriate aids (e.g. microscopes, magnifying glass, computers with internet connection, scientific literature): **no**

Unfortunately, there are no tasks in any of the units which would need any aids. These aids for working on biological matter are used in experiments and as the previous point stated already the textbooks do not encourage practice-oriented teaching. If the authors improved their textbooks with regards to this aspect, more aids for experiments would be employed.

- o Searching for, processing and displaying information: **no**

As it will be mentioned in Result 3.1d, the units in the textbooks evaluated to not encourage project-oriented working. Therefore, students are not required to search for, process and display information in any of the tasks in the four units. It seems as if all the information in the textbooks is already pre-processed for the students and they do not have to think too much about it. They are only required to learn the contents of the texts. Only by working on topics themselves, however, students will have the opportunity to actively take part in the learning process of biological contents, because they can choose what they consider important to learn. I believe that this method of accessing new topics is useful to assist students in becoming autonomous learners.

- o Identifying and solving problems: **no**

None of the tasks in the four units evaluated require students to identify and solve biological problems. The reason for this has already been mentioned in the previous point: all the information texts in the worksheets contain pre-processed contents which students only need to learn without thinking too much about what they actually need to learn. The units do not employ any tasks which require students to think about which possible problems could arise, for example, when plants do not get enough light (relevant for the unit in P), or when people listen to very loud music (relevant for the unit in HB). I believe that the ability of identifying problems and then finding solutions for those problems is highly important for students'

future live.

- o Executing simple experiments and measurement processes: **no**

As previously mentioned in this section, the units presently discussed do not encourage practice-oriented working and experiments and measurements processes are therefore not included in the tasks. However, it is important for CLIL Biology teaching materials to work practically, because natural sciences depend on experiments and students can only profit from this teaching method (cf. Chapter 2.2.1). They will be able to experience nature in practice and I believe that this is one of the most effective methods of learning new contents.

- d) Enhancing multidisciplinary and project-oriented work: **no**

In none of the units, multidisciplinary work is encouraged, because no connections are established between the present subject matter and other content subjects. Examples of the incorporation of multidisciplinary teaching in the units evaluated are the status cats had in ancient Egypt (p.18 M) which could be more obviously connected to the subject of History. This method of establishing connections between Biology and other subjects is important in order for students to realize that subjects are interconnected and not separate from each other (cf. BMUKK 2000a&b; mentioned in Chapter 2.2.2). Autonomy of learning might be enhanced via multidisciplinary work, because students are also encouraged to find such interconnections of subjects themselves.

In addition, project-oriented work is a highly effective method of educating students to become autonomous learners. This method of learning encourages students to work on new information in CLIL Biology and to try and understand it. Here, students are actively involved in the learning process and they sometimes also have some freedom to select what they consider important for the particular topic. Unfortunately, the units presently discussed do not encourage students to perform project-oriented work, because the tasks of the units only involve information of texts, which already only include the most important information.

- e) Bringing pupils into contact with nature (e.g. excursions, field trips, sympathetic interaction with animals and plants):

no

Even if the units “Snakes”, “Plants and Flowers” and “The Cat” are ideal topics for organising field trips, I do not believe that it is the job of teaching materials in Biology to tell teachers when to make such trips. It might be possible that a teacher’s book could include tips on how to organize them and which problems teachers might encounter during excursions. However, the CLIL teaching materials presently discussed do not include a teacher’s book (cf. Chapter 4.2). Bringing animals or plants to the class which can foster the sympathetic interaction of pupils with living things, however, is not mentioned at all in the teaching materials. I know that it is sometimes problematic to bring animals to class, but bringing plants is really a simple and effective method to awaken pupils’ interest in the topic. This would help pupils to look at and identify the parts of plants which are described and illustrated in the unit. Unfortunately, the unit “Plants” does not encourage the use of real plants. Pupils are therefore not encouraged to practise and use the knowledge about the parts of plants which they gain from labelling diagrams in so many tasks in P (cf. Chapter 4.2 “2. Information on the tasks”).

The unit “The Senses” is meant to raise pupils’ awareness that human beings experience nature with their senses, and that these senses are the connection between the body and the outside world: “Your body finds out things about the world around you through your sensory organs.” (p.41). In addition, pupils can use their bodies to experience nature; for example,

- by touching wood, fur or fruit,
- by seeing an apple or a cat running,
- by feeling the warmth of the sun or the skin of a snake
- by tasting a lemon or flour,
- by hearing birds sing or snakes hiss,
- and by smelling flowers or cow dung.

Teachers can help pupils experience nature with all its facets inside and outside [of] the classroom.

f) Enhancing social, personal and emotional competences:

o Group work: **no**

As mentioned in Result 2.5.1, students are required to perform all tasks of the four units evaluated individually. Therefore, no social contact has to be made in order to complete tasks. Students are not asked to further discuss tasks or topics with other fellow students, which consequently means that they are not confronted with other learners' opinions. As mentioned in Chapter 2.1.4, social interaction is a significant factor for students' progress in learning and it therefore needs to be included in the CLIL teaching materials presently discussed.

o Social learning: **yes**

Pupils learn about deaf and blind people in the unit "The Senses" (cf. Result 3.1b). This is the only example where social learning is explicitly addressed. Much more examples like the one just mentioned need to be included in the teaching materials evaluated in order to educate pupils to become caring members of society.

o Open learning: **no**

This type of learning is closely connected to project-oriented learning mentioned earlier in Result 3.1d. Students have the chance to learn topics in their own pace and they can also choose information on a topic which they consider important to know. This method of learning needs to be encouraged in order to teach pupils how to work autonomously.

4) Diversity in facilitating learning

4.1 Are tasks designed to integrate more than one aid (e.g. visuals, text or audio materials)?: **yes**

On nearly every page of the units, texts are used in combination with visuals, such as schematic diagrams or drawings (**HB**: pp.42, 44, 45; **P**: pp.9-17; **M**: pp. 19-22; **BRAF**: pp.52-55). There are also clip-art pictures inserted next to some headings (e.g. **HB**: pp. 43-44; **M**: pp.21-22) or mixed into the text (e.g. **BRAF**: p.55).

No further additional aids are employed in the tasks, which is a pity, especially for such a practice-oriented subject like Biology. Some improvements could be made by including audio materials and audio visuals. Audio materials can be employed when teachers want to demonstrate, for example, which noises animals make.

Furthermore, audio materials can be used as listening tasks where pupils have to listen out for information to do gap-fill activities. Therefore, short and simple listening tasks would be appropriate for the target learner group. In the same way, audio visuals on video, DVD or the internet can be used to show, for example, animals and plants in their natural habitat. The more additional aids a unit employs, the more likely it is that all three learner types (kinaesthetic, auditory, visual) can be addressed.

4.2 Do the tasks enhance pupils' interactive and communicative competencies which should help them, for example, to lead subject-related discussions in English?: **no**

Unfortunately, none of the tasks in any of the four units enhances communication and interaction at all. Even if most of the tasks ask students to perform written production (i.e. they have to respond to the task in written form; cf. Result 2.4), speaking or interacting is never asked for in the instructions (also cf. Chapter 4.2 "2. Information on the tasks").

As mentioned in Result 2.5, the lack of tasks involving oral communicative skills might result from a very traditional teaching approach which mainly focuses on receptive skills such as reading texts or listening, and on writing tasks. Traditional teaching is not supposed to be used in CLIL, because this new teaching approach focuses on more on communication and productive skills such as speaking and interacting (cf. Chapter 2.1.2) In the first form of grammar or secondary modern schools, it will not yet be possible for pupils to express their opinions on biological topics in English, compared to pupils in the fifth form. Depending on which L2 was introduced in primary school, pupils will either have only limited experience in English, or none at all (cf. BMUKK 2008a; cf. Result 2.5 for reasons). However, even if the communicative ability of learners is limited, they should not be neglected at all in the first year of CLIL Biology. Learners' limited knowledge of vocabulary can also be employed as the basis for simple speaking and interaction tasks (e.g. learners can form sentences like: *I have a cat. It is brown and five years old. Do you have a cat?*). Furthermore, I believe that a mixture of all five skills (reading, writing, speaking, listening and interaction) needs to be attempted in all of the units presently evaluated. This balance of skills is clearly missing in all four units, because they only use reading and writing tasks.

5) Comprehensibility and clarity of information and instructions in combination with visual support

5.1 Is any visual support (e.g. pictures, drawings, graphs, photos) used in the texts, tasks or instructions?: **yes**

5.1.1 If yes, which visuals are employed? Are they used appropriately and what purpose do they serve?

- **drawings/clip-art images:** p.42 HB; pp.20-22 M; pp.9, 12-17 P; pp.51-55 BRAF
- **schematic diagrams:** pp.44-45 HB; pp.19, 22 M; pp.10-11 P

HB:

The drawings/clip-art images are non-scientific, i.e. they are not anatomically correct and display real organisms, and they are appropriate in Task 1 (p.42), because it is meant to be an introductory task. Therefore, these types of pictorial materials suit the purpose of introducing the learner to the topic in a fun and vivid way.

The usage of schematic drawings in Task 4 (p.44) and Task 6 (p.45) is necessary in order to give pupils a more realistic idea of how an eye or an ear looks like inside. Both diagrams are depicted as a longitudinal cut through the two organs. This perspective is one of the most commonly used methods of the illustration of organs or parts of organisms in sciences and it is important to familiarize learners with it. The two schematic diagrams for the tasks, however, should be reproduced in a larger format so that learners can identify the various parts properly. Furthermore, the lines in Task 4 (p.44) which point away from some of the parts of the eye for labelling need to be longer in order for learners to recognize the correct parts and to complete the task.

M:

The drawings of three cats on p.20 are not very detailed, but they are appropriate in this situation, because they are only used for decorative purposes for the puzzle.

The schematic diagram of a cat, which is a drawing at the same time, is appropriate for the labelling Task 3 (p.21). However, it should be reproduced in a larger format so that it is easier for learner so label the cat. The diagram is not realistic and scientific, but in this case it is not necessary to portray a real cat. The

reason is because the task itself does not provide scientific expressions to label the animal (e.g. *soft paw*, *furry tail*, *pointed ear*).

The scientific schematic diagram of a skeleton of a cat (p.22) is used correctly in Task 4, because the various parts need to be labelled by the students in order that the anatomy of the cat is clearly demonstrated. The difficulty for learners might be that there are no lines which point to parts of the skeleton which have to be labelled, and having to find the parts on their own might be too advanced for ten to twelve-year-old students. This diagram could also be displayed larger so that students can see the bones of the cat more clearly.

The drawings of cat's eyes with the moon and sun next to them in Task 5 (p.22) are a very nice idea. This may attract students' attention and help them remember the form of the pupils (i.e. the part of the eye through which light enters into the eye) of cats when it is day and night.

The only schematic diagram that is not used appropriately in this unit is used with Task 1 (p.19). I do not think it is necessary to illustrate a cat's skeleton when the aim of the text on this page is to inform students about the characteristics of cats. A normal picture, for example, of a real cat which eats some food would have been more appropriate.

P:

The pictorial materials on pp.9, 11, 12 and 13 are used appropriately, because they either help students to grasp information (e.g. p.11) or they illustrate certain parts of the object being discussed (e.g. p.9).

The schematic drawings on pp.10, 16 and 17 are necessary for learners to complete the tasks, but the problem is that they are very dark and a bit too small for the learners to work with. It is obvious when looking at the drawings that the originals were full-colour pictures.

The clip-art pictures used on pp.14 and 15 merely serve the purpose of decoration. Better diagrams might have been chosen in order to represent the information of the texts in which they are used. On p.14, one diagram could instead include all components a plant needs to grow, and on p.15, graphical materials depicting American Indians while they use plants to produce oil or food could be inserted.

Another problem with the visual support is that the schematic diagrams are

not labelled in the unit. Only in Task 2 (p.10), learners know that the diagram is the tulip because the flower is mentioned in the text above the diagram. None of the other diagrams in the unit (e.g. pp.9, 11, 12) are labelled, which is inappropriate for a Biology textbook. Usually, the Latin name and the English equivalent need to be added under each diagram by the authors of the books.

BRAF:

In Task 2 (p.53), the drawing of the snake is appropriate for young learners. It is a nice idea to use a drawing, because students are asked to unjumble the sentence which has been eaten by the snake. The sentence is written without any spaces between the words and the students need to write the correctly spaced sentence.

The diagram of the head of a snake with its mouth wide open serves the purpose of illustrating the fangs of snakes and what these teeth and the forked tongue look like (Task 3, p.54). The only problem is that the diagram is too small.

The drawing of a snake next to the crossword puzzle in Task 1 (p.52) is there to decorate the activity and to make it more attractive for students.

The first diagram of a snake on p.54 is not appropriate, as it does not fit the text next to it. Learners are informed that snakes “use their ribs to move and form an “S” when moving.” The problem is that the snake depicted does not properly demonstrate the “S” movement. I believe that there are better diagrams depicting this movement.

None of the five illustrations of snakes in Task 4 (p.55) do fit the text at all, which means that they do not have any real purpose other than decoration. It is easy to find other more appropriate pictures for these informative texts (e.g. a snake swallowing an egg or mammal, squeezing its prey, demonstrating its fangs). Furthermore, the illustrations used are very small and the three pictures which have been scanned in are of bad quality in terms of resolution.

Similar to the previous unit “Plant”, neither of the diagrams is labelled in Latin and English, so the students do not know which snakes they are looking at in their worksheets.

5.2 Are the visuals used related to the pupils’ everyday life?: partly

There are only a few visuals which can be related to pupils’ everyday life and surroundings.

HB:

In the unit “The Senses”, only the drawings/clip-art images in Task 1 (p.42) can be said to fulfil this criterion. The tongue licking the lolly is probably the image which pupils can best relate to their lives. In order to make more sense for the pupils, the illustration of the eye could be improved by adding something which the eye looks at, and the nose misses the object from which the scent or steam is rising into it. Furthermore, the object which is being touched by the hand depicted in the illustration cannot be seen. The picture of an ear has not been placed with the other images and it only shows sound waves, but does not show where they come from. All these little additions would greatly improve the pictorial materials in this unit.

P:

The unit on “Plants and Flowers” incorporates only a few visuals of flowers which are related to the pupils’ everyday life experiences. It might be argued that flowers and plants in general relate to pupils’ lives, but I do not believe that this argument justifies a connection of any type of picture of plants and flowers to the learners. Only the drawings illustrating how plants and their growth are influenced by forces such as gravity or water (Task 9, p.17) can be said to establish a relationship between learners and their lives.

M and BRAF:

Unfortunately, there are no suitable illustrations of the two Austrian species of snakes in “Snakes” (BRAF), or of real cats in “The Cat” (M) which could in some way be related to the students’ everyday lives.

The rest of the illustrations in the four units either serve a demonstrative and scientific purpose or a decorative one (cf. Result 5.1 for more details on the purpose of illustrations).

5.3 Is the visual support appealing to 10 to 12 year-old pupils (e.g. considering the layout, or how easy the information is to process)?: **partly**

I think that most of the drawings and clip-art images are appealing for the pupils even if they could be improved as stated in Results 5.1 and 5.2. In addition, all visuals are suitable for students to colour in.

However, there are layout problems with some of the diagrams. Task 4 (p.44

HB), Task 4 (p.21 M), Task 2 (p.10 P) and Task 3 (p.11 P) use lines leading away from the respective parts of the eye, cat or flower which need to be identified by the pupils, but these lines are too short. This makes it difficult for pupils to exactly see which parts they have to label. If pupils should not write the answer on the lines, these short lines might be appropriate. Still, I believe that students will want to write on these lines. If this is the case, all the lines need to end in a horizontal line on which the correct answers can be written.

The cat skeleton in Task 5 (p.22 M) does not have any lines at all, but students are asked to label it. The schematic drawing needs lines here, especially when very specific bones have to be distinguished (e.g. *hip-bone*, *neck bones*, *breastbone*). Furthermore, the skeleton is too small and needs to be enlarged otherwise the various bones cannot be seen properly.

A number of other schematic diagrams might be too small for students to understand. In order to display the various parts of the inner ear (Task 6, p.45 HB), for example, it might be necessary to enlarge the diagram in a future edition of the CLIL Biology teaching materials evaluated. This illustration might be difficult for learners to understand and distinctively recognize hammer, anvil and stirrup. In addition, it is fairly difficult to complete the task, because the small-sized picture does not clearly show the lines from the letter to the diagram. In general, it has to be stated here that children need large illustrations of objects such as complicated organs, constructions in the human body, animals or plants for a better understanding of the content. An enlarged and detailed view usually facilitates the understanding of students of how the various parts fit and work together.

Finally, comparing the dashed lines in Task 6 (p.14 P) and Task 3 (p.54 BRAF), the latter uses hardly any space between the individual underscores. Pupils might encounter spatial problems when filling in the gaps in Task 3, for example (BRAF).

However, most of the schematic diagrams do not show too much detail (e.g. **HB:** pp.44, 45; **P:** pp.10, 11). This is appropriate for the target learner group, because the intended learners might be confused by too much detail in the visuals due to their cognitive abilities. The illustration of a cat's skeleton (p.22 M) is very detailed, but in this case it is appropriate because it serves the purpose of demonstrating the anatomy of the cat. Pupils will come across such illustrations many times when studying Biology in the future.

5.4 Is visual support missing from the CLIL teaching materials?: **yes**

No photographs have been used in any of the units, which could illustrate, for example, real skin or eyes, snakes, cats or plants. Considering the target learner group (pupils aged ten to twelve), there is no reason not to insert realistic illustrations at regular intervals. At the moment, the four books are more reminiscent of picture or colouring-in books, which are partly still appropriate for students at that age, but there should also be visual support in touch with reality. Students need to be able to realise that the topics they work on are scientific and connected to real life. This connection can be easily established by inserting photographs into the materials. Another reason in favour of more realistic visual support is a statement which Machotka, one of the two authors, made when I contacted her to retrieve more information about her CLIL Biology teaching materials. She stated that since the curricula of both the first and fourth form of secondary education level are similar, the teaching materials are also suitable for students at this higher level of compulsory education (students aged 13-15; see Appendix V). For this target learner group, the current visual support used in the materials is definitely no longer sufficient and would have to be improved.

In addition, labels and descriptions of the visuals used in the textbooks are missing (cf. Result 5.1). Visuals should never be introduced in a textbook without a label which puts them into a scientific context. Otherwise, students will not know what they are looking at and what the purpose of the particular visual is.

6) Intercultural learning

6.1 Is intercultural learning encouraged by the topics?: **partly**

6.1.1 If yes, in which topics and how is it done?

M:

The unit “The Cat” provides pupils with information on the role and position of cats in Ancient Egypt: “They were known as far back as Ancient Egypt (Falb cats) where they were often honoured as gods.” (p.18). This fact should give a better understanding of the history of cats and what their status was in a different culture in the past. This information can be considered to be intercultural and is therefore appropriately used in this unit.

P:

The text on p.15 in “Plants and Flowers” provides the learners with information on how American Indians made use of various parts of plants in order, for example, to produce food or dye. Learners are introduced to a different society which was (and probably still is) deeply connected with nature. This information can be used as food for thought which makes learners aware that the production of certain types of food was discovered a long time ago, and that nowadays we still do the same (e.g. ground seeds to oil or dry leaves to herbs).

Since culture and cross-cultural learning in combination with communication are central points in CLIL (cf. Chapter 2.1.4.3), more communicative activities are needed in the materials. Pupils should have the possibility to exchange their opinions on the topics within the classroom in order to learn that not everybody has the same view on one subject. The use of language is a central part of culture and intercultural learning, because it is the medium which enables written and oral communication. As mentioned above, some of the texts express specific cultural aspects which could be used as a starting point of interaction for the pupils. However, the tasks connected with these texts (cf. Chapter 4.2 “2. Information on the tasks”) do not encourage students’ oral communicative abilities.

In Austrian school classes, 15% of pupils do not have German as their mother tongue (cf. BMUKK 2008e). This diversity of learners from different cultures and countries should be utilized more in CLIL. Learners should be encouraged to socialize in class and to exchange their experiences on everyday and biological topics. If some pupils in a class were not born in Austria, they can be asked to talk about, for example, which plants or snakes exist in their native country. If students have been on holidays to foreign countries, they might potentially have experiences in these topics as mentioned above as well. Furthermore, teachers could also briefly introduce examples of snakes from countries which neighbour Austria. Students should become develop the awareness that some countries have similar vegetation and organisms when compared to Austria, but students should also learn to understand that there are differences in other countries and cultures.

7) Accuracy

7.1 Is the content of the materials factually correct?: **yes**

All the information given in the units evaluated is formulated biologically and it is accurate (cf. Campbell & Reece 2003 and the school textbooks by Kugler 2003 and Rogl & Bergmann 2005 for further biological background on the topics which are covered in the CLIL Biology teaching materials presently discussed).

7.2 Is the subject matter scientifically formulated?: **yes**

The following texts are written in a scientific and academic style and consist of biological facts only, but they do not neglect the fact that young learners between the ages of ten and twelve will need to be able to understand the contents:

HB:

All texts of this unit (pp.41-45) are scientific (i.e. they describe natural phenomena or procedures based on facts from natural sciences) except for the following sentence: “However, we are all very happy if all our five senses are functioning well!” (p.43).

Examples:

- “Nerves carry tiny electrical signals from the sense organs to the control centre, the brain.” (p.41)
- “Inside your nose are about 12 million tiny olfactory (smell) cells, with tiny hairs.” (p.41)
- “The retina changes the light into nerve messages and sends them to the brain along the OPTIC NERVE.” (p.44)

M:

All texts in this unit (pp.18-22) are scientific except for the two sentences concerning Ancient Egypt and cats (pp.18-19), and the sentence “People sometimes say that a cat has nine lives.” (p.21).

Examples:

- “Cats stalk their prey silently, attack in a sudden rush (pounce on it) and kill it with a bite to the neck or throat.” (p.18)
- “Cats like to hunt in g_____ and woods at night. They like warm, s_____ places during the day.” (p.19)
- “They can turn their ears towards a noise. They can feel well with their whiskers.” (p.21)

P:

All texts in this unit (pp.9-17) have been scientifically formulated, except for the sentences “Flowers are beautiful and lots of them smell nice too.” (p.9) and “Flowers and plants make us feel good so we should make sure they feel fine too.” (p.15).

Examples:

- “The female part of the flower produces seeds – the stigma [...]” (p.10)
- “Roots draw up water from the _____, it travels up the stems to the leaves.” (p.14)
- “Some plants have one main root that grows deep into the ground – the tap root.” (p.16)

BRAF:

All texts in this unit (pp.50-55) are formulated in a scientific way.

Examples:

- “They are able to dislocate their jaw so their mouth can stretch to swallow.” (p.51)
- “Their forked tongues are always used for “smelling” their surroundings and for orientation.” (p.52)
- “Bright colours often mean the snake is poisonous [...]” (p.55)

7.3 Are there any language mistakes in the materials?: **yes**

Overall, grammar, collocations and the choice of words are correct in all four units and there are mainly minor mistakes.

HB:

- “[...] braille (where blind people use raised dots to read with), [...]” (p.43)

The sentence in brackets is an unclear expression, because it would be clearer for students to read, for example, ‘braille (i.e. when blind people read by moving their fingers over raised dots in paper)’.

- “Use the above information to decipher [sic] the message.” (p.44)

Even if the authors added *decifer* and *decipher* to the dictionary (p.67), the version *decifer* is a spelling mistake, because the correct version is *decipher*. Therefore, the correct version has to be used in the text. Only on the internet the version *decifer*

can sometimes be found, but there is no English dictionary which states this version (e.g. cf. *Longman Dictionary of Contemporary English* (Summers 2007), *Oxford Advanced Learner's Dictionary of Current English* (Hornby 2000), also online dictionaries like Merriam Webster or Leo).

P:

- “They ground the seeds for flour and the oil for their hair.” (p.15)

This construction is not correct, because it expresses that the Indians ground seeds and oil, but oil cannot be ground. Oil is produced when certain seeds are ground. What the sentence should mean, however, is that American Indians used the oil of the ground seeds for their hair.

- “Put the correct letter to ist task in the table.” (p.12)

This is a typical typo (*ist* should be *it's*) which might often occur when Microsoft Word uses the German spell check instead of the English one.

8) Teacher support

8.1 Do the materials include a teacher's book?: no

8.1.1 If not, would it be helpful to have one?

A teacher's book would enormously improve the course materials, because it would act as a scientific and pedagogic guide for teachers. It could provide teachers with further information, for example, on the contents of the textbooks or the aims of certain tasks. Furthermore, a teacher's book can incorporate language advice, such as useful phrases or question suitable for pre- and post-task activities. In addition, it could include further information on the crossovers in the curricula of teaching Biology and English in order to give teachers a basic insight into both subjects and reasons why it is a good idea to combine them (cf. Chapter 2.2.3 for more information on the crossovers in curricula of both school subjects).

8.2 Do the materials include any additional language help for teachers?: no

Since there is no teacher's book, no additional language help is provided for teachers. Together with their pupils, they have to use the same dictionary sections

which are provided in the four textbook. As mentioned above (cf. Results 1.2 and 2.1) however, the dictionaries lack a great number of essential technical and semi-technical vocabulary items.

8.3 Is there any help for teachers regarding the content, didactics and methodological principles according to which the subjects of Biology and the L2 English need to be taught?: **no**

At the beginning of each textbook, there is a short introductory section on the teaching materials called “Information Sheet” (see the first pages of the units discussed in Appendices I 5-8a).

The lack of a teacher’s book might make teaching according to the textbooks difficult in some situations. Teachers do not get any additional help or information on the contents of the textbooks. In the materials, there are also no further reading sources provided for teachers. Only Book 3 *Plants* provides sources from which some of the textbook materials have been taken. Moreover, no methodological background on CLIL or the teaching of Biology in English is given. All of this additional information could significantly help teachers to understand how to bring the two subjects together, because teachers would find out more about which similarities the teaching approaches and curricula of both subjects have (cf. Result 8.2). It might be difficult for teachers to simply take the books and use them. Additional guidelines – more than the one or two introductory pages at the beginning of each unit currently provided – are necessary in order to give teachers clearer ideas about how to use these CLIL Biology teaching materials.

6. Discussion of the Evaluation

The following discussion establishes links between the theoretical background of CLIL (cf. Chapter 2), and the results of the textbook evaluation (cf. Chapter 5). The most striking and interesting findings of this discussion will be looked at:

- Oral Production and Communication
- Language Support
- Language vs. Content
- Krashen's Principles of Second Language Acquisition
- Accuracy and the Presentation of Biological Subject Matter
- Intercultural Learning
- The Autonomous Learner
- Multidisciplinary Teaching and Project Work
- Visual Support
- Teacher Support
- A Traditional Approach Towards Teaching

The choice of these particular discussion points has mainly been influenced by my personal interest in CLIL as a future teacher of Biology and English. I may become a CLIL Biology teacher who will use the textbooks *Cross-Curriculum Creativity – Biology (Book 1-4)* myself. Therefore, I consider it important to highlight the positive progression taking place in CLIL teaching materials development which can be seen in the present textbooks. However, I also intend to pinpoint those aspects in the books which still need improvement. Specific improvements will be mentioned in the discussion points below, and they should help CLIL teachers to see how the CLIL teaching materials evaluated can be made more suitable for teaching Biology in English.

6.1 Oral Production and Communication

As mentioned in Chapter 2.1.2, CLIL is a teaching approach in which subject matter is taught via a second language. This method is intended to be the ultimate implementation of the communicative classroom, because it puts foreign language

learning into a naturalistic environment for students by using the language to talk about relevant topics of the content subject (cf. Chapter 2.1.2). In this respect, the productive skills – writing and especially speaking – need to be focused on in bilingually-taught classes. These skills ought to be encouraged by CLIL teachers in order to reinforce their students' learning progress in both the L2 and the subject matter. The reason for this push towards more oral production in CLIL teaching is to move beyond the traditional language teaching classroom. Traditional teaching often neglects speaking and interaction in class, and receptive skills (e.g. reading, listening) are paid more attention. In order to progress more quickly in an L2 however, it is necessary for students to use language actively not only in writing but especially in speaking.

In the evaluation (cf. Chapter 5), it was established that the textbooks appear to follow a rather traditional teaching approach, despite the fact that they are intended for CLIL Biology classes with a focus on communication (also cf. Chapter 6.11). As Results 2.4, 2.5 and 4.2 reveal, oral production is not encouraged at all in the units evaluated, and students are only asked to perform productive tasks in written form. In neither of the tasks are students requested to further discuss the topics or to give oral summaries of information texts in the units. One reason for this lack of communicative tasks might be that the intended learner group (first form of secondary education, ten to twelve year old students) will not yet have a huge amount of experience and knowledge in English, the language of instruction in the textbooks. Due to this low level of language proficiency, learners probably do not know much English vocabulary or grammar. However, this should not be the reason for cutting out communicative activities in the present teaching materials. After all, the materials are intended for use in CLIL Biology classes and not for a traditional teaching setting. For this reason, an even distribution of tasks enhancing the five language skills (speaking, writing, reading, listening, interacting) ought to be the overall aim in the books (cf. Chapter 2.1.2). As mentioned above, the focus of the materials consequently needs to be on communication and interaction. Only by incorporating communicative tasks in the teaching materials can learners be given a chance to profit from this new teaching approach. In general, the point I would like to highlight here is that teachers and materials developers should not be afraid of devising communicative tasks for language beginners. The potential of young students to perform difficult language and content-related tasks should not be

underestimated (cf. Cameron 2005: xiii; also cf. Result 2.5). Challenging tasks both in biological contents and the L2 (English), can increase the learning success of younger learners. Basically, CLIL teaching materials and teachers need to provide the right guidance for learners when they are asked to perform communicative tasks. In order to enhance communication in the present textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)*, phrases and ready-to-use sentence constructions should be added in order for the target learner group to perform interaction tasks. However, this additional work load for language support should not discourage material developers from devising oral production tasks. When learners who are new to the English language realise that they are able to express their thoughts on topics in the L2, it is possible that they will become more motivated to learn CLIL Biology. At this early stage of education, learners might make more of an effort to learn more for the subject, because they are proud of being able to use English for a specific purpose (cf. Van de Craen et al. 2007: 73; mentioned in Chapter 2.1.2).

Moreover, I would like to point out that the lack of oral communication tasks within the materials discussed will create an environment where no interaction or intercultural learning can take place. As mentioned in Chapter 2.1.4, social interaction in class (socio-cultural learning) is an important method by which pupils learn and respond to new input, and gather knowledge from other pupils. This form of communication might influence their attitudes towards the content subject, and it is expected to trigger reorganisation processes of already existing knowledge in pupils' brains. When this aspect of learning is completely cut out of teaching, pupils will not have the possibility to profit the experiences and knowledge that their schoolmates have of a certain subject matter. Therefore, the principle of socio-cultural learning should not be neglected in CLIL teaching materials, otherwise students will miss out on the opportunity to enrich their subject and language knowledge.

Finally, it should be pointed out, however, that there is communicative potential in some of the tasks of the four units evaluated. Teachers can convert these into interactive activities, such as asking follow-up questions related to the tasks where students can give their personal opinions on topics (cf. Result 2.5). As a consequence, putting in all this additional work to devise communicative activities for the existing tasks in the units would require plenty of time and effort on behalf of

CLIL teachers. This extra work would not be necessary if the materials were appropriately developed for CLIL.

6.2 Language Support

In general, CLIL materials ought to provide appropriate language support for the target learner group. The type of language support in such materials depends on the content subject and the language proficiency of the intended learner group (cf. Maley 2007: 6; Lamsfuß-Schenk & Wolff 1999: 2; mentioned in Chapter 2.1.2). The materials I have evaluated offer various types of language help for learners, such as bilingual dictionaries in each textbook and clear task instructions in the units in order to facilitate the completion of activities (cf. Results 1.2 and 2.1). In addition, the style of the texts in the four units evaluated and their grammatical structures that the authors have chosen are on the whole appropriate for the intended learner group (cf. Result 1.2). However, even if at first glance the dictionaries seem to be appropriate there are some problems with them. Usually, essential and difficult technical and semi-technical vocabulary needs to be included in the word lists of textbooks, especially when they are intended for such inexperienced learners of both English and Biology. In the first form of secondary level in Austria, the subject of Biology is introduced for the first time as a school subject in its own right, separate from “Sachunterricht” [general science]; additionally, English might have been introduced at primary school, but it is also possible that learners in the first form of secondary level are exposed to this L2 for the first time in their lives (cf. Chapter 3.1.1.1).

In the present evaluation, it was established that the language support offered in the dictionaries of the four CLIL Biology textbooks are not appropriate for the intended learners. Essential technical and semi-technical vocabulary which students need to understand or complete tasks are not included in the dictionaries in the textbooks. It becomes difficult for students, for example, to complete tasks, because the solution words are not explained or translated anywhere in the units or dictionaries (cf. Result 2.1 for examples). At present, teachers will have to supply additional word lists and language help for their students in order to help them to work with the materials. The insufficiency of these dictionary sections in the present textbooks was unexpected, but it reflects how young the CLIL teaching approach still

is. Future CLIL teaching material development will require more guidelines from materials developers which have to ensure that materials for any CLIL subject are devised according to its methodology and principles.

Further language support is missing in the dictionaries; for example, they do not include phonetic transcriptions, word classes of vocabulary items or call attention to the various forms of verbs. The last point is especially important for pupils who are at the beginner level of language learning, because they might have difficulties in finding verbs in the dictionaries which are not used in the infinitive in texts or tasks in the unit. In addition, there is no language support for oral production provided for the pupils in the dictionaries and in the units, because the tasks in the teaching materials evaluated do not encourage communication and interaction between pupils (cf. Result 2.5; also cf. Chapter 6.1). If teachers wanted to turn some of the tasks into communicative discussion activities for pupils, this would require plenty of extra preparation work and time. This entire additional work load for teachers (i.e. devising extra word lists and communicative activities) could easily be avoided by improving the language support in the CLIL teaching materials themselves, and by supplying a teacher's book. This book would be a really helpful tool for CLIL teachers, because it usually offers guidance and additional information on

- tasks
- texts
- hypothetical language difficulties that teachers might encounter during a lesson
- additional tasks
- supplementary materials
- links for deeper insights into topics of the materials.

As pointed out at the beginning of this chapter, language support not only has to be chosen according to the language proficiency level of the learners, but the choice of words is influenced furthermore by the content subject which is used for CLIL. Since CLIL Biology is a school subject which derives from natural sciences, the language which describes Biology is highly scientific. Therefore, the introduction of technical terminology is essential not only in CLIL Biology but also generally in this subject. As stated above however, the textbooks do not supply sufficient technical and semi-technical language support for the students (cf. Results 1.2 and

2.1). Moreover, the mother tongue German is not employed throughout the whole materials evaluated, which I believe is not appropriate. Content-related misunderstandings which might arise in the four units evaluated could be avoided if some single words or parts of the text, or summaries were translated into German. The use of the mother tongue could furthermore reduce the fear which students might have towards the subject of Biology being taught in the L2 (English). In Chapter 2.1.3.5, it has been mentioned already that students are more motivated when the mother tongue is incorporated in CLIL classroom language, especially when the L1 is used to clarify difficult language sections or contents (cf. Langer et al. 2006: 7). Besides, it might encourage students if they find German expressions every so often throughout the texts of the units, because the L1 might make them feel more comfortable in this new CLIL learning situation. If language support was provided in German, I really believe that this would improve the motivation of many pupils, as described by Langer et al. (2006: 7). Even if pupils might not understand every single word of the materials in English, they might be able to understand the respective topics by having ‘language anchors’ provided in their mother tongue. They can fill in the gaps of understanding which will help pupils to grasp information more quickly.

Despite all the positive effects arising from the use of the mother tongue in CLIL just mentioned, many CLIL teachers still believe that this teaching approach neglects or even prohibits the use of the mother tongue during lessons completely. This belief is rather controversial, because CLIL is often also referred to as a bilingual teaching approach, and it is clearly intended that students are taught and learn how to express contents both in their L1 and in the target L2. The demonstration of subject knowledge in both the target language and the mother tongue will be important for the students’ further school career and work life (cf. Chapter 2.1.3.5). Therefore, I believe that it can only be an advantage to employ the mother tongue as part of CLIL classroom language as previously mentioned, and that it should also be used in CLIL teaching materials. However, the authors of *Cross-Curriculum Creativity – Biology (Books 1-4)* seem to neglect the advantages of bilingualism, because they have not employed German in the materials examined, except for one name of a certain species of snake (cf. Result 1.1). I believe that it is not appropriate to neglect the mother tongue in the materials in this way. As

mentioned above, the use of the L1 is desirable and worthwhile if it serves the following two purposes:

- clarifying difficult subject matter for students;
- preparing students to express subject matter not only in the target language English but also in the mother tongue German.

6.3 Language vs. Content

In Chapters 2.1.2 and 2.1.3.4, it was discussed that ever since CLIL was introduced into teaching, a discussion has been ongoing about whether CLIL classes should focus on the target language input, or on the contents of the subject. In general, current CLIL methodology states that the subject and its contents are more important and that they need to be in the foreground of CLIL teaching. The target language, which is English in the present teaching materials, takes the role of the medium of instruction. Consequently, the L2 is seen as a means of transport for subject matter, and less attention is paid to it when compared to traditional language learning classes. Evaluation Question 3 was therefore designed to examine this aspect of CLIL teaching materials.

Result 3.1 proved that the didactic and methodological principles of teaching the subject of Biology are in the foreground in the evaluated teaching materials. Furthermore, Results 3.1a and b demonstrate that the topics of the units which have been examined are relevant to the students, and that these topics are important for society. However, there are three more aspects of teaching Biology which are not fulfilled in any of the information texts or tasks provided in the four units. The present teaching materials do not encourage students'

- problem-solving abilities and autonomous style of working (cf. Result 3.1c)
- ability to do multidisciplinary and project work (cf. Result 3.1d)
- social, personal and emotional learning (cf. Result 3.1f).

Moreover, one of the most important principles of Biology teaching has not been fulfilled by the teaching materials in question either:

- contact with nature (cf. Result 3.1e)

In my teacher education at university, it was always highlighted that nature is the centre and playground of natural sciences. The subject of (CLIL) Biology

investigates and explains nature and its phenomena to students, which consequently leads to a highly practice-oriented approach towards teaching this subject. It is an absolute necessity to bring nature into the classroom, or to go outside and to convert nature into a big classroom for students. Teachers have plenty of possibilities to do this by

- conducting experiments
- bringing plants or animals to classes
- going on field trips
- encouraging project work inside and outside the classroom.

Biology should be a subject which students can ‘touch’, and theory should ideally be learned through practice. I believe that the identification of the lack of students’ contact with nature in the present CLIL Biology teaching materials is an important finding of this evaluation. It should raise the authors’ awareness that the textbooks will need further improvement in this area, so that the materials become more suitable for teaching the subject of CLIL Biology.

6.4 Krashen’s Principles of Second Language Acquisition

Krashen’s model of L2 acquisition, the “monitor model” (cf. Krashen 1985), consists of a few useful general principles of language learning which are also relevant for CLIL. However, it should be pointed out first that his approach is quite controversial, and has been criticized ever since his ideas on how foreign language learning can be improved were published. Mainly, Krashen is criticized for paying only little attention to language form in L2 learning and many linguists do not agree with his approach (cf. Lightbown & Spada 1999: 40).

As discussed in Chapter 2.1.4.1, CLIL reflects some of the main principles of Krashen’s theory of L2 acquisition (cf. Krashen 1981). The linguist introduces central concepts which influence the success of second language acquisition. The main points, which have been summed up by Dalton-Puffer & Smit (2007: 9-10; mentioned in Chapter 2.1.4.1), are “acquisition over learning”, “meaningful input” and the affective filter. These principles aim to make language learning as efficient as possible for learners. CLIL seems to fit quite well into Krashen’s model for the

following reasons (cf. Dalton-Puffer & Smit 2007: 9-10; mentioned in Chapter 2.1.4.1):

- it uses subject content to learn a language
- it creates a naturalistic environment, in which languages can be learned and
- it has potential to lower the affective filter, which among other things is influenced by emotions, motivation and attitude, so that content and language can be stored more efficiently in the brains of learners.

Nowadays, many pupils are afraid of foreign languages due to the high demands that are made on them to succeed. This fear seems to be lower in combined subject and language classes when compared to traditional foreign language classes (cf. Dalton-Puffer & Smit 2007: 9; mentioned in Chapter 2.1.2). The reason for this is probably that instead of focussing on accuracy, CLIL concentrates on communication and interaction, which is supported by Krashen's L2 acquisition model (cf. Lightbown & Spada 1999: 40). The ability to immediately communicate subject matter in a foreign language to other learners seems to increase the motivational factor for learners to perform well in CLIL subjects (cf. Hainschink 2007: 155; mentioned in Chapter 2.1.3.5). Therefore, CLIL influences the affective filter and also lowers it, in order to help learners to make better progress in subject content and foreign language learning (cf. Chapter 2.1.4.1). In the next paragraphs I try to discuss the presence or absence of those of Krashen's principles mentioned above which are relevant for CLIL.

Overall, the results of the evaluation show that the CLIL Biology teaching materials presently discussed focus on the subject content (cf. Chapter 6.3):

- The presentation of the topics is mainly appropriate and attractive for the pupils.
- New language items are repeated throughout the units and are backed-up by visuals (cf. Result 2.2).
- The topics of the units ("The Senses", "The Cat", "Plants and Flowers", "Snakes") are relevant for the learners and they also draw on the learners' experiences in order to create a comfortable teaching setting for them (cf. Result 2.2).

- Texts are presented combined with pictures (cf. Results 4 and 5), and
- various types of tasks are used in the units (cf. Result 2.5).

In general, the combination of texts and pictorial materials is an efficient way of addressing visual types of learners, but what about other learner types such as kinaesthetic and aural (cf. Lightbown & Spada 1999: 58 for the learner types; mentioned in Chapter 3.1.1.4)? I believe that the materials under discussion do fit into Krashen's theory of language acquisition, but I do not think that they address all learner types (aural, visual and kinaesthetic). There are several suggestions that I would like to make here, which if implemented would improve the quality and didactic potential of the materials in my opinion. In general, a greater variation of tasks needs to be employed within the units in order to ensure diversity and facilitate learning for all three learner types. As mentioned above, the visual learner type is already addressed in the textbooks "*Cross-Curriculum Creativity – Biology (Books 1-4)*" evaluated, as Results 2.2, 4 and 5 show. However, the pictorial materials could be enormously improved by appropriate photographs added to the units, because a naturalistic learning environment would be encouraged (cf. Result 5.4; cf. Chapter 6.9).

As I have already mentioned in Chapter 6.1, communicative and interactive tasks are missing from the four textbooks. Including communicative activities in the units would be appropriate for aural learners, because these learners need to hear language and contents in order to remember and know them. Therefore, language guidance is necessary, which ought to be provided by the CLIL textbooks or by teachers. This can be done in the form of boxes with questions and phrases, which should help learners to express their opinions on certain issues. In general, the language support needs to be improved in the all four textbooks, because it is not sufficient in the present edition (cf. Results 2.1 and 1.2; also cf. Chapter 6.2). Furthermore, listening tasks would be helpful for aural learner types, in addition to the tasks which are already present.

Kinaesthetic learners would profit from small and easy experiments and demonstrations of the subject matter, because adding a physical component facilitates their learning process.

I am sure that all the changes, adaptations and additions which I have suggested so far would result in an improvement for the quality of the CLIL Biology

textbooks presently discussed. In my opinion, Biology needs to come alive in teaching, and learners should realize that it is not only a school subject but that it surrounds and affects us all the time. I think that my suggestions for improvement would be a good step towards reaching that aim.

6.5 Accuracy and the Presentation of Biological Subject Matter

In the development of teaching materials, the accuracy of the contents being presented and of the language which is used to describe the contents are always important aspects. As mentioned throughout this thesis (e.g. cf. Chapter 2.1), CLIL is a new teaching approach which combines a content subject and a foreign language. Therefore, CLIL teaching materials need to employ accurate subject matter and also the target language at the same time. Spelling, word order or the presentation of scientific biological facts are examples in CLIL Biology which need to be accurate. These aspects of accuracy are important, because learners need to be provided with correct subject matter and language for studying. Result 7.1 shows that the subject content of the evaluated units is correct, because it is based on scientific facts; Result 7.3 demonstrates that the language is accurate, except for some minor mistakes.

However, the formulation of the subject matter is also relevant for the target learner group. Since I have examined science textbooks for CLIL Biology, I had to evaluate whether or not the content is presented in a scientific and academic way. Result 7.2 showed that the information which is used in each of the four units is formulated in a biological and academic way. Even though the style of writing is generally scientific, creative and less formal writing is also employed. In my opinion this is appropriate, because it reflects the intended target learner group of the authors, namely ten to twelve year old pupils who have probably never been exposed to scientific language in their life. This mix of academic and non-academic writing facilitates young learners to access information, because normal scientific texts are often characterized by a density of factual matter. This density of facts might be too difficult for the intended target learner group, because they might have problems to break down and understand the information presented.

6.6 Intercultural Learning

CLIL is a phenomenon which has developed from the clash of various cultures resulting from increased travelling and immigration (cf. Chapter 2.1.1). At present, people who live together in a country do not necessarily share the same mother tongue, attitudes, values and cultural background. As a result, CLIL tries to build its teaching approach around these aspects which influenced CLIL just mentioned and in particular around one central idea: culture and cross-cultural or intercultural learning (cf. Chapters 2.1.3 and 2.1.4.3). Intercultural learning in CLIL focuses on communication, because the ability to communicate plays a key role in socio-cultural interaction. As mentioned in Chapter 2.1.4, socio-cultural interaction positively influences students' learning progress, because it helps them to learn new subject matter and to reorganize the existing knowledge in their brains. This type of learning should be especially encouraged in CLIL subjects by the use of suitable topics and their discussion in class, and by the exchange of opinions and factual knowledge on these respective topics. In addition, this knowledge exchange in socio-cultural interaction can help students to expand their own knowledge. They will realize that fellow students from other countries might have different knowledge of certain topics from theirs. In general, this awareness is intended to educate students to become understanding and tolerant people in society who are open-minded and eager to find out more about the world. As discussed in Chapter 6.1, communication and interaction have, however, been completely neglected in the CLIL Biology teaching materials evaluated, which denies students the opportunity to exchange knowledge and experiences with others in class.

Overall, the four units which have been evaluated display attempts towards intercultural learning (cf. Result 6). However, this important aspect of CLIL teaching still needs to be improved by the authors and teaching materials developers. In the evaluation, some text examples from the units have been found which try to interconnect cultural knowledge with biological topics (cf. Result 6.1). However, there are no communicative tasks connected with these texts. One text section in the unit "The Cat" (p.18 M) tells students, for example, that cats were honoured as gods in ancient Egypt. This passage could be employed for a class discussion about which reasons it had that cats were honoured so much in Egypt. This topic would also be suitable for multidisciplinary teaching, because it is closely connected to the subject

of History when referring to ancient Egypt. Multidisciplinary teaching will be discussed in more detail in Chapter 6.8. The other text section with an intercultural reference is about the American Indians and which parts of plants they used for food and dye (p.15 P). In connection with this, a communicative task could ask students to talk to their desk neighbours about which parts of plants they use at home and what they do with them. If students come from different family backgrounds, it is very likely that they will find differences in this topic.

In general, there still seems to be a problem with interconnecting subject matter, intercultural learning and communication in CLIL teaching materials development. It is important for the learning progress of students that more communicative tasks are incorporated into the teaching materials *Cross-Curriculum Creativity – Biology (Books 1-4)*, because communication and interaction tend to create a more naturalistic teaching setting (cf. Chapter 2.1.2). Furthermore, the various cultural backgrounds of pupils in a class should be regarded and incorporated into the teaching of not only CLIL Biology but any subject in CLIL. The intercultural aspect of CLIL needs to be more encouraged in CLIL teaching in the future. Teaching materials need to encourage intercultural learning. If this area of CLIL will be improved, there is a potential to educate pupils to become tolerant and open-minded people who respect other members of society.

6.7 The Autonomous Learner

One of the most important aims in education is to help learners to develop autonomous competences in learning, such as time management and problem-solving thinking. Two examples of Austrian curricula for Biology can be referred to in which autonomy is explicitly stated as an important aim of the education system (cf. BMUKK 2000a&b). This aim is also central within CLIL, because autonomous learners seem to be more critical and open-minded people. I believe that these characteristics are highly significant for learners in order to fit into present day societies. Such people know what they want, they are more tolerant and they are eager to discover new areas of expertise. The development of students towards autonomy is a long and intense process, and the teaching style employed in the

classroom can influence it heavily. Autonomy and self-consciousness can especially be encouraged in a learner-centred classroom setting (cf. Lamsfuß-Schenk & Wolff 1999: 6; mentioned in Chapter 2.1.4).

Unfortunately, Result 3.1c revealed that none of the four units evaluated encourages a teaching environment in which the learners are at the centre of attention and are able to develop autonomous learning skills (also cf. Chapter 6.3). In order to complete tasks, students may have to rely heavily on additional information which the teacher will need to provide (cf. Chapter 4.2 “2. Information on the tasks”). Furthermore, the textbooks do not offer enough language support for the learners to fulfil the tasks, because often, for example, essential solution words are not explained anywhere in the units or translated in the dictionary sections of the books (cf. Result 2.1). As a consequence, teachers will have to explain and clarify a great deal of unclear technical and semi-technical vocabulary and subject matter themselves. Moreover, no communicative and interaction tasks are employed in the units, which would clearly encourage learner-centred learning (cf. Results 2.4, 2.5 and 4.2). Finally, no project work is encouraged in the materials which would encourage learners to discover topics in their own way, by using texts from the teaching materials as a source of information to work on a topic (cf. Result 3.1d).

Since the CLIL teaching materials presently discussed lack all the aspects just mentioned, CLIL Biology classes using these textbooks might become rather teacher and not learner-centred. Some disadvantages of teacher-centred classes are that students will have fewer opportunities to express their opinions and to discuss their views on biological topics; furthermore, none of the tasks encourage the use of learners’ own thinking skills to solve them, because all the information needed to complete activities is always clearly marked in boxes or highlighted in the texts. CLIL teaching materials should, however, enable teachers to create an interactive teaching setting for their learners in which they can practise language in all its facets (speaking, listening, reading, writing, and interacting). In my opinion, learning is only worthwhile when learners have the possibility to express their views and explore topics on their own, and this may encourage their autonomous thinking as well. Moreover, this method of learning can lead to increased interest in subjects, and boost learners’ self-confidence.

6.8 Multidisciplinary Teaching and Project Work

CLIL itself is an integrated teaching approach, where two subjects, a content subject and a language class, are combined into one. The subject of Biology and its didactic and methodological principles need to be in the foreground when teachers want to teach CLIL Biology (cf. Chapter 2.1.2). Therefore, CLIL Biology in English needs to encourage multidisciplinary teaching, because it is one of the didactic principles of the curriculum for Biology (cf. BMUKK 2000a&b; mentioned in Chapter 2.2.2). In general, multidisciplinary teaching is the integration of more than one school subject into any other subject, and it has been encouraged in the education systems of many countries, including the UK, America and also in Austria. Nonetheless, I know from the teacher education I myself have undertaken, and from my own teaching experience that the actual implementation of multidisciplinary teaching is a challenge in any classroom.

However, the multidisciplinary aspect of CLIL Biology is not fulfilled satisfactorily in *Cross-Curriculum Creativity – Biology (Books 1-4)*, because the evaluation did not find any attempts in which links and crossovers between the subject of Biology and other subjects are established (cf. Result 3.1c). This is a pity, since Biology is a prime example of a subject which overlaps with other school subjects. The most obvious subjects with which it is connected are Physics and Chemistry. The subject matter of Biology is closely linked to these subjects, due to their involvement in biological processes. In the unit “Plants and Flowers”, for example, Physics and Chemistry could be integrated perfectly, because the teaching materials could explain why plants can absorb water (Physics) and which substances they absorb (Chemistry).

Moreover, other school subjects are also related to Biology, such as History, Arts, Music and languages like Latin or French. Biology and nature have always been interesting for people. The special interest in discovering new parts of the world during the big empires (e.g. Roman or British Empire) also increased the interest in nature. The first descriptions in exploration novels or reports are most of the time related to the landscape, flora and fauna and people who were found living in these new parts of the world (e.g. cf. Lauter 2006 for American exploration reports). The language of sciences in former days was Latin and every living thing was appointed a binominal Latin name. This system was introduced by Carl Linneaus [Carl von

Linné] in 1758 (cf. Schmitt 2008). Technical terms often derive from Latin and would be therefore a perfect starting point for multidisciplinary work.

During the days of the great explorations, plants and animals from foreign countries were either painted or brought back to the explorers' home countries to the people there. Artists have always been mesmerized by nature and its multitude of colours and shapes. For that reason, many painters and musicians used nature as the main topic in their pieces of art. In the same way, many more links to other subjects could be established, but I think the examples mentioned above demonstrate how easily multidisciplinary learning can be adapted to Biology and CLIL Biology teaching.

Project work is another methodological principle of Biology teaching which is highly learner-centred (cf. BMUKK 2000a&b). Among other things, project work asks learners to become active and to work on topics. Learners have to acquire knowledge about certain topics on their own with only a little help from their teachers. This is a good method by which teachers can encourage learners to become more autonomous in learning and thinking. The encouragement of this alternative form of teaching would give pupils the possibility to develop autonomy in learning, because they are given more responsibility and freedom in their learning process (cf. Chapter 6.7). Project work can also be linked to multidisciplinary learning, which has been discussed above.

However, project-oriented teaching methods are not encouraged by the CLIL teaching materials evaluated either (cf. Result 3.1c). They need to encourage this form of learning in the future, because it focuses on communication, which is one of the main aims of CLIL.

6.9 Visual Support

Overall, visual support is an important aid for learners and teachers, because it often helps to clarify and illustrate contents in schools subject (cf. Chapters 2.1.4.1 and 2.2.1). As Result 5 shows, visuals are used in the units *Cross-Curriculum Creativity – Biology (Books 1-4)*. However, there are no photographs used in any of the units which have been evaluated. The visual support mainly consists of:

- schematic diagrams
- drawings
- clip-art pictures
- cartoons

I believe that this type of visual support is not sufficient or satisfactory for a Biology textbook. These visuals can be used in the teaching materials in some places, but it is inappropriate that the CLIL Biology teaching materials evaluated do not include any photographic material of animals or plants.

A common way of raising students' interest in the subject of Biology is to demonstrate its connections to the real world. Since CLIL Biology aims to draw on the personal experiences of the learners, it is necessary to demonstrate this connection between experience and subject matter by visualizing nature in everyday situations. At the moment, the textbooks are more reminiscent of colouring-in books than of CLIL Biology textbooks (cf. Result 5.4). Furthermore, I think that the intended learner group would find the materials more attractive if photographs were incorporated. I am aware of the fact that the lack of photographs, for example, could be a result of missing financial support to cover the expenses of the copyrights of such visuals. This reason would be understandable, but still it does not devalue the arguments for photographs in the textbooks.

In addition, in many cases the quality of the visuals which have been used in the units presently discussed is not good (cf. Result 5.1). Sometimes it might even be hard for learners to work with those low-quality materials, because they are too small, or there is not enough space provided for students to write down the words of parts which need to be identified and labelled (cf. Results 5.1 and 5.3). Furthermore, pictures and diagrams normally need to be labelled in scientific papers and in textbooks. This information is needed to show learners what they are looking at and why certain visuals are used. As Result 5.4 indicates, labels are, however, completely missing under all visual materials. All these problems are easy to solve and it would be an enormous improvement of the visual support in the present textbooks.

In CLIL, and also in more traditional teaching settings, relevant and authentic text materials should be used and therefore, the visual support also has to be meaningful and genuine. However, Result 5.1 shows that in some cases the visual support was not appropriate for the units. Therefore, this area would also need

improvement in order to increase the suitability of the teaching materials evaluated for CLIL Biology.

6.10 Teacher Support

At the moment, the most problematic deficits within CLIL teaching generally are the lack of suitable teaching materials and, therefore, the missing support which teachers will expect when they want to use this approach within a school subject. Gierlinger (2007: 80-81; cf. Chapter 2.1.3.1) has pointed out that many teachers complain about that there is hardly any support for them concerning CLIL pedagogy and methodology. Unfortunately, Results 8.1, 8.2 and 8.3 confirm this problem which stresses teachers. Teachers who use the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* for the first form of grammar and secondary modern schools are not offered any supplementary material. Consequently, they do not have any additional information on the contents of the books, and so it is difficult for them to enhance specific topics for students. A teacher's book is a resource for teachers in which they can find implementation tips, further pre-, while- or post-activities for texts, and language support which has especially been designed for teachers. In many traditionally-taught subjects (i.e. where the mother tongue is the language of instruction) and especially in second language learning classes, teacher's books are standard. In CLIL, it is not yet the norm to be provided with a teacher's book in addition to a student's book. The reason for this is that it is still difficult to find appropriate CLIL teaching materials which have specifically been developed for this teaching approach at all (cf. Chapter 2.1.3.6). As a result, teachers do not always have sufficient support to use the teaching materials even if they have been specifically devised for use in CLIL.

The potential deficit in the supply of appropriate materials for teachers reflects how young CLIL and its pedagogical and methodological principles are (cf. Chapter 2.1.3). Thus, the development of suitable materials is also affected by this problem. Clear guidelines for materials development in CLIL are not yet available, because linguists, researchers and teachers are still trying to agree on the most important methodological principles of this new teaching approach. In my opinion,

only a general set of theoretical principles for CLIL can substantially and irreversibly improve this present difficult situation in CLIL materials development.

6.11 A Traditional Approach Towards Teaching

Traditionally-taught classes mainly focus on receptive skills such as listening, reading and written production. At present, CLIL shifts the teaching emphasis from receptive to more productive skills such as speaking and interacting, which increases and encourages communication between students in the classroom (cf. Chapter 2.1.2). Compared with traditional teaching, CLIL is a teaching approach which intends to provide a naturalistic environment for the acquisition of a foreign language by putting it into context (cf. Dalton-Puffer 2007: 2; mentioned in Chapter 2.1.2). Therefore, teachers have to be trained according to the methodology of CLIL, which is currently still a problem due to its lack of research (cf. Chapter 2.1.3.3). Furthermore, the teaching materials for the CLIL subjects have to reflect the main characteristics of this teaching approach in order to guarantee the creation of a natural teaching setting. It is still difficult nowadays to find CLIL-specific materials, and only slowly do suitable teaching materials come onto the market (cf. Chapter 2.1.3.6). Due to the lack of suitable materials, CLIL is not yet very popular with current teachers in Austrian schools. The reason for this might be that it is still more convenient for them to adopt the traditional way of teaching in a subject than to use CLIL. Furthermore, teaching according to the traditional method might certainly already be a habit for teachers who have been teaching for a long time, and this might be rather difficult for them to abandon even if they do want to teach a subject in CLIL.

Even if the textbooks evaluated have been developed specifically for CLIL Biology classes, Results 2.5 and 4.2 indicate that they appear to follow a traditional approach towards teaching. The four units which have been examined in the evaluation do not employ a great variety of teaching methods and tasks. Each of the units seems to follow a similar format: first, teachers are introduced to the topic (“Information Sheet”) at the beginning of the unit. Then, there are several worksheets with reading and writing tasks for learners (cf. Chapter 4.2 – “2. Information on the tasks”). As already mentioned in Chapter 6.1, learners are not asked to perform any

productive tasks, such as discussing topics in class or with their neighbours. The communicative aspect of CLIL – the most important principle of this teaching approach – is neglected completely in all four units. This finding is rather disappointing, because it is difficult to understand how Biology teaching materials, which have been developed specifically for CLIL, appear not to contain any attempt to integrate communicative and interactive tasks. Even if CLIL methodology was not so elaborated at the time when this series of books was first published (2000), CLIL theory has developed since then. Research has been carried out by linguists and CLIL teachers in order to elaborate more concrete guidelines and principles for this teaching approach. The textbooks evaluated are already the 6th edition, which was published in 2008. I am not aware of possible changes in format, tasks or contents in the textbooks since their first publication, but there are no tasks incorporated in the present edition which would fulfil the communicative goals of CLIL as its theory suggests (cf. Chapters 2.1.2 and 6.1). If the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* were modified to encourage communication, these changes would lead to great improvements in the quality of these teaching materials.

In summary, the above discussion aimed to highlight the strengths and weaknesses of the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)*. Overall, these CLIL teaching materials help teachers to teach Biology in English, because the content is based on the Austrian curriculum of Biology (cf. BMUKK 2000a&b):

- They provide teachers with suitable basic texts on all the topics which teachers need to cover in a school years.
- The content is presented scientifically and it is biologically accurate. In addition, the language which is used is correct when looking at grammar and spelling.
- The subject of Biology is in the foreground and English language learning is integrated in the studying of the subject, because the L2 is the language of instruction.

In addition, there are several areas in the textbooks evaluated which might need improvement so that the teaching materials fulfil the methodological and didactic principles of CLIL Biology teaching:

- Communication needs to be encouraged and interactive activities need to be integrated into the tasks of the units.
- Learners need to be directly exposed to nature, which is one of the main characteristics of science classes.
- Learners need to be introduced to observation methods and experiments, two important research tools in Biology, in order to demonstrate how the natural sciences operate and how they try to explain phenomena in nature. Learners should be made aware that Biology is not only a subject which simply exists at school, but that it surrounds and engages us every day.
- The language support in the dictionary sections of the four textbooks needs to be improved. Also, further language help (e.g. phrases, German translations) should be added to the teaching materials, so that the young learners are able to understand all the contents.

7. Conclusion

The development of teaching materials for any school subject presents a challenge for those people who are involved in its design. In order to develop suitable teaching materials, developers need to have information on the content a school subject which needs to be covered by the textbooks, the methodology, pedagogy and the didactic principles of the respective subject. As stated throughout this thesis, CLIL is a very recent teaching approach which developed from structural changes in societies, because more people now have the opportunity to move between countries without too many difficulties (e.g. cf. Dalton-Puffer 2007: 1-2). Research on CLIL has been carried out by linguists in the last few years, but because this teaching approach is still very new, much more research will be needed in the future in order to explore every aspect of CLIL that might exist. Since CLIL methodology is not yet sufficiently developed, CLIL teaching materials development itself is consequently still in its infancy. As a result, teachers who are interested in using CLIL in their school subjects are left without specifically-designed teaching materials and clear guidelines on how to implement this new educational approach (cf. Massler, Steiert & Storz 2007).

At present however, CLIL-specific teaching materials are gradually starting to be developed by teachers who have already been teaching CLIL over the last few years. In CLIL teaching, Biology was only recently introduced as a CLIL subject alongside other subjects, such as Geography and History. CLIL teachers such as Mathews and Olmesdahl (*Discover Biology 1*, 2009) or Fierling and Machotka (*Cross-Curriculum Creativity – Biology (Books 1-4)*, 2008) have developed textbooks specifically for use in CLIL Biology. These materials are an enormous help for other CLIL teachers, because they offer appropriate teaching support. This facilitates the teaching of the school subject in a foreign language.

In this thesis, I have conducted a detailed textbook analysis and evaluation of the CLIL teaching materials *Cross-Curriculum Creativity – Biology (Books 1-4)*. The reason for scrutinising these materials was to investigate how far current CLIL methodology and Biology-related didactic principles are reflected in these textbooks. As the results showed, many requirements which are relevant for CLIL, for the subject of Biology and for English are fulfilled satisfactorily in the teaching materials. However, the examination also revealed that the textbooks contain many

deficits. I believe that the materials evaluated would need improvement in several areas in order for them to become more suitable for CLIL Biology. Such improvements ought to involve the incorporation of communicative and interactive tasks, of appropriate language support for learners and the encouragement of the contact with nature in the subject. Overall, it should be mentioned that the textbooks evaluated are useful materials for CLIL Biology teachers, because the accuracy of the subject matter helps to build a good basis for teaching Biology in English. In addition, the tasks which are included in the units are suitable for the intended learner group. The amount of effort which the authors, Fierling and Machotka, will have put into the development of these materials can only benefit other Biology teachers who use CLIL in their school subjects.

Finally, the evaluation results from these materials should highlight that linguists and CLIL teachers will have to carry out more research on CLIL. Coyle (2007) provides a number of suggestions on how research could be structured in the future. The linguist recommends that “communities of CLIL practitioners” should be encouraged in which the theory behind this new teaching approach can be developed (Coyle 2007: 556). In particular, this means that content and language teachers, subject and language trainers and CLIL teachers and their students would all work together on the theory of the approach. They would share experiences and ideas concerning CLIL and develop further methodological and didactic principles which are needed by future CLIL teachers (cf. Coyle 2007: 557). These communities of CLIL practitioners are also mentioned in Holmes et al. (2001). Holmes et al. (2001) try to establish an educational approach which aims for the integration of Information and Communication Technologies (ICT) into teaching. They describe that such communities of practice are “a form of communal constructivism” (Coyle 2007: 557):

[Communities of practice are] an approach to learning in which students [and teachers] not only construct their own knowledge (i.e. constructivism) as a result of interacting in their environment (social constructivism) but are also actively engaged in the process of constructing knowledge *for* their learning community (communal).
(Holmes et al. 2001: 1 quoted in Coyle 2001: 557)

This quote sums up all of the main principles of CLIL: it is a teaching approach which encourages a learner-centred teaching environment in which learners are able to practise communication in a foreign language during socio-cultural interaction. In

the end, these principles aim to educate autonomous learners who can then construct their own knowledge. If materials developers pay regard to all of these important aspects of CLIL, they will greatly increase the chances that this innovative teaching approach will increasingly find its way into classrooms.

APPENDIX

APPENDIX I – Scans of the textbooks Cross-Curriculum Creativity – Biology (Books 1-4) (Fierling & Machotka 2008)

Appendix I 1 - Cross-Curriculum Creativity – Biology – Book 1: The Human Body

1a) Cover page

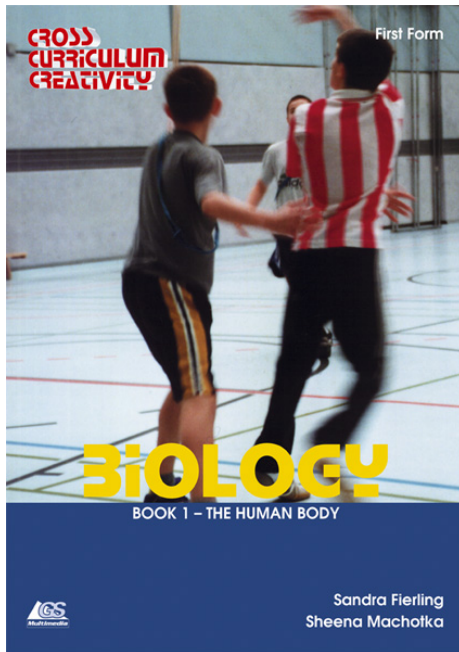


Image source:

http://www.bildungsverlag-lembberger.at/img_cover/978-3-900196-25-7_C.jpg

1b) Table of Contents (pp.3-4 HB)

Image source: Electronic scan

Introduction	
The Human Body	
The Human Body - Information Sheet	
Body Bits	
The Human Body (2)	
Body Organs	
Body Organs - Information Sheet	
Body Organs	
Body Organ Mix (2)	
Organ Geography	
Organ Order (2)	
Your Skin	
The Heart	
Matters of the Heart - Information Sheet	
Hear Your Heart	
The Heart	
Heart Beats	
The Pulse	
Circulation	
Our Circulation - Information Sheet	
Body Circuits	
The Body's Pipeline	
Bones	
The Bones of our Body - Information Sheet	
The Skeleton	
The Skeleton Selection	
All About Bones	
Bones Protect	
Backbone/Spine	
Posture Problems	
Twist and Turn	
Joints Join	
Our Muscles	
	Tooth Talk
	More Tooth Talk
	Tooth Care
	The Digestive System
	The Food we Eat
	The Senses
	The Senses - Information Sheet
	It makes a Lot of Sense
	Sense Surprises
	Body Windows
	The Ear
	The Brain
	The Brain - Information Sheet
	Brain Bits
	Brain Functions
	First Aid
	First Aid - Information Sheet
	Injuries - First Things First
	Reproduction
	Reproduction - Information Sheet
	More Body Bits
	Know Your Body
	Body Changes
	The Sperm Race
	Baby on Board
	The Birth of the Baby
	It's a Baby's Life
	Quizzes
	Biology Word Search
	Biology Quiz Chart (blank)
	Biology Quiz Cards (2)
	Biology Quiz (blank)
	Solutions
	Dictionary

Appendix I 2 - Cross-Curriculum Creativity – Biology – Book 2: Mammals

2a) Cover page

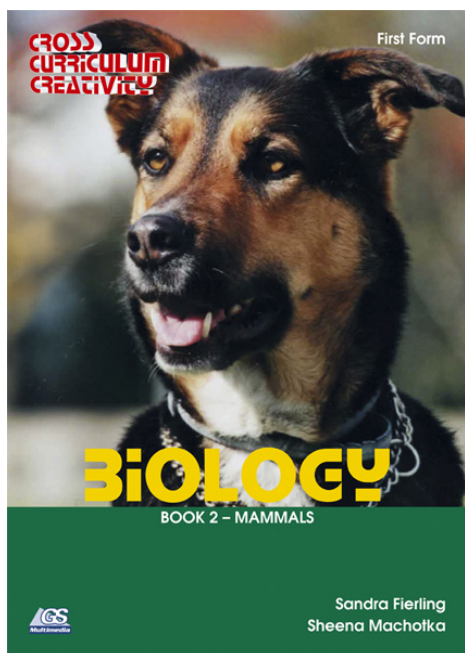


Image source:

http://www.bildungsverlag-lembberger.at/img_cover/978-3-900196-26-4_C.jpg

2b) Table of Contents (pp.3-5 M)

Image source: Electronic scan

Introduction

Mammals

Mammals Information Sheet
Animals
Mammal Mix Crossword
Parents and Offspring
Pet Puzzle
My Pet

The Dog

The Dog Information Sheet
The Dog
Define the Dog

The Cat

The Cat Information Sheet
The Cat
The Cat Number Puzzle
Label the Cat
Copycat

The Cow

The Cow Information Sheet
The Cow
Cow Confusion

The Horse

The Horse Information Sheet
The Horse Crossword
The Horse Wordsearch
Hunt the Horse Parts

The Pig

The Pig Information Sheet
The Pig

The Domestic Pig
The Domestic Pig and the Wild Pig
Comparing Pigs

The Mole

The Mole Information Sheet
The Mole
The Marvellous Mole

The Bat

The Bat Information Sheet
The Bat
Batty Bits
Bats - A Team Crossword (4 Pages)

The Deer

The Deer Information Sheet
The Deer (Wordsearch)
The Deer (Crossword)
Deer Tracks

Rabbits and Hares

Rabbits and Hares Information Sheet
The Rabbit
A Rabbit Riddle
The Hare
Rabbits and Hares (Crossword)

Rats and Mice

Rats and Mice Information Sheet
Rats and Mice
Rodent Rebus

The Shrew

The Shrew Information Sheet
The Short-Lived Shrew
The Stunning Shrew

The Hedgehog

The Hedgehog Information Sheet
The Hedgehog
The Hibernating Hedgehog

The Squirrel

The Squirrel Information Sheet
Squirrel Search
Silly Squirrel

The Bear

The Bear Information Sheet
The Bear
The Brainy Bear

Hibernation

Hibernation Information Sheet
Hibernation Highlights
Hibernation Hints

The Fox

The Fox Information Sheet
The Fox

Quizzes

What Do you Know?
Mammal Quiz
Mammal Quiz (blank)
Mammal Mania (2)
Biology Wordsearch

Solutions

Dictionary

Appendix I 3 - Cross-Curriculum Creativity – Biology – Book 3: Plants

3a) Cover page

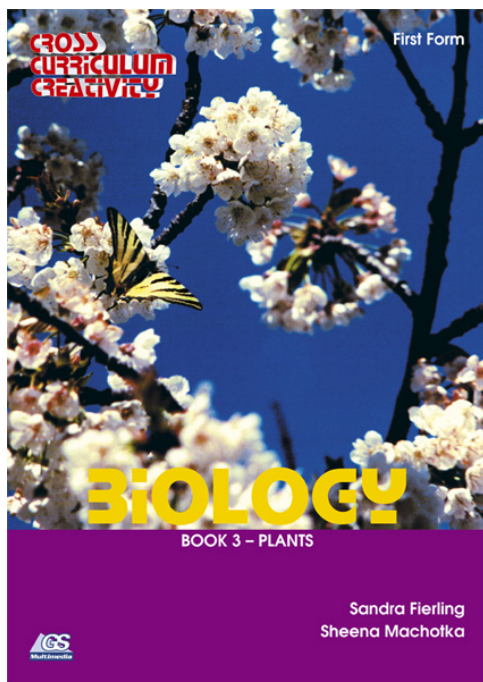


Image source:

http://www.bildungsverlag-lehmer.at/img_cover/978-3-900196-27-1_C.jpg

3b) Table of Contents (pp.3-4 P)

Image source: Electronic scan

Introduction

Living Things

- The Signs of Life
- Living Things
- Animal or Plant?

Plants and Flowers

- Plant Parts
- Flower Parts
- Flower Power
- What Do Plant Parts Do?
- More About Plant Parts
- What Plants Need
- Water That Plant
- Root Systems
- Plants Move

Pollination / Fertilization

- Powerful Pollination
- Scattering Seeds
- Speedy Seeds
- Graceful Grasses
- The Forest's Fenny Floor
- Flower Facts
- Fertilization
- Vegetative Reproduction
- Cherries, Ripe Cherries
- Find the Fruit
- Fresh From the Garden
- Watch That Bean!
- Sprouting Seedlings
- Humans and Plants - "Togetherness"
- Photosynthesis

Flower Families

- More Flower Families
- Round Robin Plant Crossword (4pp)
- Save our Wild Flowers
- A Farewell to Flowers?

Trees

- Tree Talk
- Tree Leaves
- Leaves "Fall" in Autumn
- Working With Leaves
- Coniferous Trees
- Life Cycle of a Conifer
- Deciduous Trees
- Rings of Life
- Layers of a Forest
- Types of Forests
- Life in Coniferous Forests
- Life in Deciduous Forests
- Nature's Food Chains
- Forest Food Chains
- Biology Word Search
- Biology Quiz Cards (2)
- Biology Quiz cards (empty)
- Biology Quiz Chart

Solutions

Dictionary

Sources

Appendix I 4 - Cross-Curriculum Creativity – Biology – Book 4: Birds, Reptiles, Amphibians & Fish

4a) Cover page

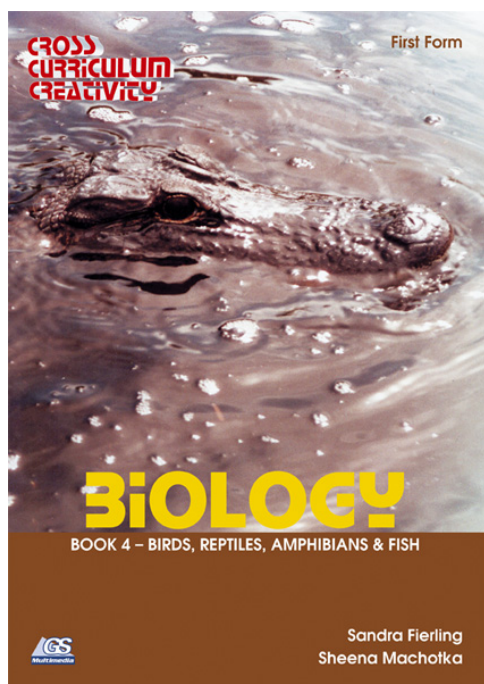


Image source:

http://www.bildungsverlag-lemburger.at/img_cover/978-3-900196-28-8_C.jpg

4b) Table of Contents (pp.3-5 BRAF)

Image source: Electronic scan

Introduction Birds Information Sheet Bird Basics Birds Flight and Feathers Information Sheet (2) Birds of a Feather Birds - Flight and Feathers A Bird Mobile for Your Classroom Poultry - the Domestic Chicken Information Sheet Which Came First - the Chicken or the Egg - Info The Chicken and the Egg The Chicken Poultry Puzzle Bird Song and Bird Talk Information Sheet Scrambled Songbirds Bird Search (2) Five Mockingbirds, Scores Lyrics Song Bird Search Blackbird Bungles Waterfowl Information Sheet (2) A Water Wizard Ducks, Swans and Geese - Info Magic Waterfowl Square Birds of Prey The Woodpecker - a Good Climber Bird Migration Information Sheet Migrating Birds The Swallow	Breeding Information Sheet Breeding Bloomers The Cuckoo Quiz Cuckoo and Blackbird Quiz (2) Helping Birds in Winter Brave Birds Bird Bits All About Birds Biology Bird Quiz Cards Bird Quiz Lizards Information Sheet Lizards Austrian Lizards Snakes Information Sheet The Simple Snake The Swallowing Snake Austrian Snakes Snakes Amphibians, Frogs and Toads Information Sheet How Frogs Develop The Life Cycle of a Frog Frogs and Toads Fish Facts Information Sheet (2) Fishy Facts - Inside and Outside Comparing Carp and Trout - Info Fishy Tales Funny Fish Fussy Fish (3) Vertebrates and "Family Trees" Information Sheet Family Trees Classy Vertebrates The Grouping Grid	Various Vertebrates Backbone - Yes or No? The Grouping Grid (blank) Vertebrate Revision I Vertebrate Revision II Animals in Danger - They Need our Help Keep our Environment Clean Biology Quiz Cards Amphibians, Reptiles, Fish Quiz Biology Quiz (blank) Biology Quiz (Chart) (blank) Biology Word search (blank) Solutions Dictionary
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Appendix I 5 – Unit “The Senses” and the dictionary section of HB

5a) “The Senses” (pp.41-45 HB)

Image source: Electronic scan

I have added all the task numbers.



The Senses

Information Sheet



Your body finds out things about the world around you through your sensory organs. There are five senses (sight, hearing, smell, touch and taste).

Nerves carry tiny electrical signals from the sense organs to the control centre, the brain, and take instructions from the brain to the muscles. The brain controls many processes automatically, such as breathing, heartbeat and digestion.

The ears are the organs of hearing and balance. We cannot hear as many different sounds as most animals. We also have to turn our heads towards the direction of a sound, unlike rabbits or horses, who can swivel their ears. The outer ear is like a satellite dish. It picks up sound waves in the air and sends them to the eardrum. They pass through the middle ear, past the hammer, anvil and stirrup to the cochlea, where they become electrical messages and are sent to the brain.

The organs of sight, the eyes, provide more than half of all the information that enters the brain. Only humans and a few other types of animal can see in full colour. Nerve cells on the retina react to light and send signals along the optic nerve to the brain.

You can really taste only four main kinds of flavours: sweet, salty, sour and bitter. Each flavour is detected by a certain part of the tongue. The tip can is sensitive to sweetness. The middle of the tongue has almost no taste buds.

Your organ of touch is the skin: you can feel heat, cold and pain. The cells of the outer layers of the skin are dead. They act like a barrier to infection.

Inside your nose are about 12 million tiny olfactory (smell) cells, with tiny hairs. When you taste food, you also smell it. When you have a cold, food does not have much taste. Nerve signals from the smell cell pass along the olfactory nerve to the brain, which analyses and identifies them. Smell is the only sense directly connected to parts of the brain dealing with memory and emotion.

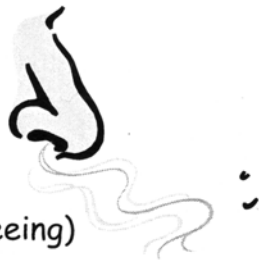


It makes a Lot of Sense

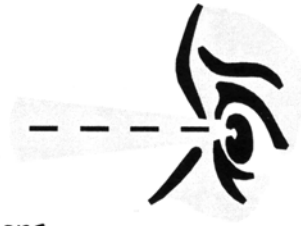
Your body has lots of ways of finding out about the world around you. We have five senses and all these senses send messages to the brain.

TASK 1

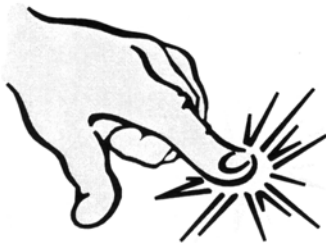
Which body parts do you need for which sense? Connect them.



Sight (seeing)
Hearing
Touch (feeling)
Smell (smelling)
Taste (tasting)



Ears
Nose
Tongue
Eyes
Skin



TASK 2

Now complete the sentences (use the word bank to help you).

1. We use our _____ to see with.
2. We use our _____ to smell with.
3. We use our _____ to feel with.
4. We use our _____ to hear with.
5. We use our _____ to taste with.

Word Bank

tongue skin ears
eyes nose





Sense Surprises



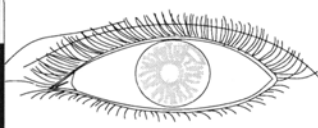
The five main senses are sight, hearing, touch, smell and taste. Your senses give you pleasure and also warn you of danger. People who lack one sense (blind or deaf people) often use other senses to make up for this loss. Maybe a deaf person can smell very well. Today blind and deaf people can receive lots of help: blind guide dogs, braille (where blind people use raised dots to read with), hearing aids to hear better with. However, we are all very happy if all our five senses are functioning well!

TASK 3

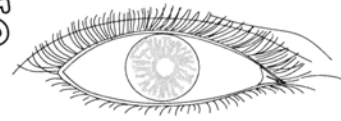
Now find the correct answers. For example, number 1 is the first letter in the answer "skin", so the letter "s" goes into the circle.

- ☐ You use your **tongue/skin/feet** to touch with 1
- ☐ When it's dark you can't **smell/taste/see** very well 3
- ☐ You taste with your **skin/ear/tongue**. 3
- ☐ If you have a cold you can't **see and hear/taste and smell** well. 3
- ☐ You feel with your **skin/eyes/ears**. 3
- ☐ You taste food with your **fingers/tongue/skin**. 1
- ☐ Messages from your senses go to your **toes/brain/bedroom**. 4
- ☐ Cats can see **very well/not so well** in the dark 1
- ☐ If you are hard of hearing you can't **see/hear/taste** well. 2

Solution: Your senses make you _____ to the world around you.



Body Windows

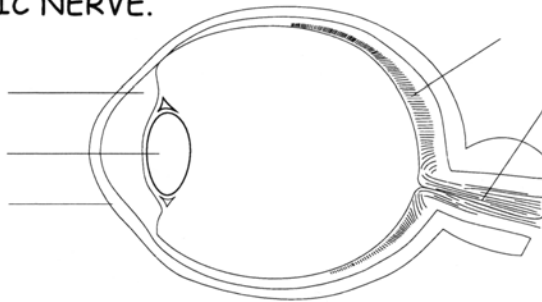


You look out onto the world around you with your eyes. Eyes can be brown, blue, green, grey - but that's only the part of the eye called the iris.

Your eye is shaped like a ball. It has a clear round window in front called the CORNEA. The coloured IRIS controls how much light enters the eye. Light enters through an opening called the PUPIL. The pupil is black and the iris surrounds it. In bright light, your pupil is very small but it gets larger when it's darker. The LENS is behind the pupil. It focuses the light onto the back wall of your eye - just like a camera. This wall is called the RETINA. The retina changes the light into nerve messages and sends them to the brain along the OPTIC NERVE.

TASK 4

Label the parts of the eye.



TASK 5

Use the above information to decipher the message.

I control the light 1 - - -

I become smaller in bright light - - - - -
10

I am the clear window 8 - - - - 3 -

I am the coloured part of the eye - - - - 6

I send pictures to the brain 9 - - - - 2 - - - 4 -

I am the wall at the back 5 - - - - 7

-
1 2 3 4 3 5 6 3 3 2 3 7 5 8 9 5 2 3 10 1 7



The Ear

Your ears let you hear sounds.

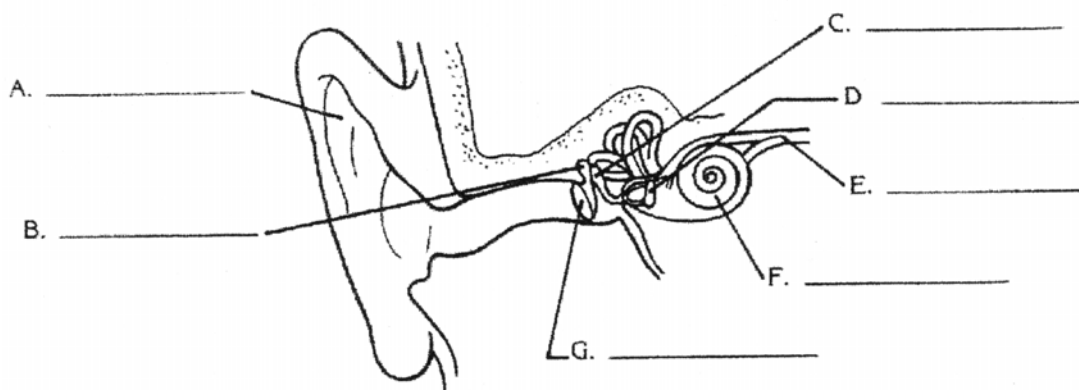
Sound travels as waves through the air and enters your ears.

The sound waves send messages to your brain and you hear.

Parts of your ears also help you to balance.

Word Bank

pinna
anvil
hammer
stirrup
cochlea
auditory nerve
eardrum

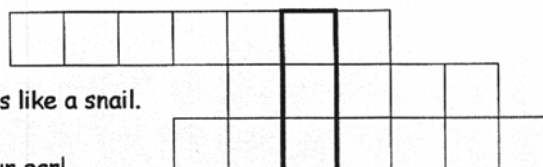


TASK 6

1. Label the parts of the ear shown.
2. Colour the parts of the ear which form the middle ear red.
3. Colour the parts of the ear which send sound impulses to the brain blue.
4. Colour the part of the ear where wax is formed yellow.

TASK 7

Can you do this simple crossword puzzle?
What's the word in the middle?



1. What is the part of the ear called that looks like a snail.
2. Sound enters the ear in w_____.
3. The name of the "musical instrument" in your ear!

5b) Dictionary section of HB (pp.67-69)

Image source: Electronic scan

Dictionary

ache, to	schmerzen	conceive, to	empfangen
acid	Säure	connect	verbinden
adult	Erwachsene(r)	consciousness	Bewusstsein
ankle	Knöchel	contract, to	sich zusammen- ziehen
backbone	Wirbelsäule	covering	Decke
belly button	Nabel	crown	Krone
bendy	biegsam	cube	Würfel
birth	Geburt	cuddle, to	liebkoosen
bladder	Blase	curvature	Krümmung
blood	Blut	deaf	taub
blood pressure	Blutdruck	decifer (decipher)	entschlüsseln
blood vessel	Blutgefäß	deformity	Missgestaltung
bone	Knochen	dentine	Zahnbein, Dentin
bottom	Gesäß	desk	Schreibtisch
brain	Gehirn	develop, to	sich entwickeln
brain stem	Gehirnstamm	digestion	Verdauung
brake, to	bremsen	dot	Punkt
breast	Brust	droop, to	hängen lassen
breathe, to	atmen	eardrum	Trommelfell
bruise	Prellung	egg	Ei
brush, to	bürsten	emergency	Notfall
build	Bau	enamel	Zahnschmelz
calm	ruhig	entire	ganz
canine	Hund-	example	Beispiel
carbon-dioxide	Kohlendioxid	excess	überflüssig
cartilage	Knorpel	factory	Fabrik
cell	Zelle	first aid	Erste Hilfe
chamber	Kammer	fist	Faust
chest	Brust	fit, to	passen
chew, to	kauen	float	schwimmen
choke, to	verschlucken	framework	Gerüst
chunk	Klumpen	furry	pelzig
circuit	Umlauf	fuse, to	zusammenfließen
circulation	Kreislauf	gap	Spalte, Abstand
code	Schlüssel		
collapse, to	zusammenbrechen		

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germs	Bazillen, Bakterien	oxygen	Sauerstoff
get rid of, to	los werden	pad	Unterlage
grind, to	knirschen	pancreas	Bauch- speicheldrüse
gum	Zahnfleisch	pipeline	Rohrleitung
harmful	schädlich	pituitary gland	Hypophyse
healthy	gesund	posture	Haltung
hearing aid	Hörgerät	protection	Schutz
heart	Herz	pubic hair	Schamhaar
heart attack	Herzanfall	race	Rennen
heart beat	Herzschlag	rapid	schnell
helpless	hilflos	report, to	berichten
hinge	Scharnier	reproduce, to	sich fortpflanzen
hole	Loch	rib	Rippe
human	menschlich	root	Wurzel
hurt, to	weh tun	safety belt	Sicherheitsgurt
injure, to	verletzen	second	Sekunde
injury	Verletzung	seep, to	sickern
intestines	Gedärme	sense	Sinn
involuntary	unwillkürlich	set	Satz
jelly	Wackelpudding	shape	formen
joint	Gelenk	share, to	teilen
kidneys	Nieren	skeleton	Skelett
layer	Schicht	skin	Haut
link, to	verbinden	skull	Schädel
liquid	flüssig	slide, to	gleiten
liver	Leber	slump, to	sinken
loss	Verlust	smooth	glatt
lungs	Lungen	socket	Höhle
main	Haupt-	sperm	Sperma
marrow	Mark	spinal cord	Rückgrat
medulla	Rückenmark	spine	Rückgrat, Wirbelsäule
mirror	Spiegel	spleen	Milz
navel	Nabel	splint	Schiene
neck	Hals	sponge	Schwamm
nourish, to	nähren	squash, to	zerquetschen
on board	an Bord		
ovary	Eierstock		

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squeeze, to	pressen
squirt, to	spritzen
stale	alt, abgenutzt, abgestanden
starch	Stärke
steadily	ständig
stomach	Magen
store, to	lagern
strain, to	sich überanstrengen
stretch, to	sich dehnen
sugar	Zucker
support	Unterstützung
swallow, to	schlucken
swivel, to	herumdrehen
taste, to	schmecken
tendon	Sehne
testicle	Hode
thigh	Oberschenkel
thumb	Daumen
tiny	winzig
tissue	Gewebe
tooth	Zahn
tough	zäh
trap door	Falltür
treat, to	behandeln
twist, to	drehen
urinary	Harn-
vagina	Scheide
valve	Klappe
various	verschieden
vein	Vene
voluntary	willkürlich
walnut	Walnuss
waste	Abfall
waterproof	wasserdicht
wrist	Handgelenk

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Appendix I 6 – Unit “The Cat” and the dictionary section of M

6a) “The Cat” (pp.18-22 M)

Image source: Electronic scan

I have added all the task numbers.



The Cat

Information Sheet



There are 36 members of the cat family. They are hunters and most species only eat meat, most are shy and live alone. Lions are the exception and live in a family group (called a pride) of up to 30 lions (mostly females). Young male lions are solitary until they challenge the head of an existing pride. Wild cats have “cubs”. Most cats hunt at night (are nocturnal). Their pupils dilate at night in order for them to see so well in the dark. They hear well, too. Cats stalk their prey silently, attack in a sudden rush (pounce on it) and kill it with a bite to the neck or throat. Their teeth are sharp. Most cats have razor sharp claws and these are retractable. They are used for defence, climbing, clinging to things and hunting. (The cheetah is an exception - its non-retractable claws are similar to the dog's helping it to run fast and long distances.). Cats' tongues have tiny muscles so they can change the surface. They lick themselves (or their young) with a smooth tongue and scrape the skin off their prey with a rough tongue. Many species of cat are endangered and man is the biggest threat to their survival! Tigers are the largest and strongest of the big cats. They live in Asia and are the only cats that really enjoy swimming! Cats have whiskers to feel with (e.g. when they need to go through a narrow opening). Their paws are soft with soft pads. They take good care of their fur. They were known as far back as Ancient Egypt (Falb cats) where they were often honoured as gods. Kittens (baby cats) are born blind - after being in the womb for 65 days.

Male cat: Tom

Some cats: lions, leopards, tigers, jaguars, panthers, cheetahs, lynx, pumas, wild cats, domestic cats.



TASK 1

The Cat

Habitat

The cat lives in homes and likes families. Cats like to hunt in grass and woods at night. They like warm, sunny places during the day.

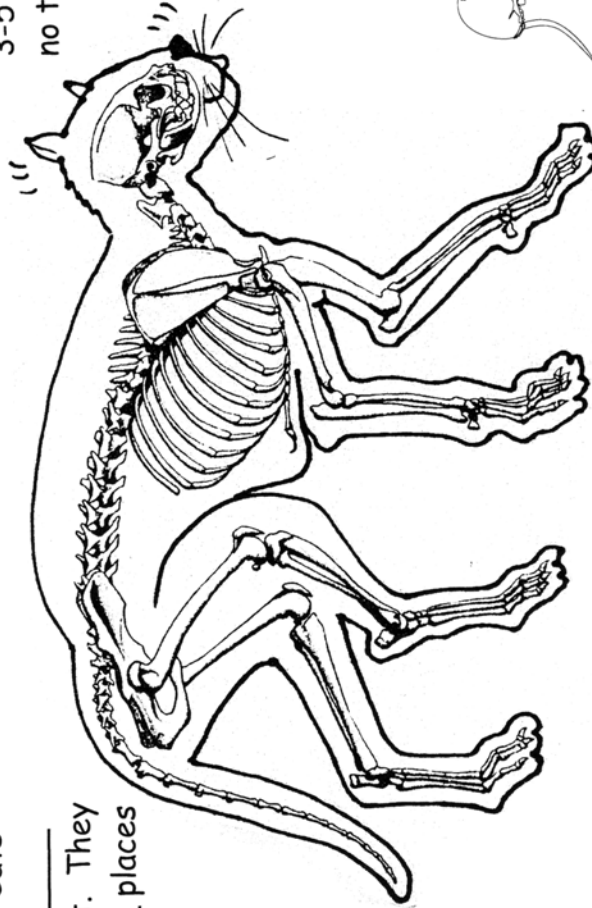
food, gardens, mice, claws, cats, kittens, grams, meat, sunny, long

Reproduction

The female cat gives birth to 3-5 kittens which are blind, have no teeth and weigh 100-140 g.

Ancestors

In ancient Egypt many families had cats like the ones in our homes.



Appearance

Cats come in many shapes and sizes. They can have long or short fur. They have very sharp claws. They like to pounce on their prey.

Food

The cat likes to eat meat, and small animals like mice. Cats like to eat tinned food and also dry food. They drink water.





TASK 2

The Cat Number Puzzle

Read the information on page 21 - "Label the cat".

Read the sentences below. Colour the square marked **1** blue, if you think sentence number 1 is correct. Colour it red if you think it is wrong. Square **2** = sentence number 2, and so on. Do the same for all 7 sentences.

1. Cats like to hunt alone.
2. In the sun, the pupils of cats' eyes open wide.
3. Cats like to hunt and kill birds.
4. Cats always have their claws out.
5. Cats can sleep for 16 hours a day.
6. A baby cat is called a kitten.
7. The mother cat gives her babies water.

1	2	3	7	2	2	4
3	4	5	4	7	2	7
5	7	6	7	3	7	2
1	4	3	5	6	1	3
1	7	4	7	6	4	2
6	2	2	4	3	7	2
3	7	4	4	5	7	2

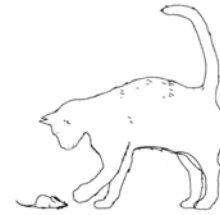


When you have coloured everything, which blue number can you see in the number puzzle?

Solution: _____



Label the Cat



Cats like to catch mice, rats, frogs and birds. They like to hunt alone. They bend down, creep up very slowly and quietly on their prey, and then jump!

Cats have very sharp claws and teeth. They can pull back (retract) their claws.

Sometimes they bite the necks of their prey.

Cats have very good eyes. They can see well in the dark, at night. Their pupils form slits in the sunshine. They have very good ears. They hear well. They can turn their ears towards a noise. They can feel well with their whiskers.

Cats can sleep for 16 hours in one day.

Baby cats are called kittens and drink milk from their mothers.

People sometimes say that a cat has nine lives ! Is this true?

TASK 3

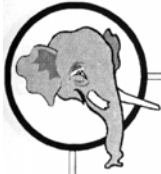
- What is the name for a baby cat? _____
- What do cats eat? _____
- What do cats drink? _____
- What can cats do with their claws? _____

TASK 4

Label the parts of the cat, using the following words:

soft paw sharp claw furry tail long whiskers sensitive eye pointed ear

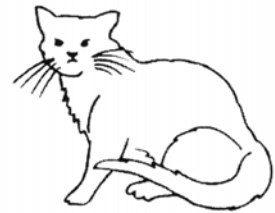




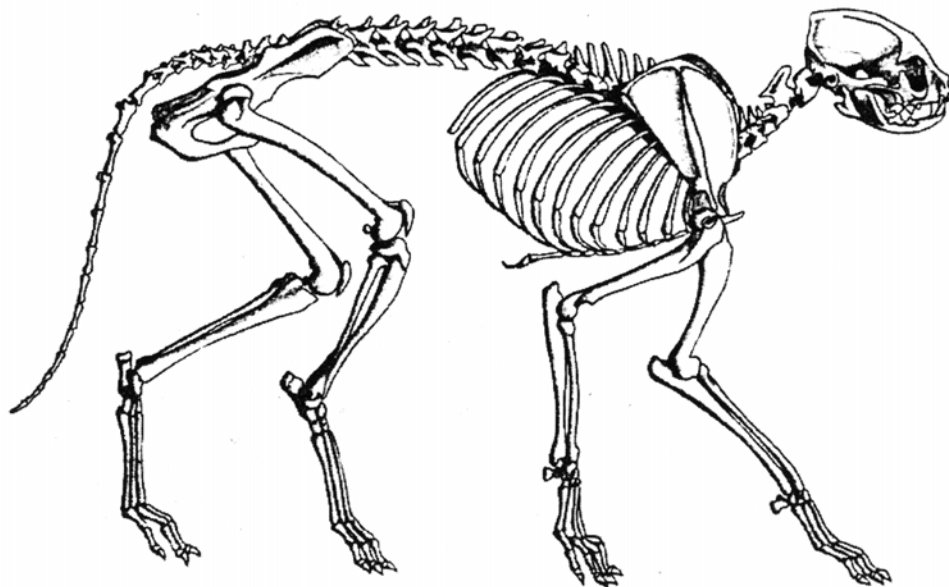
Copycat

TASK 5

Use the words from the word bank to label the parts of the cat in the picture below:



breastbone
skull jawbone
ribs knee-bone toe-bones
foot bones tailbones hip-bone
backbone shoulder blade
retractable claws neck bones



TASK 6

Draw the pupils in the cat's eyes in the pictures below:



Now describe your drawings:

When it is _____, the pupil is _____.

When it is _____, the pupil is _____.

6b) Dictionary section of M (pp.87-89)

Image source: Electronic scan

Dictionary			
air	Luft	bunny	Häschen (niedlich)
alive	lebend	burrow	Bau (Kaninchen)
Alsation	Schäferhund	bury, to	begraben
ancestors	Vorfahren	butterfly	Schmetterling
ancient Egypt	Alt Ägypten	calf	Kalb
animal	Tier	carnivore	Fleischfresser
ankle	Knöchel	cat	Katze
antlers	Geweih	catch, to	fangen
appearance	Aussehen	caterpillar	Raupe
autumn	Herbst	cave	Höhle
available	vorhanden	cereals	Getreide
backbone	Rückgrat	check, to	überprüfen
bark	Rinde	cheek	Wange
bat	Fledermaus	chew the cud, to	wiederkauen
bear	Bär	chew, to	kauen
beat, to	schlagen	chicken	Huhn
beetle	Käfer	circle	Kreis
bird	Vogel	clavicle	Schlüsselbein
birds of prey	Greifvögel	claws	Krallen/Klauen
bite, to	beißen	climber	Kletterer
blinkers	Scheuklappen	clothing	Bekleidung
blood	Blut	cloven hoof	Paarhufer
boar	Eber	cloven	gespalten
bob, to	auf- und abwippen	clover	Klee
both	beide	clue	Tipp
box	Kasten	coat	Fell
brainy	gescheit	collar-bone	Schlüsselbein
branch	Ast	collect, to	sammeln
breast	Brust	colour	Farbe
breaststroke	Brustschwimmen	confusion	Verwirrung
breed (of dog)	Rasse	covered	gedeckt
breed, to	sich vermehren	cow	Kuh
brick	Ziegel	creep, to	kriechen
bristles	Borsten	cry	Schrei
buck	Bock	cub	Junge
building	Gebäude	cunning	schlau

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curly	lockig	form	Mulde/Sasse
dairy product	Milchprodukt	fox	Fuchs
damage, to	beschädigen	freeze, to	frieren
damp	feucht	frog	Frosch
dandelion	Läwenzahn	fruit	Obst
dangerous	gefährlich	fur	Fell
dark	dunkel	German	Schäferhund
deer	Rotwild/Reh	shepherd	
den/earth	Bau/Lager	glands	Drüsen
descend from, to	abstammen	grain	Getreide
dictionary	Wörterbuch	greeting	Gruß
die, to	sterben	grid	Gitter
digest, to	verdauen	ground	Boden
disc	Scheibe	habitat	Lebensraum
ditch	Graben	hare	Hase
doe	Ricke	hare-lip	Hasenscharte
dog	Hund	hay	Heu
dolphin	Delphin	heart	Herz
domestic	Haus-/Nutz-	hedgehog	Igel
animal	Tier	hen	Henne
during	während	herbivore	Pflanzenfresser
dusk	Dämmerung	hibernate, to	Winterschlaf
echo-location	Echolot	hold	halten
endangered	gefährdet	hibernation	Winterschlaf
enormous	riesig, gigantisch	hide	Haut/Fell (eines Tieres)
face	Gesicht	hide, to	sich verstecken
fact	Tatsache	high pitched	In hoher Tonlage
fawn	Kitz	hip	Hüfte
feed, to	füttern	hock	Knöchel
female	weiblich	hog	Eber
fiercely	heftig, grimmig	hole	Loch
flanks	Flanken	home	Heim
fledg(e)lings	Jungvögel	honey	Honig
flesh	Fleisch	hoof	Huf
foal	Fohle	hook	Haken
food	Futter	hop, to	hüpfen
forest	Wald/Forst		

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horse	Pferd	mud	Schlamm
huddle, to	sich zusammendrängen	munch	mampfen
		musk-rat	Bisamratte
human	Mensch	musky	modrig,
hungry	hungrig		moschusartig
hunt, to	jagen	muzzle	Maul
indoors	innen	neck	Nacken, Genick
italics	Kursiv	noise	Lärm/Geräusch
jaw	Kiefer	nuts	Nüsse
jump, to	springen	oats	Hafer
kitten	Kätzchen	offspring	Junge
label, to	benennen/ beschriften	omnivore	Allesfresser
		opposite	Gegenteil
lake	See	pads	Ballen
lamb	Lamm	pair	Paar
leather	Leder	parents	Eltern
leaves	Blätter	peelings	Schalen
leveret	Häschen	pelvis	Becken
lip	Lippe	pet	Haustier
litter	Wurf	pig	Schwein
loin	Lende	piglet	Ferkel
lurk, to	lauern	pine cone	Tannenzapfen
male	männlich	plants	Pflanzen
mammal	Säugetier	pocket/pouch	Beutel
mane	Mähne	polar bear	Eisbär
mania	Wahn/ Verrücktheit	pork	Schweinefleisch
		pounce, to	springen
mare	Stute	powerful	kräftig
marsupial	Beuteltier	predator	Raubtier
marvellous	wunderbar	prey	Beute
mate, to	sich paaren	prickles	Stacheln
mean, to	bedeuten	pupil	Pupille
meat	Fleisch	puppy	Welpen
mice	Mäuse	rabbit	Kaninchen
mole	Maulwurf	rabies	Tollwut
monkey	Affe	raccoon	Waschbär
mouse	Maus	race	Rennen (auch Rasse)

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rapid	schnell	smuggle, to	schmuggeln	tiny	winzig
rat	Ratte	snake	Schlange	tip toe walker	Zehenspitzenwandler
recorded	eingetragen	snout	Rüssel/Schnauze	tired	müde
reindeer	Rentier	snow	Schnee	touch	Berührung
related	verwandt	soap	Seife	toxic	giftig
reproduction	Vermehrung	soil	Erde	trespass, to	eindringen
retract, to	einziehen	soles	Sohlen	trot, to	traben
ribs	Rippen	sow	Sau	tusk	Hauer
ride, to	reiten	spade	Spaten	twigs	Zweige
river	Fluß	species	Spezies/Arten	twitch, to	zucken
rodent	Nagetier	spines	Stacheln	udder	Euter
root	Wurzel	spirited	temperamentvoll	underline, to	unterstreichen
rough	rau	split	Spalte	unpleasant	unangenehm
rumen	Pansenmagen	spring	Frühling	upper	ober
ruminant	Wiederkäuer	square	Viereck	upside down	verkehrt herum
saliva	Speichel	squirrel	Eichhörnchen		umgedreht
saucer	Untertasse	stag	Hirsch	veal	Kalbfleisch
screwy	verschoben	stallion	Hengst	vegetables	Gemüse
seeds	Samen	steer, to	steuern	velvet	Samt
senses	Sinne	stomach	Magen	venison	Rehfleisch
sensitive	sensibel	store, to	lagern	vertebrae	Wirbel
set	Satz	stripes	Streifen	vixen	Füchsin
shape	Form/Gestalt	strong	stark	voice	Stimme
sharp	scharf/spitz	stun, to	betäuben	vole	Wühlmaus
sharpen, to	schärfen	stunning	atemberaubend	walk, to	gehen
shed, to	abwerfen	sunglasses	Sonnenbrille	wallow, to	sich suhlen/wälzen
sheep	Schaf	sunny	sonnig	warren	Bau
shoot, to	schießen	supply	Vorrat	web	Schwimmhaut
shoulder blade	Schulterblatt	survive	überleben	weigh, to	wiegen
shrew	Spitzmaus	Switzerland	die Schweiz	weight	Gewicht
shy	scheu	tadpole	Kaulquappe	whiskers	Schnurrhaare
size	Größe	tail	Schwanz	withers	Widerrist
skull	Schädel	territory	Revier		
sleep, to	schlafen	thigh	Oberschenkel		
slit	Schlitz	thump, to	trommeln/klopfen		
slugs	Nacktschnecken	tight	fest		
smile, to	lächeln	timid	scheu		

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Appendix I 7 – Unit “Plants and Flowers” and the dictionary section of P
7a) “Plants and Flowers” (pp.9-17 P)

Image source: Electronic scan

I have added all the task numbers.



TASK 1

Plant Parts

Flowers are beautiful and lots of them smell nice too. Look at the plant below and label the parts. Then colour it in.



bud	flower	root	leaf	stem
				

What's your favourite flower? What colour is it?



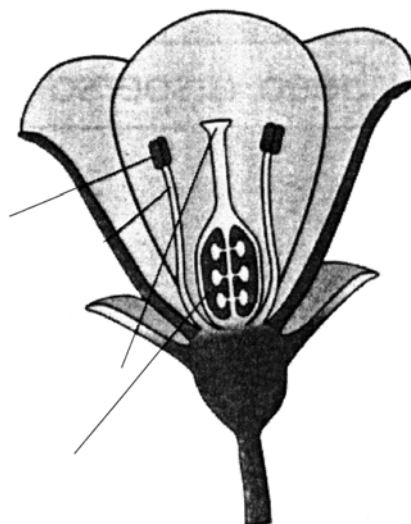
Flower Parts

Flowers are made up of different parts. There are male and female parts.

Pollen is made by the male part of the flower - the stamen. (StaMEN - male).

The female part of the flower produces seeds - the stigma (stigMA - ma for mama - female). The ovary is the flower's seedbox. The carpel is the name for the female parts - the stigma and the ovary. A seed (ovule) can only grow when it is fertilised by pollen - this is called pollination.

Look at the names of the flower parts in this picture of a tulip.



TASK 2

Unjumble the flower parts and look at what they do.

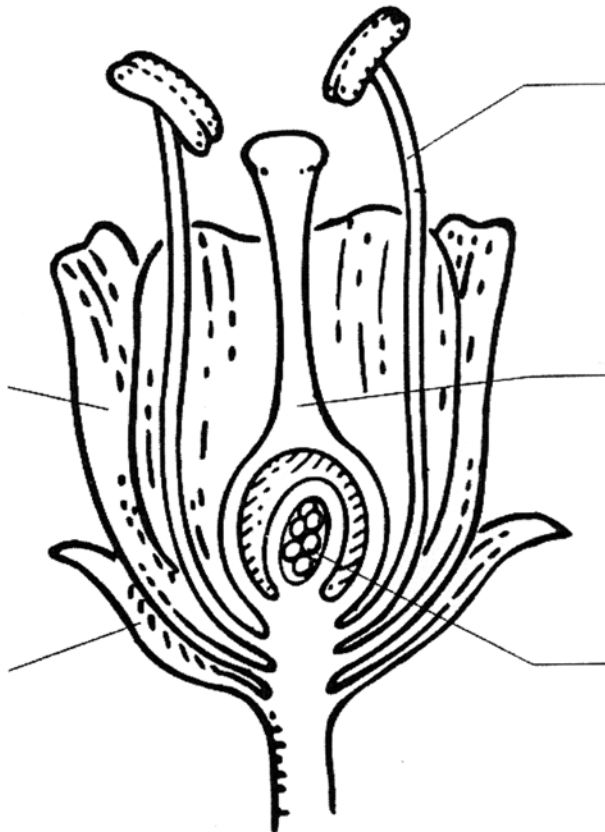
Flower Part	What it does
talep	attracts insects to the flower
mensta	male parts which produce pollen
magist	top of female part of the flower
varoy	the female seedbox



Flower Power

TASK 3

It is the job of the flower to make seeds inside the flower. Look at the information below and use it to label and colour the flower.



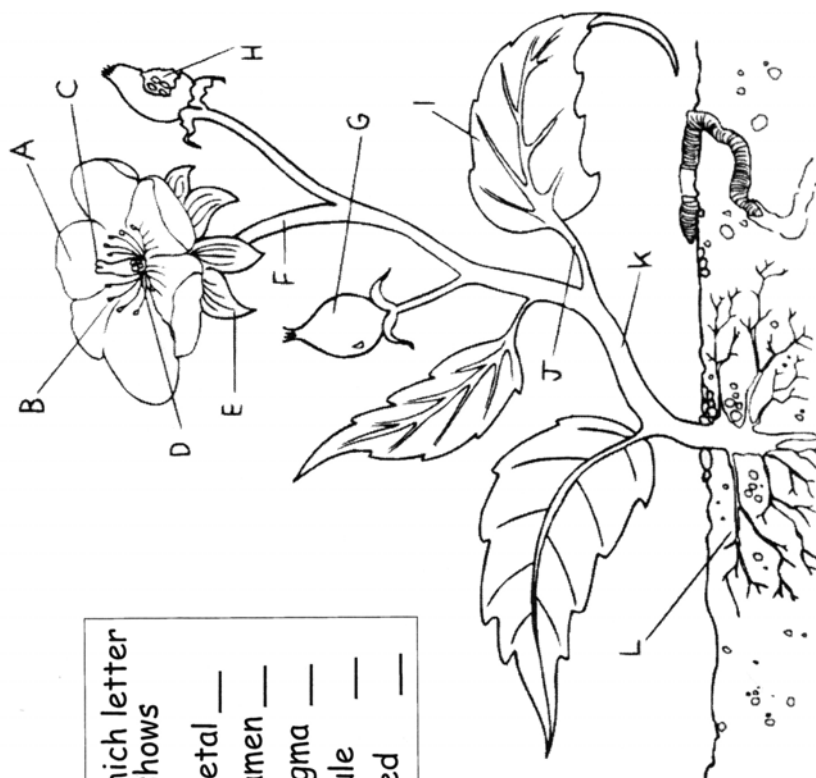
Flower Part	Description	Colour
pistil	Large centre stalk often looks like a water bottle	yellow
stamen	A thin, tall stalk with a knobbed tip. It holds grains of pollen.	brown
petal	Brightly coloured and sweet smelling leaves to attract insects	a bright colour
sepal	Small leaf-like part at the bottom of the flower	green
ovary	Ball-shaped part at the bottom of the pistil. This is where seeds develop	blue



TASK 4

What Do Plant Parts Do?

Look at the plant parts - they are labelled from A to L. Put the correct letter to ist task in the table. Part L has two tasks.



Which letter shows
a petal —
stamen —
stigma —
ovule —
seed —

Part	What it does
	makes food
	takes water to leaf
	attracts insects
	holds up flowers
	takes water to leaf and flower
	catches pollen
	turns into a seed
	grows into new plant
	holds plant in ground
	protects flower in bud
	takes up water from soil



More About Plant Parts

Flowering plants have six parts:
stem, root, leaf, flower, fruit
and seeds.



TASK 5

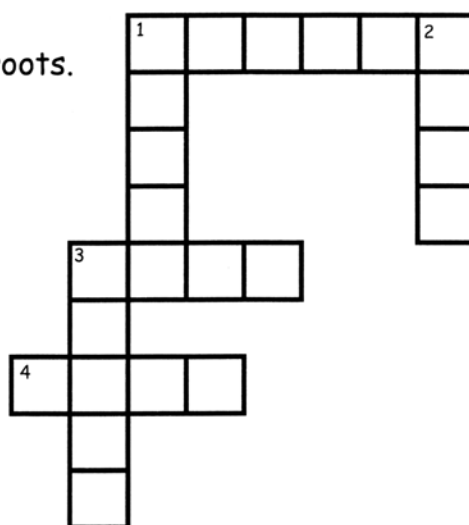
Complete the crossword and
use the words to label the
plant.

Across:

1. I often have beautiful colours
but my real job is to make seeds.
3. I carry water from the roots to
the leaves and food back to the roots.
4. I collect energy from the sun to
make food for the plant.

Down:

1. I usually taste good but my job
is to hold and protect the seeds.
2. I hold the plant tight in the soil
but also collect water and
minerals from the soil.
3. Some day a new plant will grow
from us.





TASK 6

What Plants Need

Plants only need light, air and water to grow. They grow well in brightly lit, warm places. Think of the plants in the Rainforest - this is paradise for $\frac{1}{14}$!

LIGHT

If there is $\frac{8}{10}$ - - enough light, plants die because the leaves cannot make food. Plants grow towards the $\frac{10}{4}$.

AIR

Plants need the air to make food. They use carbon dioxide from the $\frac{13}{9}$ - - plus water from the roots and energy from $\frac{2}{11}$ sun to make a $\frac{12}{7}$ food.

WATER

Roots draw up water from the $\frac{6}{5}$ - - - , it travels up the stems to the leaves. Otherwise plants couldn't grow.

TEMPERATURE

Plants grow better in warm places. In $\frac{5}{3}$ - - countries like Iceland, plants grow very $\frac{3}{3}$ - - - .

Use the word bank below to find out the name we use to describe how plants make food.



1 2 3 4 5 6 7 8 9 10 11 12 13 14

Word Bank

cold soil not plants light the air slowly sugary

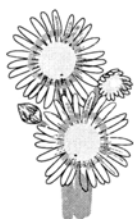




Water That Plant

Plants in your garden and home need your care. They need water and sunlight. If they are inside, sometimes their leaves get dusty so it's good to clean them. Flowers and plants make us feel good so we should make sure they feel fine too.

American Indians knew a lot about plants and they used all the parts of the plants. They ate the root of the sunflower and fed the stem and leaves to their animals. They ground the seeds for flour and the oil for their hair. They even used the yellow petals for dye. They also used the roots and leaves of certain plants to make tea which they drank when they were sick.



TASK 7

Think about plants you know and what they are used for.

Plant	Part of Plant	Used for
peppermint	leaves	tea



Root Systems

Plants need water - without water they wilt and die. The roots of the plant take water and minerals from the ground. Water and minerals are in the soil. Minerals include calcium, magnesium, phosphorus, etc.

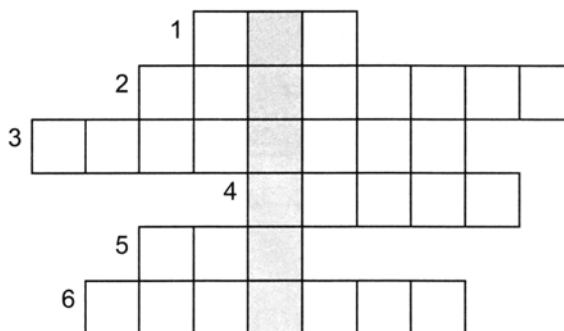
There are two kinds of root systems. Some plants have one main root that grows deep into the ground - the tap root. Other smaller roots branch off the tap root. Other plants are anchored to the ground with shallow roots that have lots of branches. These roots are called fibrous roots. Both root systems have tiny root hairs and these hairs absorb (take) the water out of the soil.

TASK 8

Look at the pictures and label the roots - tap or fibrous.



1. This root grows deep into the ground.
2. Roots take up water and _____.
3. Fibrous roots have lots of _____.
4. These are tiny and absorb water.
5. How many root systems are there?
6. This root system has shallow roots.



Roots _____ the plant to the ground



Plants Move

The roots, stems, leaves and even flowers of plants grow in different directions. Leaves grow towards the **LIGHT**. Roots grow towards **WATER**. A plant grows straight up in the air, away from the centre of the earth, because of **GRAVITY**.

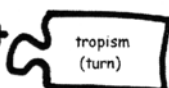
TASK 9

These 3 kinds of plant movements have special names. The names come from putting two words together.

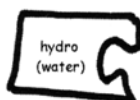
Read the two words, then write down the new word.



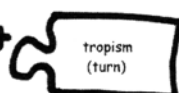
+



_____ To turn towards light



+



_____ To turn towards water



+

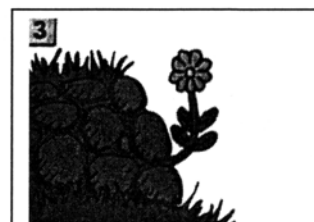
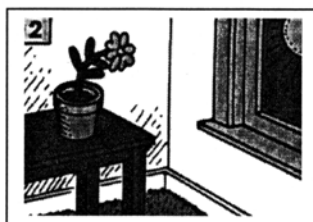
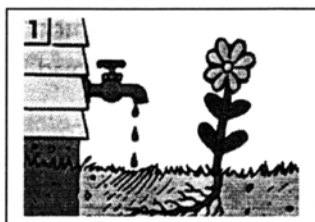


_____ To turn because of the Earth's gravity

TASK 10

Look at the 3 plants below.

1. Write down what is making them "move" or grow in this way.
2. Write down the correct special name for this kind of movement.



- 1) The root is growing towards the _____. This is _____.
- 2) The flower is growing towards the _____. This is _____.
- 3) The plant is growing straight upwards because of _____.
This is: _____.

7b) Dictionary section of P (pp. 64-65)

Dictionary

adult	Erwachsen	maple	Ahorn
ash	Esche	marsh	Sumpf
bark	Rinde	moist	feucht
bark, to	bellen	moss	Moos
beech	Buche	need, to	brauchen
bracken	Farnkraut	oak	Eiche
breathe, to	atmen	opposite	Gegenteil
bud	Knospe	ovary	Fruchtknoten
bulb	Blumenzwiebel	oxygen	Sauerstoff
capitals	Großbuchstaben	peas	Gartenerbsen
carbon dioxide	Kohlendioxid	petal	Blumenblatt
carpel	Fruchtblatt	pine	Fichte
chain	Kette	pip	Kern
cherry	Kirsche	pistil	Stempel
clover	Klee	plumule	Sprössling,
conifer	Nadelbaum		Blattknospe
cornflower	Kornblume	pod	Schote
cotyledon	Samenlappen,	pollination	Bestäubung
	Keimblatt	primrose	Primel
damage	verletzen	radicle	Keimwurzel
dandelion	Löwenzahn	react, to	reagieren
deciduous	Laubbäume	respire, to	atmen
dust	Staub	rhizome	Wurzelstock
elm	Ulme	root	Wurzel
excited	aufgeregt	runner	Läufer
excrete, to	ausscheiden	saucer	Untertasse
exhale, to	ausatmen	save, to	retten
extinct	ausgestorben	scatter, to	streuen
farewell	Wiedersehen	seed	Samen
flour	Mehl	seedling	Sämling
fur	Pelz	sepals	Kelchblatt
gravity	Schwerkraft	shallow	flach, seicht
hawthorn	Weißdorn	shoot	Sprössling
hay	Heu	sign	Anzeichen
inhale, to	einatmen	sneeze, to	niesen
lettuce	Salat	snowdrop	Schneeglöckchen

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soil	Erde
spore	Spore, Keimkorn
spruce	Fichte, Rottanne
squirrel	Eichkätzchen,
	Eichhörnchen
stamen	Staubfaden
stem	Stängel
stigma	Narbe
sundew	Sonnentau
tap root	Hauptwurzel
tuber	Knolle
waste	Abfall
wheeze, to	keuchen
wilt, to	verblühen
wither, to	verwelken

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Appendix I 8 – Unit “Snakes” and the dictionary section of BRAF

6a) “Snakes” (pp.51-55 BRAF)

Image source: Electronic scan

I have added all the task numbers.



Cross-Curriculum Creativity - Biology Book 4: Birds, Reptiles, Amphibians & Fish

Snakes

Information Sheet

Snakes belong to the reptile family and have been living on the planet for millions of years.

Snakes move using their ribs and they form an "S" when they move. They have a forked tongue and they are constantly "smelling" their immediate surroundings with it and use it for orientation purposes. Snakes have no eyelids.



Snakes kill their prey either by "constricting" it - i.e. wrapping themselves around their prey and squeezing until the animal dies - the boa constrictor and the anaconda are good examples. Other snakes are venomous/poisonous. They have special fangs which inject poison/venom into their prey. This venom is mostly deadly to the animal involved.

Snakes swallow their prey whole. They are able to dislocate their jaw so their mouth can stretch to swallow. Then the snake goes to rest to digest the food. Snakes are cold blooded animals and don't have to eat very often.

In Austria snakes eat small rodents, frogs, insects etc. Once they have seen their prey, they strike very quickly.

The Ringelnatter (Ringed Adder) is a good swimmer and can mostly be seen around water. Its main food is frogs. It has yellow patches on the sides of its heads. It is not poisonous.

The Northern Viper (Kreuzotter) is a small snake (50-60 cm long) and mostly eats mice and other small rodents which are killed with venom so it is a poisonous snake. It likes living in open spaces in woods and sunning itself. It has zig-zag markings on its back.

All Austrian snakes are endangered so they are protected.



The Simple Snake

Snakes are reptiles and have been living on the planet for millions of years. They use their ribs to move and form an "S" when moving. Their forked tongues are always used for "smelling" their surroundings and for orientation. They have no eyelids. Snakes swallow their prey whole - they can dislocate their jaw so their mouth can stretch over their prey - then they rest to digest their food. They are cold blooded and don't have to eat very often. They lay eggs with soft shells.

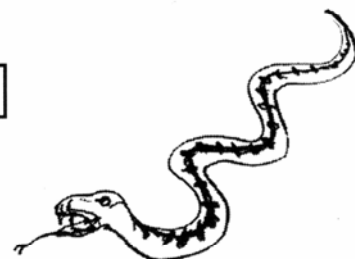
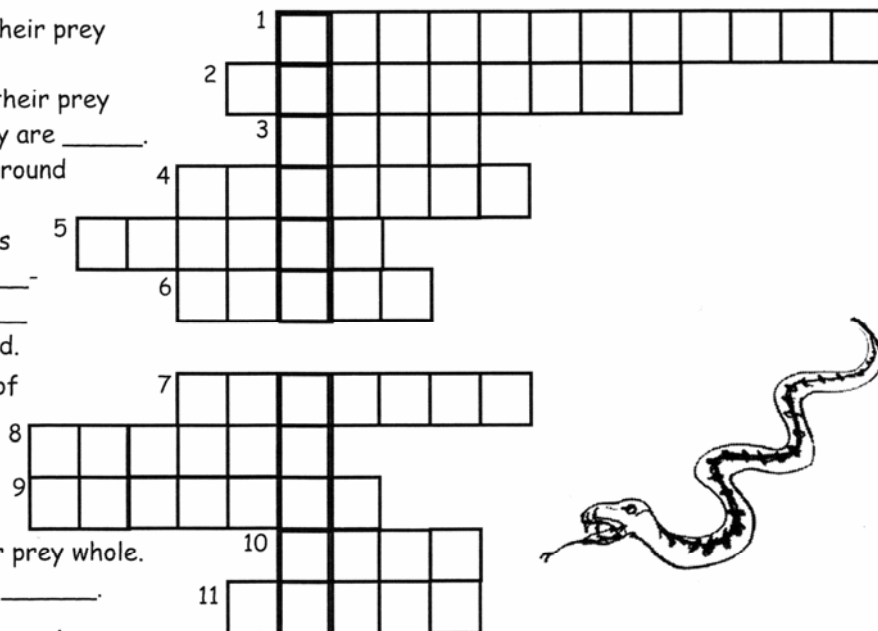
The RINGED ADDER is a good swimmer and likes living near water. It eats frogs and kills them by wrapping itself around the frog and squeezing - these snakes are called constrictors. The Ringed Adder has yellow patches on the sides of its head.

The NORTHERN VIPER is poisonous - it kills small mammals like rats by biting and injecting poison (called venom) with its fangs (special teeth). It is a small snake (50-60 cm long) and likes living in open spaces in woods and sunning itself. It has a pattern of zig-zags on its back.

TASK 1

Now complete the crossword to find out another name for the Northern Viper.

1. These snakes kill their prey by squeezing.
2. These snakes kill their prey with venom so they are _____.
3. They _____ on the ground in an S.
4. The viper eats rats and other small _____.
5. This snake has _____ patches on its head.
6. Venom comes out of their _____.
7. They _____ their prey whole.
8. Their tongues are _____.
9. They have no _____.
10. The young hatch out of _____.
11. The Ringed Adder eats these.

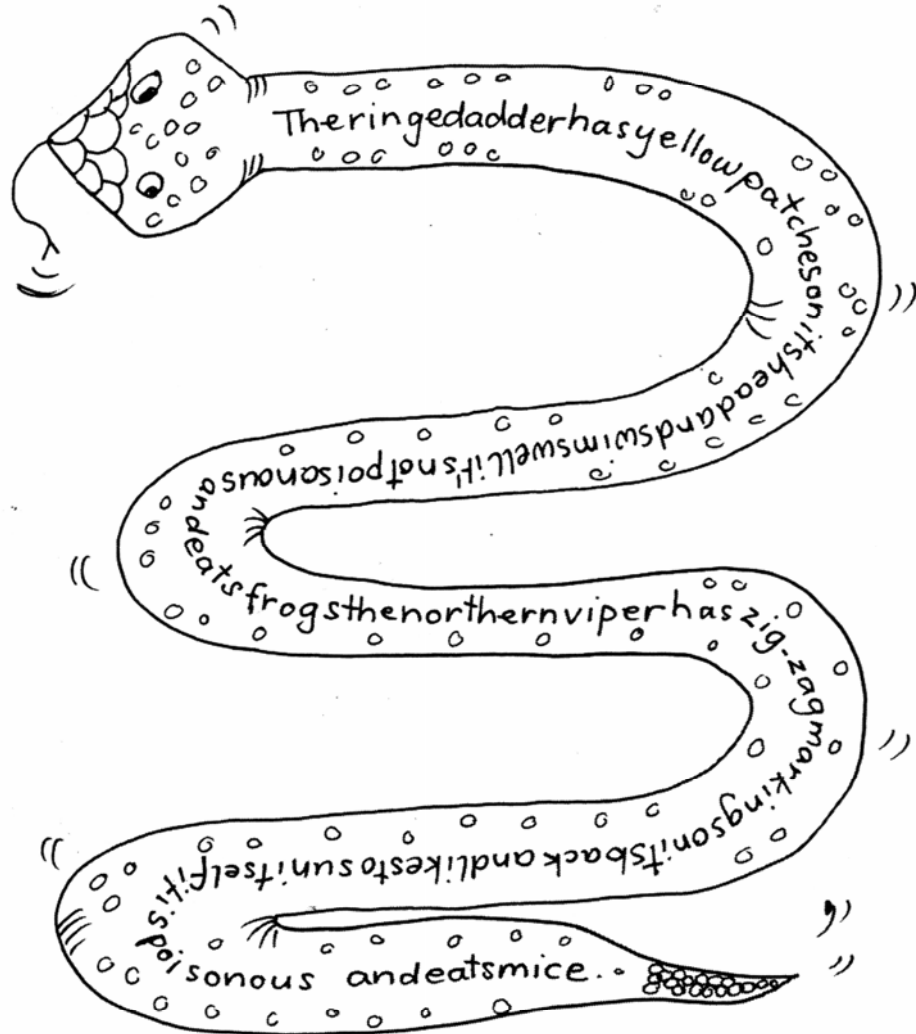




TASK 2

The Swallowing Snake

Find out what the snake has swallowed. Write it down.





Austrian Snakes

Snakes belong to the reptile family and have been living on the planet for millions of years. They use their ribs to move and form an "S" when moving. Their forked tongues are always used for "smelling" their surroundings and for orientation. They have no eyelids. Snakes swallow their prey whole. To do this they can dislocate their jaw so their mouth can stretch over the animal. Then the snakes rest and digest the food. They are cold-blooded and don't have to eat often. They lay eggs.

The RINGED ADDER (Ringelnatter) is a good swimmer and likes living near water. It mainly eats frogs but is not poisonous. It has yellow patches on the sides of its head.



TASK 3

The Northern Viper

Use the information below and the word bank to fill in the blanks and find out another name for this snake.

Another word for snake's poison: -----₃

-----₅ -----₆

-----₇

the venom -----₁₀ the fang

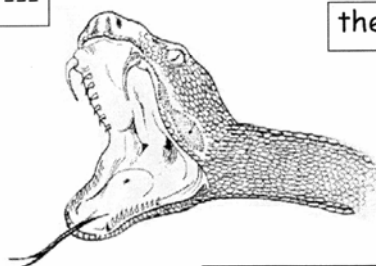
-----₂

the venom is -----₈ here

the venom ---₁

4= 13th letter of the alphabet

9= 4th letter of the alphabet



-----₁₁ tongue

1 2 3 4 5 6 7 8 9 10 11

Word Bank:

upper jaw, sac, enters, ejected, poisonous fang, venom, forked, lower jaw

The Northern Viper is a small snake (50-60 cm long), which mostly eats mice and other small animals - killed with venom from its fangs (teeth). So this snake is poisonous. It likes living in open spaces in woods and sunning itself. It has zig-zag markings on its back.

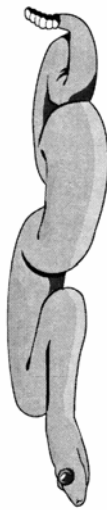
Snakes

TASK 4



There are over 2,400 species of snake

Snakes mate when they are 2-3 years old and the female lays 9 eggs. In colder climates the eggs stay inside the snake and she gives birth to live snakes



Snakes swallow poor markings smelling crocodiles eggs reptiles mouth venom

Snakes have 3 eyesight (no eyelids) and poor hearing (no external ears). They find their prey by 10 (flicking their forked tongue in the air) and by feeling vibrations on the ground. They are 5 and are cold-blooded so do not have a lot of food

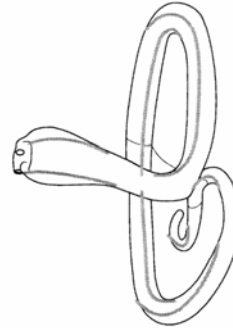
Snakes kill their prey: with 6 (poison) using their fangs (hollow teeth). Snakes kill their prey: by constriction (wrap themselves around prey and slowly squeeze!)



All snakes are 1 2 3 4 5 6 7 8 9 10

They have 8 on their skin for camouflage. Bright colours often mean the snake is poisonous. 4 shed their skin. Scales on their belly grip the ground. Snakes move in S-shaped curves

Small snakes eat insects and worms. Larger snakes eat eggs, birds, small mammals, even gazelles and 1. They 2 their prey whole and can separate their jaw bone and stretch their 7 very wide



8b) Dictionary section of BRAF (pp.91-95)

Dictionary

acute	scharf	bungle	Fehler
adder	Natter	butterfly	Schmetterling
alike	ähnlich	camouflage	tarnen/Tarnung
amphibian	Lurche	carnivore	Fleischfresser
ancestors	Vorfahren	carp	Karpfen
ants	Ameisen	cartilage	Knorpel
appearance	Erscheinung	caterpillar	Raupe
approach, to	sich nähern	cheeky	frech
attract, to	anziehen	chin	Kinn
balance	Ausgleich	claim	beanspruchen
barb	Barb	claw	Kralle
barbel	Barbe	claws	Krallen
base	Unterteil	climate	Klima
bat	Fledermaus	climber	Kletterer
beak/bill	Schnabel	cloaca	Kloake
beetle	Käfer	cob	männlicher Schwan
belly	Bauch	cock	Hahn
berries	Beeren	comb /crest	Kamm
birds of prey	Raubvögel	constrict, to	erdücken, erwürgen
bits	Stückchen		Deckfeder
blackbird	Amsel	contour	
bladder	Blase	(feather)	
bloomers	Fehler	cover, to	decken
blue-tit	Blaumeise	crane	Kranich
body	Körper	crawl, to	kriechen
bone	Knochen	croak	quaken
brake, to	bremsen	crop	Kropf
branch	Ast	crow	Krähe
brave	tapfer	curl	Locke
bream	Brachse	currants	Korinthen
breast	Brust	current	Strömung
breathe, to	atmen	curved	gewölbt
breeding	brüten	cygnet	Schwanjunge
bright	leuchtend	danger	Gefahr
bullfinch	Gimpel	dependent	abhängig
bumpy	uneben	descend, to	abstammen

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description	Beschreibung	fluffy	flaumig
development	Entwicklung	fly(plural: flies)	Fliege(n)
digest, to	verdauen	food	Essen
discover, to	entdecken	food supplies	Essensvorräte
dislocate, to	ausrenken	forked	gespalten
domesticate, to	domestizieren,	foster- parents	Pflege-eltern
	zähmen	frequently	oft
down (feather)	Daunen	frog	Frosch
drake	Erpel/Enterich	fur	Fell
drum	Trommel	fussy/choosy	wählerisch
dry	trocken	gander	Gänserich
duck	Ente	gap	Lücke
duckling	Entlein	gill	Kiemem
dull	matt	give birth to, to	gebären
earth	Erde	gizzard	Muskelmagen
ecology	Ökologie	goose	Gans
egg	Ei	gosling	Gänschen
environment	Umwelt	grab, to	greifen
escape, to	entkommen	grid	Gitter
external	äußerlich	grip, to	greifen
extinct	ausgestorben	ground	Boden
eye socket	Augenhöhle	guard	Schutz
eyeball	Augapfel	habitat	Lebensraum
factory	Fabrik	habits	Gewohnheiten
family tree	Stammbaum	hatch, to	ausschlüpfen
fang (snake)	Giftnote	heartbeat	Herzschlag
feather	Feder	heavy	schwer
features	Einzelheiten/ Merkmale	hedgehog	Igel
		height	Höhe
feed, to	füttern	help	Hilfe
female	weiblich	herbivore	Pflanzenfresser
finch	Finke	hibernate	Winterschlaf
flap, to	flattern	hiding place	Versteck
flat	flach	highlight	hervorheben
flick	züngeln	hind legs	Hinterbeine
flight	Flug	hole	Loch
flock	Schwarm	hollow	hohl

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honk	Schrei (von Gans)	nuthatch	Kleiber
hook	Haken	omnivore	Allesfresser
hover, to	schweben	opposing	gegenüberstehend
hunt, to	jagen	originate, to	entstammen
independent	unabhängig	outside	außerhalb
injury	Verletzung	owl	Eule
insecticide	Insekten- vertilgungsmittel	oxygen	Sauerstoff
		parents	Eltern
introduce, to	vorstellen	paste, to	kleben
jaw	Kiefer	patch	Fleck
jump, to	springen	pattern	Muster
jungle	Dschungel	paws	Pfoten
lark	Lerche	peaceful	friedvoll, ruhig
leaf	Blatt	pellets	Gewölle
length	Länge	pen	weiblicher Schwan
life cycle	Lebenszyklus	pigeon	Taube
line	Linie	pillow	Kopfkissen/Polster
lizard	Eidechse	plumage	Federkleid
male	männlich	pocket/pouch	Beutel
mammals	Säugetiere	pointed	spitz
markings	Markierungen	poison	Gift
match, to	anpassen	pollute, to	verschmutzen
mate	Partner/paaren	pond	Teich
migrating birds	Zugvögel	poultry	Geflügel
millet	Hirse	pound, to	klopfen
mingle, to	vermischen	powerful	kräftig
moist	feucht	predator	Beutefänger
mole	Maulwurf	prefer, to	vorziehen
moss	Moos	prey	Beute
moult, to	mausern	protected	geschützt
mud	Schlamm	quill	(Schreib) Feder
muscle	Muskel	quilt	Federbett/Tuchent
marshy	breiartig	rabbit	Kaninchen
narrow	eng	rainforest	Regenwald
necessary	nötig	raisins	Rosinen
nightingale	Nachtigall	reach	Reichweite
nostril	Nasenloch	region	Teil/Gebiet/Bereich

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reproduction	Vermehrung	species	Speziell/Arten	touch, to	Berührung, Hauch (fig.)
rhinoceros	Nashorn	speckled	gesprenkelt	trout	Forelle
room	Platz	split, to	spalten	trunk	Baumstamm
rooster	Hahn	spread, to	strecken	unscramble, to	ordnen
rotting	verfaulend	spy, to	erspähnen	venom	Gift
round	rund	squeeze, to	drücken	vertebrate	Wirbeltier
row	Reihe	squirrel	Eichhörnchen	waddle, to	watscheln
rubbish	Müll/Mist/Abfall	steer, to	steuern	walrus	Walross
sabre tooth tiger	Säbelzahniger	sticky	klebrig	warbler	Grasmücke
sad	traurig	stork	Storch	waterfowl	Wasservogel
scales	Schuppen	strain, to	sehen, sieben	waterproof	wasserdicht
scatter, to	streuen	straw	Stroh	wattle	Kehllappen
sensitive	sensibel	streamlined	stromlinienförmig	weather	Wetter
separate, to	teilen/trennen	suckle, to	säugen	webbed feet	Schwimmfüße
shaft	Schaft	suet	Nierentalg/fett	wet	nass
shape	Form	sun	sonnen	whiskers	Schnurrhaare
shark	Hai	sunflower	Sonnenblume	wing	Flügel
shed, to	abwerfen	support, to	stützen	wizard	Magier/Zauberer
shell	Schale	surface	Oberfläche	wood	Holz
sight	Sehvermögen, Sicht	surroundings	Umfeld	woodlouse	Bohrassel
simple	einfach	swallow	Schwalbe	woodpecker	Specht
sketch	Skizze	swallow, to	schlucken	wrap, to	herumwickeln
skin	Haut	swoop	im Sturzflug fliegen	wren	Zaunkönig
skull	Schädel	tadpole	Kaulquappe	yolk	Eidotter/Eigelb
slant, to	neigen/schief				
	stehen	tail	Schwanz		
slender	schlank	tale	Erzählung		
slice	Scheibe	talon	Kralle		
smooth	glatt	territory	Revier		
snail	Schnecke	thread	Faden		
snake	Schlange	throat	Kehle		
soar, to	hochfliegen	throw, to	werfen		
solve, to	lösen	thrush	Drossel		
south	Süd	tit	Meise		
space	Platz	toad	Kröte		
sparrow	Sperling/Spatz	tongue	Zunge		
spawn	Laich	tortoise	Schildkröte		

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APPENDIX II – Scan Materials for the Analysis and Evaluation

Appendix II 1 – Quizzes and Worksheets

1a) Examples of a Quiz: BRAF p.81 and M p.77

Image source: Electronic scan



Cross-Curriculum Creativity - Biology Book 4: Birds, Reptiles, Amphibians & Fish

Amphibians, Reptiles, Fish Quiz

GRASS SNAKE 1. It isn't an amphibian 2. Its eggs are not stored in the earth 3. It's not a snake 4. its skeleton has remains of lizard legs	LIZARD 1. It hibernates 2. It lays eggs 3. It sheds its skin 4. It has legs and a tail	RINGED ADDER 1. It lays eggs 2. It swallows its prey whole 3. It likes swimming 4. It eats frogs
NORTHERN VIPER 1. It is a reptile 2. It has a forked tongue 3. It likes sunny places 4. It eats mice	FROG 1. It is an amphibian 2. It has a long, sticky tongue 3. Its skin is smooth 4. It lives in groups	TOAD 1. It hibernates 2. It's born from spawn 3. It can only make short jumps 4. It has a thick bumpy skin
TROUT 1. Babies are called fry 2. It migrates 3. It's a predator 4. It lives in fast flowing water	CARP 1. It lays spawn 2. It is not a predator 3. It has no teeth 4. It's about 30-120 cm. long	FROG 1. It eats insects 2. Eggs are called spawn 3. Babies have gills 4. It's green
TOADS 1. It eats insects 2. It lives in water as a baby 3. An endangered species 4. Similar to a frog	RINGED ADDER 1. It swims well 2. Eats pond life 3. Not poisonous 4. Has yellow patches on its cheek	LIZARD 1. Likes warm, sunny places 2. Has dry skin 3. Hibernates 4. Lays 5-15 eggs

Cut out cards. Divide class into groups. 1 group draws a card and gives another group information. If group says the correct animal after 1 question, 10 points, after 2 questions, 5 points, 3 - 2 points and 4 - 1 point. Then another group draws a card and game continues. Make your own cards.

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Cross-Curriculum Creativity - Biology

Book 2: Mammals

Mammal Mania

What is a baby deer called?	Name three farm animals	Can a bat fly?
What do pigs eat?	Name three members of the cat family	What does a bat eat?
When do cats hunt?	Name three mammals	When do bats hunt?
Name the ancestor of the dog	Is a bat a mammal?	Name three things we get from a cow
How many kittens does a female cat have?	Where do moles live?	What does a mole eat?
What is a female deer called?	What is a female horse called?	Where does the mole live?

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1b) Examples of Worksheets: HB p.28 and P p.20



The Skeleton Selection

Below you will find lots of facts about your skeleton. Use this information to colour the boxes - green for correct and red for incorrect.

- 1 ☐ There are over 200 bones in our skeleton.
- 2 ☐ The skeleton holds the body up.
- 3 ☐ The backbone is called the spine.
- 4 ☐ The smallest bone is in your foot.
- 5 ☐ There are 26 bones in your foot.
- 6 ☐ There are three bones in your hand.
- 7 ☐ The main head bone is called the skull.
- 8 ☐ Bones are very strong.
- 9 ☐ The backbone has 36 bones.
- 10 ☐ Your arm has five bones.



There are 26 bones in each foot and 27 bones in each hand.

There are three main bones in your arm.

The skull is your head bone.

Bones have a hard layer outside and a strong layer inside.

There are 206 bones in our body.

Without our skeleton, we just couldn't stand up.

The smallest bone is in the ear.

There are 26 bones in your backbone (also called spine).



Speedy Seeds



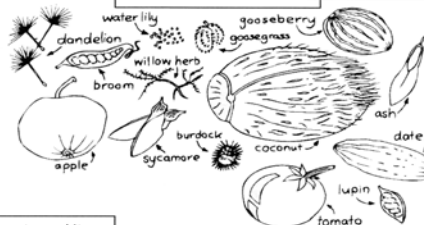
A seed needs to get away from the parent plant to survive. Otherwise, there will not be enough food and sunlight for both. Nature is very clever and has given seeds many ways of getting away from their parent plants.

Sort these plants into the correct group.

The wind blows them away

Animals eat them and they pass through their bodies

Fruits stick to animals' fur



They fall into water and it carries them away

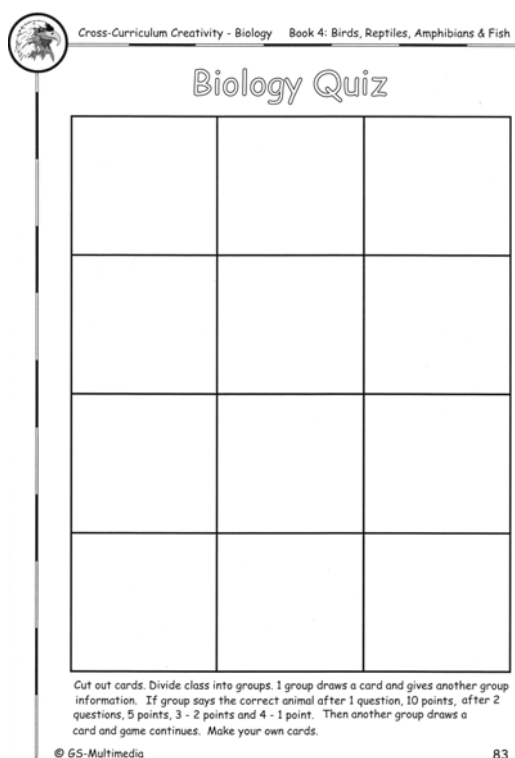
Animals eat the fruit flesh but throw away the stone and pips

The seedpod shoots seeds out by itself

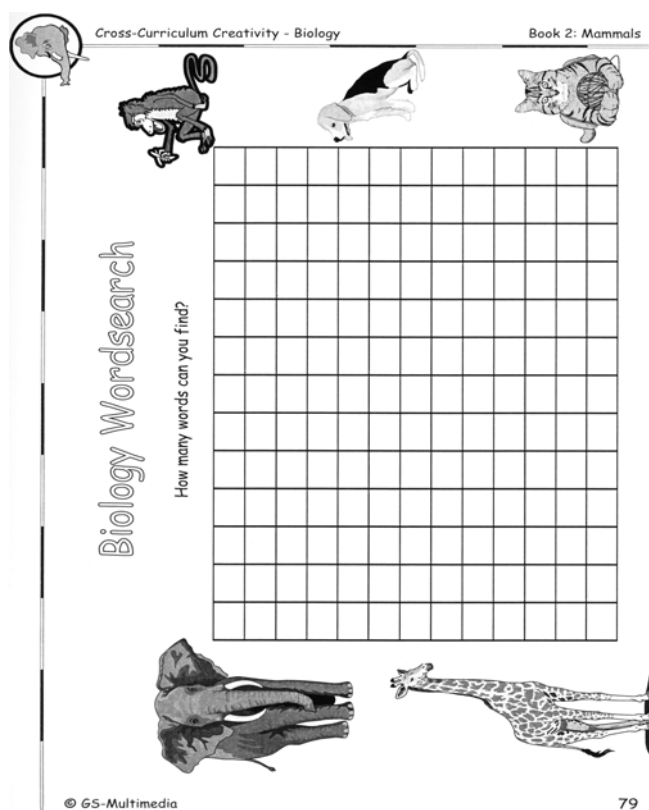
Appendix II 2 – Blank Quizzes and Wordsearch Grids

2a) Example of a blank Quiz: BRAF p.83

Image source: Electronic scan



2b) Example of a blank Wordsearch grid: M p.79



Appendix II 3 – Pictorial Materials

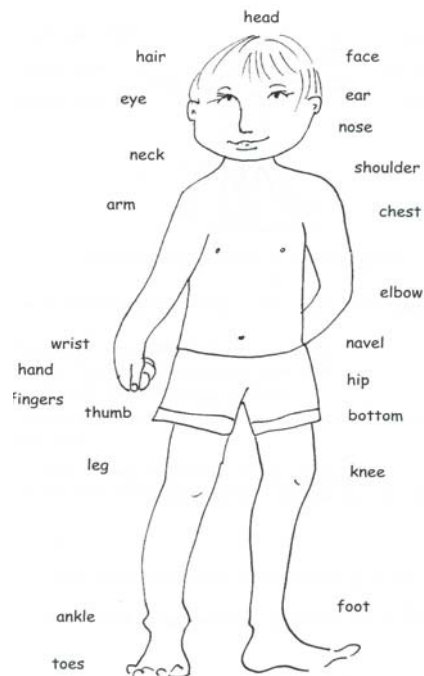
3a) Examples of Drawings

Image source: Electronic scan

M p.21:



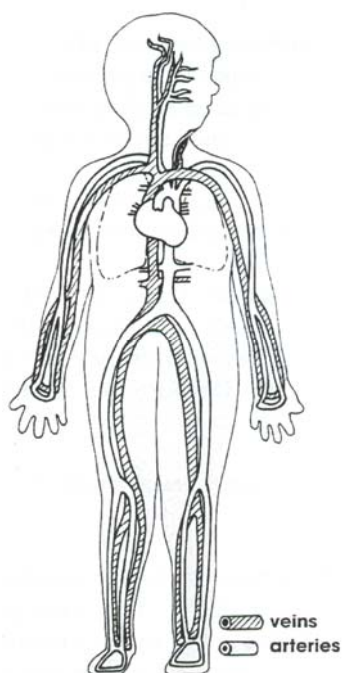
HB p.7:



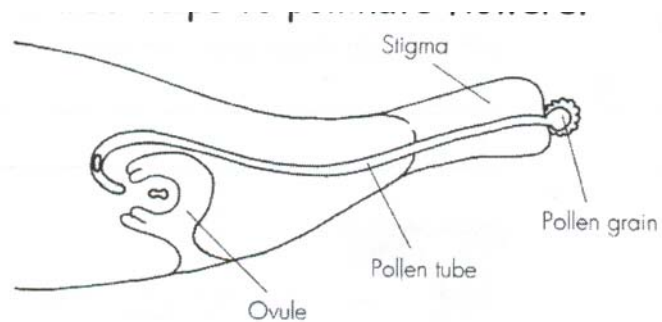
3b) Examples of Schematic Drawings and Diagrams

Image source: Electronic scan

HB p.25:



P p.18:



3c) Examples of Clip-art Images

Image source: Electronic scan

HB p.50:



P p.31:



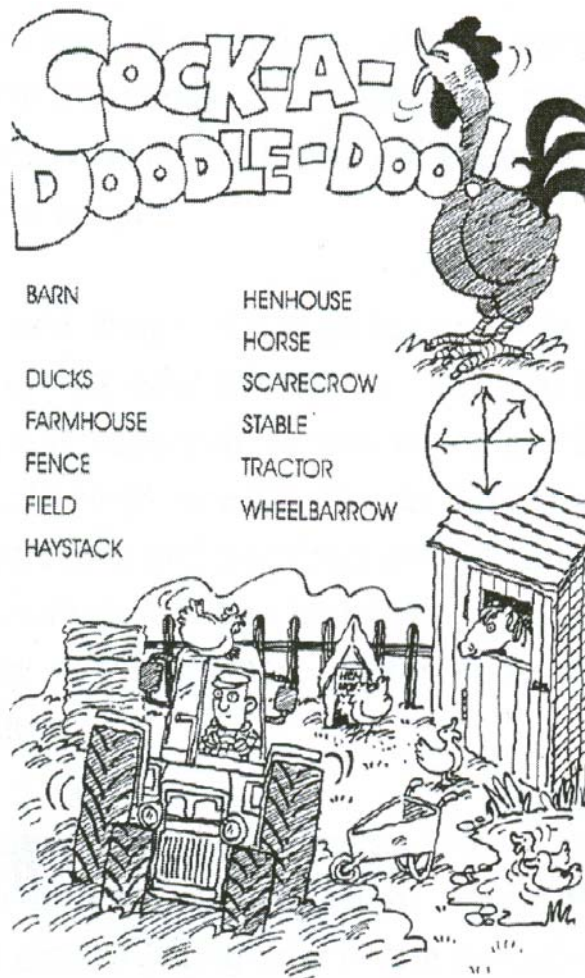
M p.28:



3d) Examples of Cartoons

Image source: Electronic scan

BRAF p.18:



BRAF p.65:

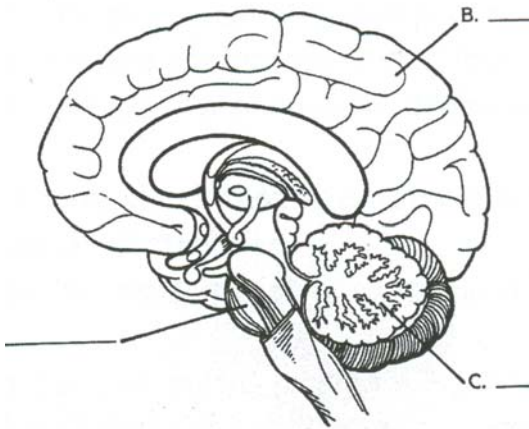


Appendix II 4 – Images and their Differences in Quality

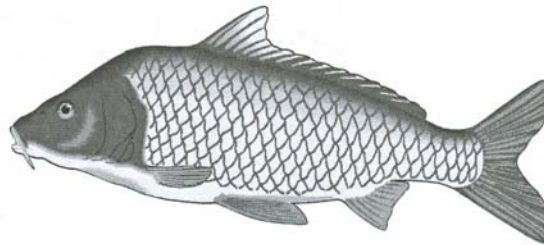
4a) Examples of High-Resolution Pictures

Image source: Electronic scan

HB p.48:



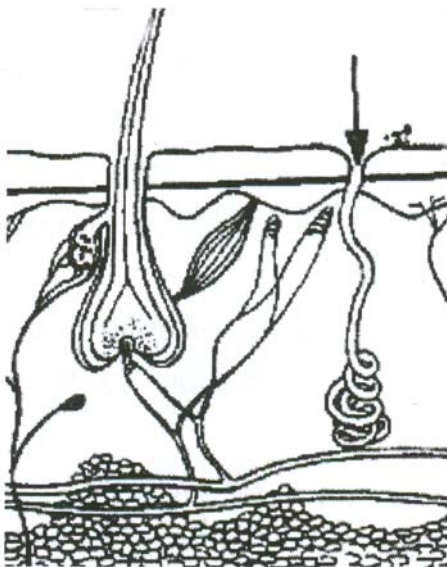
BRAF p.63:



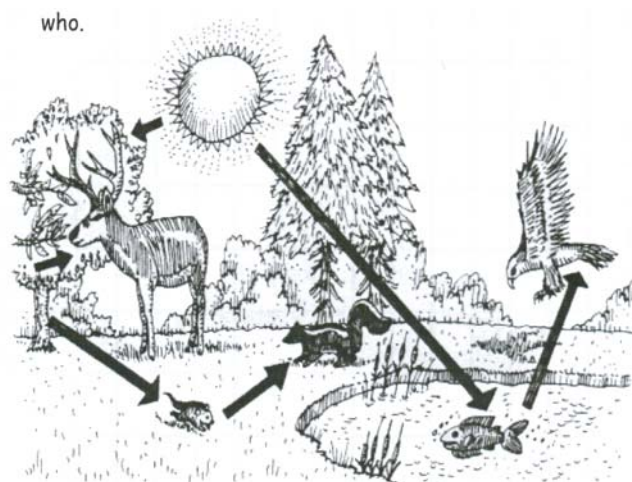
4b) Examples of Low-Resolution Pictures

Image source: Electronic scan

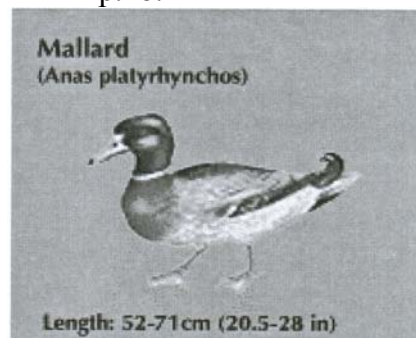
HB p.17:



P p.54:



BRAF p.28:



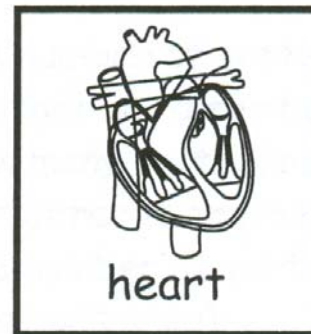
4c) Examples of Pictures with unclear lines

Image source: Electronic scan

M p.59:



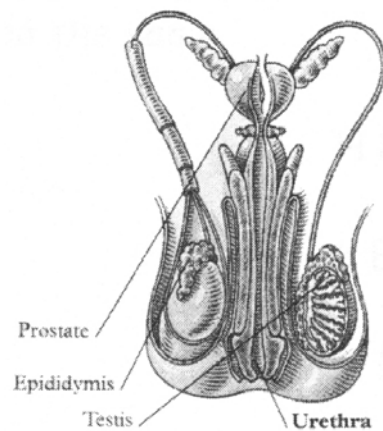
HB p.30:



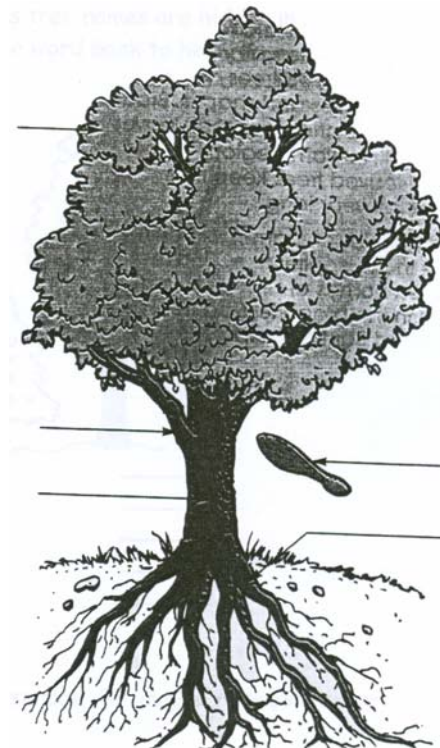
4d) Examples of Pictures which are difficult to understand, because they are not in full colours but in black and white

Image source: Electronic scan

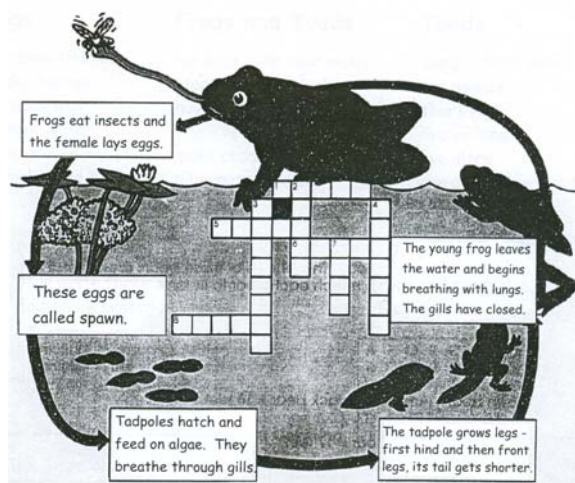
HB p.52:



P p.41:



BRAF p.58:



Appendix II 5 – Font Type and Size

Image source: Electronic scan

BRAF p.63:

The font type of all text materials is **Comic Sans MS**.

The following font sizes are usually used:

Headings:

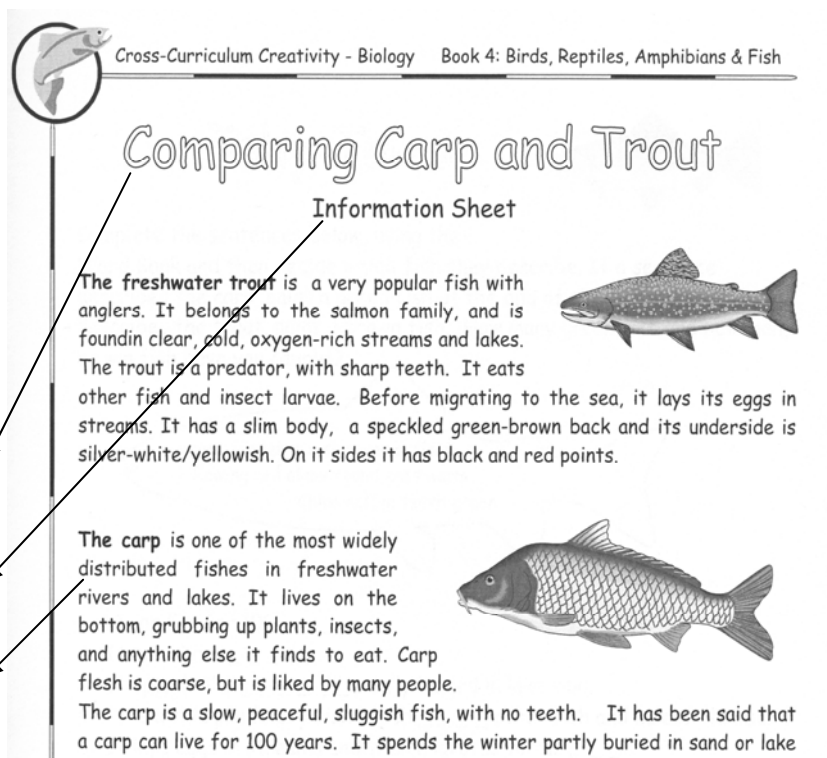
36 outline

Subheadings:

18

Text:

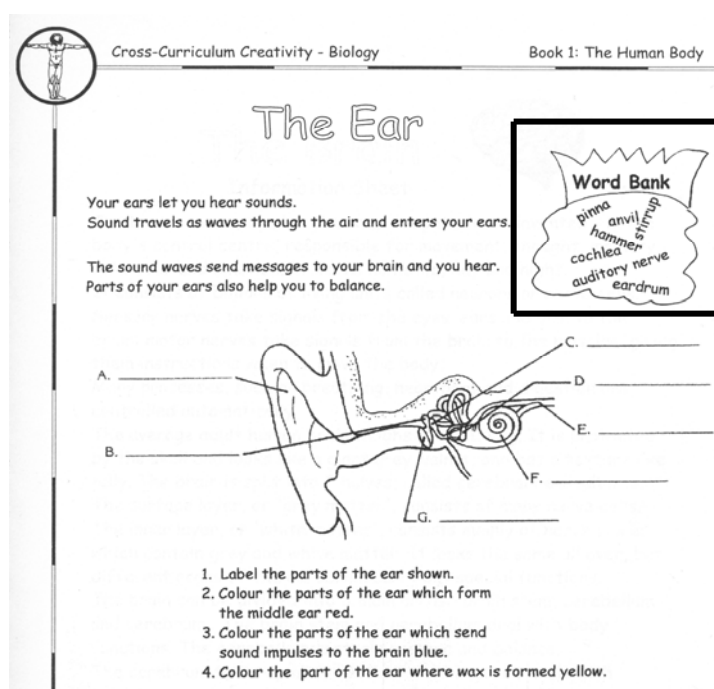
12 or 14, sometimes 16.



Appendix II 6 – Insufficiency of the Dictionary Sections of the four textbooks and how this effects the completion of some Tasks

6a) Task 6 (p.45 HB)

The black box in the task marks the “Word Bank” which contains the solution words for the labelling of the ear. These seven technical terms (*pinna*, *anvil*, *hammer*, *cochlea*, *stirrup*, *auditory nerve*, *eardrum*) are, however, not included in the dictionary section of HB (see Appendix I 5b). Therefore, it is almost impossible for the young learners to complete the task.



6b) Task 3 (p.11 P)

Flower Part	Description	Colour
pistil	Large centre stalk often looks like a water bottle	yellow
stamen	A thin, tall stalk with a knobbed tip. It holds grains of pollen.	brown
petal	Brightly coloured and sweet smelling leaves to attract insects	a bright colour
sepal	Small leaf-like part at the bottom of the flower	green
ovary	Ball-shaped part at the bottom of the pistil. This is where seeds develop	blue

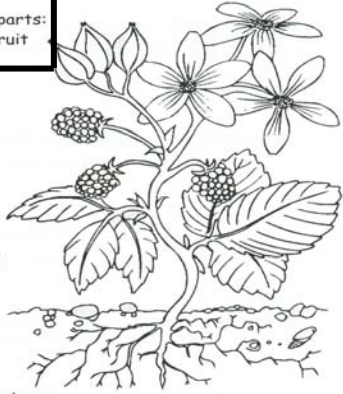
The descriptions of the *pistil*, *stamen* and *petal* consist of 31 words. I believe that 22 (not 23, because the term *stalk* appears twice!) of these 31 words are difficult for the target learner group to understand. All these 22 technical (e.g. *stalk*, *grains*, *pollen*) and semi-technical terms (e.g. *to attract*, *often*, *like*) are not included in the dictionary section of P (see Appendix I 7b). Even though the parts of a flower are described in this task, I doubt that the learners really understand which part it is exactly.

6c) Task 5 (p.13 P)

The technical terms in the box (*stem*, *root*, *leaf*, *flower*, *fruit*, *seed*) should be used by the learners to label the plant. However, only half of the words (*root*, *seed*, *stem*) are translated in the dictionary (see Appendix I 7b). I believe that the other three terms also need to be included in the dictionary.

More About Plant Parts

Flowering plants have six parts: stem, root, leaf, flower, fruit and seeds.



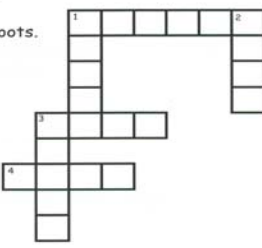
Complete the crossword and use the words to label the plant.

Across:

- I often have beautiful colours but my real job is to make seeds.
- I carry water from the roots to the leaves and food back to the roots.
- I collect energy from the sun to make food for the plant.

Down:

- I usually taste good but my job is to hold and protect the seeds.
- I hold the plant tight in the soil but also collect water and minerals from the soil.
- Some day a new plant will grow from us.



6d) Task 6 (p.14 P)

The “Word Bank” in this task is marked in with a black box. There are nine words (*cold, soil, not, plants, light, the, air, slowly, sugary*) which need to be filled in to the gaps of the text. Only the word *soil* is enclosed in the dictionary section of the textbook (see Appendix I 7b). In my opinion however, *cold, light, air, slowly* and *sugary* also need to be included in the dictionary so that learners can fulfil the task.

What Plants Need

Plants only need light, air and water to grow. They grow well in brightly lit, warm places. Think of the plants in the Rainforest - this is paradise for 1 - - - - - 14!

LIGHT

If there is 8 - - enough light, plants die because the leaves cannot make food. Plants grow towards the - - - - - 10 4.

AIR

Plants need the air to make food. They use carbon dioxide from the 13 - - plus water from the roots and energy from 9 2 11 sun to make a 12 - - - - - 7 food.

WATER

Roots draw up water from the 6 - - - , it travels up the stems to the leaves. Otherwise plants couldn't grow.

TEMPERATURE

Plants grow better in warm places. In 5 - - - countries like Iceland, plants grow very - - - - - 3.

Use the word bank below to find out the name we use to describe how plants make food.



1 2 3 4 5 6 7 8 9 10 11 12 13 14

Word Bank

~~cold~~ ~~soil~~ ~~not~~ ~~plants~~ ~~light~~ ~~the~~ ~~air~~ ~~slowly~~ ~~sugary~~



6e) Task 4 (p.55 BRAF)

Snakes

There are over 2,400 species of snake

Snakes swallow poor markings smelling crocodiles eggs reptiles mouth venom

Snakes mate when they are 2-3 years old and the female lays
In colder climates the eggs stay inside the snake and she gives birth to live snakes

Snakes kill their prey: with (poison) using their fangs (hollow teeth)
Snakes kill their prey: by constriction (wrap themselves around prey and slowly squeeze!)

Snakes have eyesight (no eyelids) and poor hearing (no external ears)
They find their prey by (flicking their forked tongue in the air) and by feeling vibrations on the ground
They are and are cold-blooded so do not have a lot of food

All snakes are 1 2 3 4 5 6 7 8 9 10

They have on their skin for camouflage
Bright colours often mean the snake is poisonous
 shed their skin
Scales on their belly grip the ground
Snakes move in S-shaped curves

Small snakes eat insects and worms
Larger snakes eat eggs, birds, small mammals, even gazelles and
They their prey whole and can separate their jaw bone and stretch their very wide

In this task, there are 10 words which students need to fill in to the text (*snake, swallow, poor, markings, smelling, crocodiles, eggs, reptiles, mouth, venom*). However, half of the terms (*poor, smelling, crocodile, reptiles, mouth*) are not explained in the dictionary (see Appendix I 8b).

Appendix II 7 – Information Sheet of “The Senses” (p.41 HB)

Image source: Electronic scan

The most important technical terms from this Unit are marked in this scan:



Cross-Curriculum Creativity - Biology

Book 1: The Human Body



The Senses

Information Sheet



Your body finds out things about the world around you through your sensory organs. There are five senses (sight, hearing, smell, touch and taste).

Nerves carry tiny electrical signals from the sense organs to the control centre, the brain, and take instructions from the brain to the muscles. The brain controls many processes automatically, such as breathing, heartbeat and digestion.

The ears are the organs of hearing and balance. We cannot hear as many different sounds as most animals. We also have to turn our heads towards the direction of a sound, unlike rabbits or horses, who can swivel their ears. The outer ear is like a satellite dish. It picks up sound waves in the air and sends them to the eardrum. They pass through the middle ear, past the hammer, anvil and stirrup to the cochlea, where they become electrical messages and are sent to the brain.

The organs of sight, the eyes, provide more than half of all the information that enters the brain. Only humans and a few other types of animal can see in full colour. Nerve cells on the retina react to light and send signals along the optic nerve to the brain.

You can really taste only four main kinds of flavours: sweet, salty, sour and bitter. Each flavour is detected by a certain part of the tongue. The tip can is sensitive to sweetness. The middle of the tongue has almost no taste buds.

Your organ of touch is the skin; you can feel heat, cold and pain. The cells of the outer layers of the skin are dead. They act like a barrier to infection.

Inside your nose are about 12 million tiny olfactory (smell) cells, with tiny hairs. When you taste food, you also smell it. When you have a cold, food does not have much taste. Nerve signals from the smell cell pass along the olfactory nerve to the brain, which analyses and identifies them. Smell is the only sense directly connected to parts of the brain dealing with memory and emotion.

APPENDIX III – Another CLIL Biology Textbook: Discover Biology 1
(Mathews & Olmesdahl 2009)

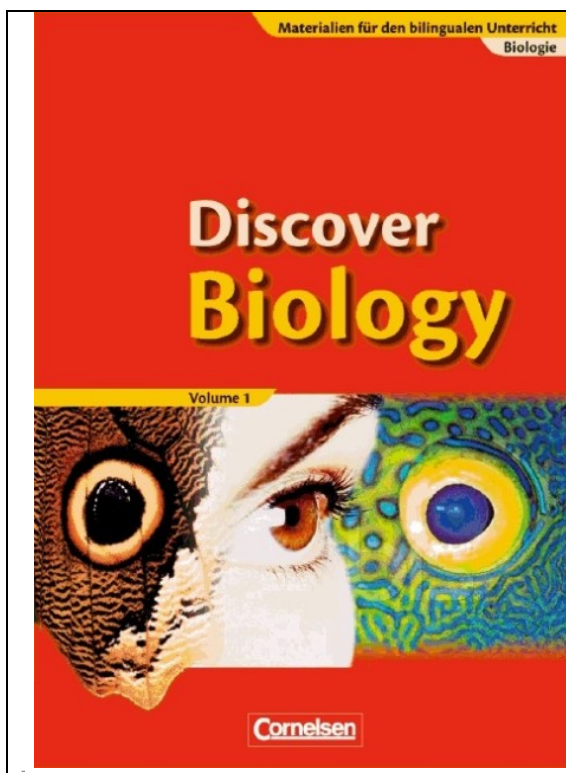


Image source:

http://www.libri.de/shop/action/product_Details/7678625/horst_dieter_mathews_simon_olmesdahl_discover_biology_1_schuelerbuch_7_8_schuljahr_sekundarstufe_1_3464318443.html

APPENDIX IV – Blank Analysis and Evaluation Checklists for CLIL Teachers

Appendix IV 1 – Blank Context and Textbook Analysis Checklist

Context Analysis		
<u>Learner factors</u>		
<i>Aspects</i>		<i>Commentary</i>
1.	Age range	
2.	Proficiency level in English	
3.	Education level in Biology	
4.	First language (of most learners in the class)	

5.	Socio-cultural background	
6.	Experience in studying Biology in English (CLIL)	
7.	Previous language learning experience (of the target language and/or any other languages)	
8.	Interest in Biology	
<u>Institution and specific programme</u>		
<i>Analysis criteria</i>		<i>Commentary</i>
1.	Level within the education System (e.g. kindergarten, primary level)	
2.	Time available for the subject of English	
3.	Time available for the subject of Biology and CLIL-Biology	
4.	Class size	
6.	Additional resources available for teaching Biology	
7.	Syllabus and aims of Biology in English (CLIL)	
8.	Form of assessment in CLIL Biology	

Textbook Analysis		
1. General description of the materials		
a)	In which target language are the materials written, and for which target group and first language (L1) are the materials intended?	
Target language		
Target group and L1		
b)	What do the materials consist of?	
	Materials	Yes/No Commentary
	Student's book	
	Teacher's book	
	Workbook	
	Knowledge checks/tests/quizzes	
	CDs	
	DVDs	
	Pictorial materials (e.g. flashcards)	
	Others:	
c)	Date of publication and purchase price	
Where were the materials published?		
When were the materials published?		
Are all the components available?		
What do the materials cost?		
d)	What kinds of target learners are the materials intended for?	
Age		
Level of education		
Students' interest in Biology		
e)	How durable are the materials, and what kind of layout do they have?	

<i>Layout features</i>	<i>Yes/ No</i>	<i>Commentary</i>		
Pictures/images/ illustrations				
Quality of graphical materials				
Colours or black & white				
Text				
Graphs and tables				
Different font types and sizes				
Durability (quality of paper, binding method)				
f)	What teaching situation/context are the materials intended for?			
<i>Context</i>	<i>Commentary</i>			
Type of course supported by the materials				
Total time available				
Syllabus				
Country				
<u>2. Information on the tasks</u>				
[select units from the textbooks for this part of the analysis]				
<i>Analysis Question</i>	<i>Commentary</i>			
Which types of tasks have to be performed by the learner?				
What forms of classroom organisation are involved in the performance of tasks (e.g. individual, pair work)?				

Which media are involved in the tasks?	
Who/what will be the source of information?	
Do the tasks involve speaking, reading, listening, writing and interacting?	

Appendix IV 2 – Blank Textbook Evaluation Checklist for an Austrian CLIL Biology Textbook (1st grade, secondary education)

1) Proportion of the target language to the mother tongue (German) in CLIL materials

1.1 German or English: which language is used more often, in which situations is it used and is its usage justified?

1.2 Is the choice of the target language appropriate for the level of proficiency (A1; cf. CEFR 2001) of the pupils?

If possible, give examples for each of the following skills: speaking, reading, listening, writing and interaction instructions!

2) Focus on early foreign language acquisition methodology

2.1 Do the materials give language support (e.g. technical terms, useful phrases, glossary) which makes approaching a task easier for the pupils?

2.1.1 If they give language support: What type of support is given (e.g. technical vocabulary, phrases, German translations, etc.)?

2.1.2 Is the language support appropriate for the proficiency level of A1?

2.2 Are new language items, such as technical terms and phrases introduced in various ways in the unit (e.g. on their own, related to previous knowledge/personal experiences of the pupils)?

2.3 Is there further repetition of new technical vocabulary or contents after their introduction in the unit?

2.3.1 If so, how is it done (e.g. put into different contexts, repeated in exercises)?

2.4 How do pupils have to respond to productive tasks, orally or by writing, and are the demands appropriate considering the proficiency level of A1?

2.5 Does each unit employ a variety of tasks?

2.5.1 What tasks are used (e.g. communicative, group or pair work, writing, etc.)?

2.5.2 Are the aims of the tasks in a unit clear?

3) Focus on subject- and content-based methodology

3.1 Are the didactic principles of teaching Biology in the foreground of the materials?

3.1.1 If yes, select from the following principles:

- a) The topics and methods of teaching are always closely related to the everyday life of pupils, in order for them to relate to the contents directly:
- b) Frequently, lessons focus on biological findings that matter to society. This focus prepares pupils to develop the ability to act responsibly in social situations, and to participate in society:
- c) As pupils need to be educated to develop the ability to solve problems and to work autonomously, the following methods should be employed in Biology:
 - Observation – comparison - sequencing:
 - Working with appropriate aids (e.g. microscopes, magnifying glass, computers with internet connection, scientific literature):
 - Searching for, processing and displaying information:
 - Identifying and solving problems:
- d) Enhancing multidisciplinary and project-oriented work:
- e) Bringing pupils into contact with nature (e.g. excursions, field trips, sympathetic interaction with animals and plants):
- f) Enhancing social, personal and emotional competences:
 - Group work:
 - Social learning
 - Open learning:

4) Diversity in facilitating learning

4.1 Are tasks designed to integrate more than one aid (e.g. visuals, text or audio materials)?

4.2 Do the tasks enhance pupils' interactive and communicative competencies which should help them, for example, to lead subject-related discussions in English?

5) Comprehensibility and clarity of information and instructions in combination with visual support

5.1 Is any visual support (e.g. pictures, drawings, graphs, photos) used in the texts, tasks or instructions?

5.1.1 If yes, which visuals are employed? Are they used appropriately and what purpose do they serve?

5.2 Are the visuals used related to the pupils' everyday life?

5.3 Is the visual support appealing to 10 to 12 year-old pupils (e.g. considering the layout, or how easy the information is to process)?

5.4 Is visual support missing from the CLIL teaching materials?

6) Intercultural learning

6.1 Is intercultural learning encouraged by the topics?

6.1.1 If yes, in which topics and how is it done?

7) Accuracy

7.1 Is the content of the materials factually correct?

7.2 Is the subject matter scientifically formulated?

7.3 Are there any language mistakes in the materials?

8) Teacher support

8.1 Do the materials include a teacher's book?

8.1.1 If not, would it be helpful to have one?

8.2 Do the materials include any additional language help for teachers?

8.3 Is there any help for teachers regarding the content, didactics and methodological principles according to which the subjects of Biology and the L2 English need to be taught?

APPENDIX V – Interview with Sheena Machotka, one of the authors of *Cross-Curriculum Creativity – Biology (Books 1-4)*

Mag. Sheena Machotka is one of the authors of the CLIL Biology textbook set *Cross Curriculum Creativity – Biology*, which she devised together with Sandra Fierling. Both Machotka and Fierling come from Great Britain, and they are both teachers. Machotka is a teacher of German and French at a Wirtschaftshauptschule [secondary modern school for economics] in Berndorf (Austria). She did an additional exam which enables her to teach Biology in secondary modern schools.

The books are aimed at the 1st grade of lower secondary schools (grammar and secondary modern schools), and the content of the materials was developed according to the Austrian curriculum for Biology for this target learner group. Machotka pointed out in a telephone conversation with me that it is possible to use the textbook set for teaching Biology in both the 1st and the 4th forms of secondary education, because the topics covered in both forms are very similar.

The reasons why Machotka and Fierling developed materials for teaching CLIL Biology are simple. Firstly, the use of a foreign language (L2) as the language of instruction in school subjects such as Geography, History and Biology is very popular in European countries at the moment. This innovative teaching approach enables pupils to learn an L2 content-based, i.e. language learning is put into context in the content subject. Secondly, it is still very difficult to find suitable teaching materials for CLIL. These two factors were the prime motivators for Machotka and Fierling to begin working on CLIL-specific teaching materials for Biology, which teachers can then use in their classes. The authors also devised another set of textbooks for Geography, *Cross Curriculum Creativity – Geography (Books 1-4)*. For more details on Machotka's intentions when she developed these materials together with Fierling, and how *Cross-Curriculum Creativity – Biology (Books 1-4)* should be used in the classroom, please see the following questionnaire:

E-mail interview between Mag. Sheena Machotka and me about the textbooks *Cross-Curriculum Creativity – Biology (Books 1-4)* (15 April 2009)

What was your intention in writing these textbooks?

Our intention in writing the course books was primarily to provide teachers of English as a Foreign Language in Schools with information, vocabulary as well as

simple and advanced worksheets for use in the classroom. When we began teaching in Austrian schools, no material was available and preparation was extremely time-consuming.

How long did it take you and Ms. Fierling to write the books?

Can't remember. Several months.

How are the textbooks meant to be used (by both teachers and students)?

Teachers: for acquiring vocabulary, the info page.

Teachers can either use the worksheets as they are, or alter them (they have the basic vocabulary from the info pages). They can even adapt the info pages for advanced students.

Students: do the worksheets. Advanced students can also read the info pages. Or create their own worksheets. Or use them as a model for little talks in class.

Are the information sheets in each unit only aimed at teachers?

Basically, yes, but they can be used or adapted for advanced students.

What variety of English did you use in the materials (British or American English)?

British English as we are both British.

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English Summary

Under the microscope: CLIL teaching materials for Biology. An analysis and evaluation of an Austrian textbook for 10-year olds. (Theresa Floimayr)

Content and Language Integrated Learning (CLIL) is one of the most recent and most innovative phenomena in education at the moment. It integrates foreign language learning with content subject learning (cf. Dalton-Puffer 2007:1). Foreign language learning (L2) is put into context in CLIL. Therefore, this teaching method is intended to have a positive effect on the learning process, because learners see more reason in L2 learning. Since this approach is still very new, very little research on it has been carried out so far. As a consequence, the methodological principles of CLIL teaching are not yet completely established. Therefore, the development of CLIL teaching materials influenced by the methodology of the approach is also still in its infancy. Many teachers who use CLIL complain about the lack of teaching materials available to them, and therefore they have to prepare most of the materials on their own (cf. Gierlinger 2007: 80-81). At present, CLIL is certainly a rather time-consuming approach for teachers to take, which is probably one of the reasons why it is not practised more frequently.

In some countries, however, there are dedicated CLIL teachers and linguists who have already developed CLIL-specific textbooks for certain content subjects (e.g. Geography, History or Biology). In this thesis, a theoretical analysis and evaluation of the CLIL teaching materials *Cross-Curriculum Creativity – Biology (Books 1-4)* (Fierling & Machotka 2008) was carried out. These textbooks are intended to be used to teach Biology in English. They follow the Austrian curriculum for Biology for the first form of secondary education (i.e. for children aged ten to twelve). Since very little work has been done to analyse and evaluate CLIL teaching materials, it was difficult to find suitable materials upon which to base the criteria for the examination. Tomlinson (2007) and McGrath (2002) were mainly used for the analysis criteria, and the evaluation criteria are based on Mathews (2005) and Massler, Steiert & Storz (2007).

Overall, the examination showed that the books which I analysed are a good basis for CLIL teachers who intend to teach Biology in English in Austria:

- They provide teachers with suitable basic texts on all the topics which teachers need to cover in a school years.
- The content is presented scientifically and it is biologically accurate. In addition, the language which is used is correct when looking at grammar and spelling.
- The subject of Biology is in the foreground and English language learning is integrated in the studying of the subject, because the L2 is the language of instruction.

However, there are some newer methodological aspects of CLIL which are not reflected in the materials. The following points should summarise the most important improvements of the materials based on the findings of the evaluation:

- Communication needs to be encouraged and interactive activities need to be integrated into the tasks of the units.
- Learners need to be directly exposed to nature, which is one of the main characteristics of science classes.
- Learners should develop the awareness that Biology is not only a subject which simply exists at school, but that it surrounds and engages us every day. Therefore, experiments and observation methods need to be encouraged in the materials.
- The language support in the dictionary sections of the four textbooks needs to be improved. Further language help (e.g. phrases, German translations) should be added to the teaching materials, so that the young learners are able to understand all the contents.

My materials evaluation of *Cross-Curriculum Creativity – Biology (Books 1-4)* furthermore affirmed that more research towards a common CLIL methodology will need to be carried out in the next few years in order to make CLIL more accessible for teachers.

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German Summary – Deutsche Zusammenfassung

Unter dem Mikroskop: CLIL Unterrichtsmaterialien für Biologie. Analyse und Evaluation eines Schulbuches aus Österreich für Schüler der 5. Schulstufe (10-12 Jahre). (Theresa Floimayr)

Content and Language Integrated Learning (CLIL) ist derzeit eine der innovativsten Unterrichtsmethoden des Bildungswesens. Diese Methode verknüpft Fremdsprachenlernen mit Inhaltslernen in Unterrichtsfächern wie Geographie, Geschichte oder Biologie (cf. Dalton-Puffer 2007: 1). Dem Fremdsprachenlernen soll in CLIL mehr Sinnhaftigkeit verliehen werden, da die Fremdsprache durch die Verwendung von relevanten Inhalten gelernt wird. Da dieser Lehransatz allerdings noch ziemlich neu ist, gibt es bis jetzt noch nicht viele Untersuchungen, die dazu geführt hätten, die methodischen Prinzipien von Unterricht in CLIL festzulegen. Daher steckt auch die Entwicklung von Unterrichtsmaterialien für CLIL, die sehr stark von der Methodik einer Unterrichtsmethode abhängt, noch in ihren Kinderschuhen. Viele LehrerInnen, die CLIL in ihren Fächern schon verwenden, klagen über den Mangel an passenden Materialien und sie sind deshalb gezwungen, viel Zeit in die Vorbereitung selbstentwickelter Materialien zu stecken (cf. Gierlinger 2007: 80-81). Dieser Mehraufwand für LehrerInnen ist sicherlich einer der Gründe dafür, dass sich CLIL im Unterricht noch nicht mehr durchgesetzt hat.

Es gibt jedoch in einigen Ländern schon Unterrichtsmaterialien für Schulfächer, die von engagierten CLIL LehrerInnen und LinguistInnen speziell entwickelt wurden. Die vorliegende Diplomarbeit befasste sich mit der Analyse und der Evaluation eines dieser CLIL Materialien, *Cross-Curriculum Creativity – Biology (Books 1-4)* (Fierling & Machotka 2008). Diese vier Schulbücher wurden für den englischsprachigen Biologieunterricht in Anlehnung an den österreichischen Lehrplan für die 1.Klasse der Sekundarstufe (10-12 Jahre alte Schüler) entwickelt. Da allerdings zum Zeitpunkt der Diplomarbeit noch kaum Analyse- und Evaluationsarbeit für CLIL Unterrichtsmaterialien existierte, gestaltete es sich schwer, geeignetes Material als die Basis für die Kriterien der Analyse und Evaluation zu finden. Für die Analyse Kriterien wurden Tomlinson (2007) und McGrath (2002) verwendet; die Evaluationskriterien basieren auf Mathews (2005) und Massler, Steiert & Storz (2007).

Die Untersuchung der Schulbücher zeigte, dass die Materialien für BiologielehrerInnen in Österreich, die ihren Unterricht gerne in CLIL auf Englisch halten würden eine gute Basis darstellen:

- Die Unterrichtsmaterialien bestehen aus geeigneten Textmaterialien, die alle Themen behandeln, die BiologielehrerInnen in der 5. Schulstufe abdecken müssen.
- Der Inhalt der Bücher basiert auf wissenschaftlichen Fakten und ist korrekt. Weiters ist die grammatikalische Struktur der verwendeten englischen Sprache korrekt.
- Das Fach Biologie ist im Vordergrund und das Erlernen von Englisch ist im Inhaltslernen von Biologie integriert.

Allerdings gibt es einige methodische Aspekte von CLIL, die nicht in den Materialien reflektiert sind. In den folgenden Punkten werden die wichtigsten Bereiche, die verbesserungswürdig sind, aufgelistet:

- Kommunikation und interaktive Aufgaben müssen in den Materialien gefördert werden.
- Schüler müssen direkten Kontakt mit der Natur haben, da dieser einer der wichtigsten Charakteristika von naturwissenschaftlichem Unterricht ist.
- Schüler sollen die Möglichkeit haben sich bewusst zu machen, dass Biologie nicht ein theoretisches Unterrichtsfach in der Schule ist, sondern dass sie tagtäglich davon umgeben sind. Deshalb müssen in den Materialien Experimente und Beobachtungsmethoden erlernt und gefördert werden.
- Die sprachliche Unterstützung, die die Schüler in den Wörterlisten der vier Schulbücher erhalten, muss verbessert werden. Phrasen oder auch deutsche Übersetzungen sollten in den Materialien hinzugefügt werden, damit die Schüler die Inhalte der Bücher besser verstehen können.

Meine Evaluation der Unterrichtsmaterialien *Cross-Curriculum Creativity – Biology (Books 1-4)* hat weiters ergeben, dass in den nächsten Jahren mehr Forschungsarbeit im Hinblick auf eine generelle Methodik von CLIL geleistet werden muss, damit CLIL für LehrerInnen besser zugänglich wird, die an diesem neuen Unterrichtsstil interessiert sind.

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Curriculum Vitae

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Schulbildung – Ausbildung

Studienjahr 2006/2007	Auslandsstudium an der University of Leicester (England/UK) - o Teilnahme am ERASMUS-Programm - o Hauptsächlich Studium der Biologie, auch Englisch
Seit 10/2003	Lehramtsstudium Englisch und Biologie und Umweltkunde Universität Wien
24/06/2003	Matura Gymnasium Dachsberg/Prambachkirchen (OÖ)

Berufserfahrung

Seit Oktober 2008	Volkshochschule Hernals (Wien) Englischkurse für Erwachsene: A1+, A2+, B1, Eltern in Karenz mit Kindern (B2+, Conversation)
2008-2009	Schülerhilfe Floridsdorf und Alterlaa (Wien) o Englisch Nachhilfe für 1-6 Schüler aller Alters- und Schulstufen
Studienjahr 2006/2007	Arbeiterin der der Firma McKenzie Arnold Security (England) o Ticketverkauf und Platzaufsicht bei diversen Motorsportveranstaltungen (u.a. Motorrad WM in Donington Park)
2006-2008	Heimleitung/Organisatorin für das CARITAS BAMBERG (Deutschland) Kinderferienlager im Internat Dachsberg (OÖ) - o Dauer: 3 Wochen im August, 80 – 100 Kinder - o Arbeit: Auswahl der GruppenleiterInnen, Vortreffen mit Einschulung der Leiter, Organisation der 3 Wochen, Vor- und Nachbetreuung des Lagers

2003 – 2005

Gruppenleiterin für das CARITAS WÜRZBURG-BAMBERG (Deutschland) Kinderferienlager im Internat Dachsberg/OÖ

- o Dauer: 3 Wochen im August, 80 – 100 Kinder
- o Zielgruppe: Kinder aus schlechten sozialen Verhältnissen
- o Gruppengröße: 8-11 Mädchen
- o Arbeit: Rund um die Uhr Betreuung, altersgerechtes Gruppenprogramm, Ausflüge

2000 – 2003

Ferialarbeiterin bei der Firma EFKO Delikatessen

- o Jeweils 1 Monat im Juli

Seit 2000

Schilehrerin bei der Union Stroheim – Sektion Schi Alpin

- o Schiunterricht mit Kindern in Gruppen (Semesterferien)

Zusatzqualifikationen

Winter 2005

Ausbildung zum ÖSV Übungsleiter Schi Alpin

2003-2006

Stellvertretende Heimvertreterin des Studentenheimes Pfeilgasse 1a, 1080 Wien

Weitere Kenntnisse

EDV

MS Office, ACDSee Photomanager, Photoshop, Internet

Fremdsprachen

Englisch fließend, Französisch Maturaniveau, Latein Maturaniveau, Spanisch Anfänger

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