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**ADVANTAGES AND PROBLEMS REGARDING CONTENT AND
LANGUAGE INTEGRATED LEARNING ON THE EXAMPLE OF
MIINA HÄRMA GYMNASIUM**

MA thesis

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ABSTRACT

In recent years Content and Language Integrated Learning (CLIL) has attracted much attention in Europe and other parts of the world as a way of acquiring any foreign language in the natural environments. Therefore, the research project presented in this thesis was carried out to learn more about the usefulness of CLIL. Thus, the thesis deals with the advantages and problems of CLIL. The purpose of the thesis is to provide an overview of the most relevant literature regarding CLIL. The goal of the action research is to investigate what the CLIL teachers and the CLIL students of Miina Härma Gymnasium, Tartu see as the advantages and problems of CLIL, in reality being a part of it themselves. Consequently, the present thesis has a potential to make a valuable contribution to the field of CLIL application research.

Chapter one is based on secondary sources and gives an overview of the different methods most often used within CLIL, thereafter the main advantages of CLIL are described, which are followed by the most common problems regarding CLIL. Furthermore, there is a section about its educational service. The next section provides information on CLIL in Estonia, followed by the description of the qualities of good CLIL teachers and strategies for teachers towards quality CLIL. Last, ten tips for CLIL teachers of maths and science are presented and discussed.

Chapter two introduces the methods and the results of an action research conducted in the scope of the present thesis. The purpose of the thesis was to carry out research on the advantages and problems regarding CLIL on the example of Miina Härma Gymnasium and also to get feedback on how the CLIL students have comprehended the terminology of chemistry and can apply the knowledge to more practical tasks. Five CLIL teachers and also five CLIL students of Miina Härma Gymnasium were interviewed. In addition to that, a chemistry test on the properties of metals was carried out. Nine CLIL students and nine control group students completed the test. The results of the study were analysed both qualitatively and quantitatively.

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INTRODUCTION

Even though Europe has long tradition in the teaching of foreign languages, this length can be misleading as there is little relation between the time and effort dedicated to different approaches and the results obtained. There have been many changes in teaching methods over years. In the seventies communicative language teaching, which was to have long lasting effect, was propagated. Nevertheless, students soon lost interest as it was very simple and the teaching was somewhat artificial. The next step was “task-based approach”, using the foreign language for some kinds of school activity that leads to a certain outcome. It led to using the foreign language as the means for teaching certain subjects in the school’s curriculum (Marsh 2002). Marsh (2002: 183) has referred to M. Siguan (1998) who has stated that “teaching in a foreign language will continue to grow as (it) represents the most effective means of acquiring a thorough knowledge of a foreign language... (and can serve stimulus for certain aspects of intellectual development)”. More efficient language teaching and multilingualism are promoted in larger European countries. Marsh (2002: 184) has also referred to D. Wolff (2000) who has pointed out that ““Learning by construction” (is) entirely different from “learning by instruction”, which is still the most characteristic feature of the mainstream classroom. There can be no doubt that the constructivist paradigm will replace instructivism in the near future”.

In recent years CLIL (Content and Language Integrated Learning) has attracted much attention in Europe and other parts of the world. The term was originally defined in 1994 and launched in 1996 by the University of Jyväskylä and the European Platform for Dutch Education (Darn 2006). CLIL refers to any dual-focused educational context in which an additional language, thus not usually the first language of the learners involved, is used as a medium in the teaching and learning of non-language content (Marsh 2002). Thus, CLIL means that a language and a subject are learnt at the same time. For example, Malaysian students have studied mathematics and science in English. Italian students have studied

science in French and Australian students have studied mathematics in Chinese etc (Mehisto et al 2008). Lorenzo, Casal and Moore (2010) declare that the teaching matters through a foreign language is not new. They state that there is no coherent conceptual framework of CLIL that may be applied in all cases. It is agreed that there is a widespread agreement among bilingual teaching staff that CLIL is beneficial to the educational process in general, an opinion echoed by parents and learners alike (Lorenzo, Casal, Moore 2010). It is also stated that CLIL enhances cohesion within schools. The purpose of the present paper is to carry out research on the advantages and problems of the method on the example of Miina Härma Gymnasium.

In the first chapter an overview of different methods within CLIL is given, then the main advantages of CLIL are described, which are followed by the most common problems regarding CLIL. Furthermore, there is a section about its educational service. The next subchapter provides information on CLIL in Estonia, followed by the description of the qualities of good CLIL teachers and strategies for teachers towards quality CLIL. Last, ten tips for CLIL teachers of maths and science are presented and discussed. In the experimental part of the work there were carried out interviews with both the students and teachers of Miina Härma Gymnasium on the topic of the advantages and problems regarding CLIL. Subsequently, the CLIL students and also a control group of Miina Härma Gymnasium completed a chemistry test. The language of instruction of the CLIL group is English, while the control group is taught in Estonian. The results are analysed in comparison to each other. Chemistry was chosen as the content part of the research because the author of the present work is primarily chemistry teacher and he has not been able to find any research carried out on chemistry as the CLIL content. Thus, the present thesis has a potential to make a contribution to the field of CLIL application research.

CHAPTER 1. LITERATURE OVERVIEW

The first chapter provides an overview of different aspects of CLIL and it is divided into seven sections. The first section describes different methods CLIL involves. Sections 1.2. and 1.3 present the advantages and problems reading CLIL respectively. Next, there are sections about the educational service of CLIL, the qualities of good CLIL teachers and strategies improving teaching according to CLIL methodology and CLIL in Estonia. The last section includes tips for the CLIL teachers of maths and science.

1.1. Many faces of Content and Language Integrated Learning

Content and Language Integrated Learning (CLIL) is a concept that involves more than twelve different study methodologies like language shower, language immersion, language camps, bilingual education, multilingual education etc. The novelty of CLIL for all these methodologies lies in the synthesis of knowledge of different fields. The time dedicated to teaching according to CLIL methodologies can be different. Thus, there can be intensive short term courses as well as intensive long term courses. Below, some of the most important study methodologies of CLIL are described (Mehisto et al 2008).

Language showers are suitable for learners starting from four and up to ten-year-old children. Children usually stay in a foreign language atmosphere for about thirty minutes, maximum one hour. Language showers include playing, singing, different use of pictures or objects, handling the learning objects and moving. The language of instruction is almost entirely the foreign language. If the activities reoccur, children know what to expect. These so-called routine-activities (the beginning and ending of activities, reoccurring phrases and sentence types) create a safe atmosphere that reduces anxiety and promotes learning. Language showers help students recognize the existence of different languages and prepare for their future language studies. It also gives students a positive attitude and introduces different sounds, words and sentence models (ibid.).

There are arranged language camps for one week period by CLIL teachers. Students gather in a place that can offer different activities, accommodation and catering. The groups usually comprise students from one school or there can also be students from friendship schools. Five days are long enough to achieve remarkable results in language skills and short enough for students to accept it. The first rule in the language camp is to speak only the target language. Competitions are very motivating for students; therefore, it is reasonable to form groups of students. The groups are asked to come up with different strategies that help the use of the target language. In this way students are more responsible themselves using the CLIL language. Students can work out different play-money and fine systems to motivate themselves even more. The group that receives the most of the play-money can win a prize at the end of the camp. These language camps help students experience success in the environment of the foreign language, spend time pleasantly and connect the target language with fun experience, find motivation for their future language studies and find interesting ways to learn foreign languages (Mehisto et al 2008).

Different international projects are held that help improve students' language and also subjects' knowledge through communication with students from different countries. It is easy and cheap to join international networks like *Science Across the World*. These types of networks guide students to study and discuss different scientific topics like acid rains, biological diversity, nutrition and food, health, genetics, energy and environment. Students share their ideas and discoveries with different students from all over the world and students from the same form try to reach consensus what they have found out. Networks offer learning and teaching materials and also guidelines for teachers how to teach. Estonian universities, schools and kindergartens increasingly actively take part in different programs every year. International projects help students get extra motivation and take more responsibility for their own studies, integrate different subjects, make new friends and communicate to other CLIL students from over the world. They also develop students' communication, info technological, collaboration and problem solving skills. Furthermore,

students' discussion, observation, critical and creative thinking and assessment skills are improved. Nowadays these programs focus on lifelong learning (ibid.).

Another form of CLIL that has been pointed out is language immersion programs, which are started at kindergartens or in the first school year. Within these programs children learn everything in a foreign language. When students reach elder forms more and more of their curriculum is presented in their mother tongue. Half the subjects are often taught in the foreign language and the other half in their mother tongue after two year of studies. Many schools even offer an opportunity to learn a third language. It has been stated that there is a principle: one teacher – one language. By doing that, students get used to turning to teachers either in the mother tongue or in the foreign language depending on the language teacher uses for instruction (Mehisto et al 2008).

The teachers of language immersion try to create a good atmosphere for language studies. A lot of attention is paid to communication and many gestures and repetitions are used. Language is taught systematically in a logical way step by step. On the contrary, non-systematic ways are used as well giving students opportunities to express themselves, discussing subject matter and talking about things, which are important for them. Small children acquire language quickly and at the end of the first year they are able to understand almost everything that a teacher says and can also respond in the foreign language (ibid.).

There are also some problems regarding language immersion because more attention is paid on the fluency of the foreign language than it being grammatically correct, which means some mistakes can fossilise. There is also a risk that students' language development reaches certain level and slows noticeably or even stops. Nevertheless, there have been worked out certain reformulation strategies that help overcome the problem (ibid.).

The language immersion programs try to help students achieve functional use of the target language, the development of mother tongue at the same level as students' who do

not take part in the language immersion programs, the subject knowledge at the same level as students who do not take part in the program and the valuation of the target and their own culture (Mehisto et al 2008).

1.2. Advantages regarding Content and Language Integrated Learning

There are generally five major advantages mentioned regarding CLIL. They are linked to learning and development outcomes relating to culture, environment, language and learning. A short overview is given below.

Firstly, the culture dimension is stated as an advantage of CLIL. It is stated that CLIL has been identified as one way to achieve positive results in “intercultural knowledge and understanding” because language can be used as a tool for showing similarities and differences between people of different backgrounds. Transforming knowledge into understanding often needs to be realised through experimental methods. Intercultural knowledge and understanding helps develop intercultural skills which are about how language is used in intercultural situations (Marsh 2002). The aspect of wider cultural context has been remarkably described by David Marsh (2002: 67):

Terms such as enculturation, cultural adaption and others have been used over years to refer to a situation in which trans-migrant individuals learn to live in a different society to that of their early years or their forbears. CLIL can be used to facilitate such process of cultural/linguistic adaption.

The environment dimension is drawn attention to as an advantage. It is noted that European integration and global internationalisation have had an influence on environments extending from those of the nation, through to regions and schools. Many opportunities for funding are available for young people. CLIL could be used for such preparation, especially with older learners. David Marsh (2002) has stated that the transnational dynamic of the non-language subject can be used as a reason for the introduction of this approach. Also, different types of certification exist throughout Europe. CLIL is used as a unifying platform to make students linguistically and contentwise

prepared to take up their rights in Europe. Furthermore, schools look for new means such as CLIL by which to enhance their profiles. Schools have had to adapt to socio-economic forces in recent years which has been stressful for them. It is even more complicated in the increasing use of criteria-based evaluation systems by which the performance of schools is judged (Marsh 2002).

The language itself is another advantage of CLIL. Improving overall language competence has been the basic advantage of CLIL historically. All the four language skills are developed through CLIL. Also, oral communication skills are developed. A student may have the knowledge of a language but it does not mean that the student is able to use the language in real-life situations. CLIL studies involve much communication, even in written form through information and communication technology modes. Therefore, CLIL helps improve communicative language skills. Another benefit regarding CLIL is that it deepens awareness of both mother tongue and the target language. Some schools have developed language-sensitive curricula that cultivate both first and additional language simultaneously. Multilingual interests and attitudes are developed through CLIL studies as well. There still remains a dispute whether multilingualism is relevant or not. Such opinion is based on people's perception of what is advantageous for young people and their future needs. There is no general agreement whether the main CLIL language should be English, because youngsters will pick up English anyway. This idea is based on the fact that English is seen as a dominant *lingua franca* type language. Therefore, other languages should be learnt using this approach. CLIL studies also allow school to introduce a language in a non-formal way that is often geared towards developing interest in further study (ibid.).

Furthermore, the content is an advantage of CLIL. CLIL provides opportunities to study content from different perspectives. For example, history is sometimes seen differently depending on the country and its culture. Therefore, educational curricula of different countries are not identical on the same matter. These different world-views can be seen in the ways in which some content is taught. However, it may lead to significantly

diverse ways of approaching and understanding similar phenomena. CLIL enables learners to study through these different perspectives, which can lead to achieving a deeper understanding of the subject matter. Also, CLIL helps learners understand the subjects and their core terminology in the target language. It prepares learners for forms of mobility. Furthermore, CLIL helps learners develop their language capabilities for future studies and/or working life. Many adults go working abroad and therefore, CLIL studies help them prepare for future (Marsh 2002).

The last but not the least advantage that has been pointed out is learning. Special emphasis is on learner-based methodologies to improve learning by paying attention to individuals' needs in terms of social and analytical skills. Therefore, individual learning strategies are improved through CLIL. Also, CLIL helps develop students' analytic, reflective and hypothesizing skills and all that encourages them to become much greater risk-takers in terms of their linguistic self-confidence. The main characteristic of many CLIL methodologies is the synergy resulting from communication orientation on the language, the content, and the interaction as it takes place within classroom. It is stated that this approach is much more effective than traditional foreign language teaching. CLIL programmes are often focused on providing non-threatening and supportive contexts where most or all learners feel comfortable with the classroom objectives. The whole process is relaxed and natural. Therefore, CLIL helps increase learner motivation (ibid.).

There have been carried out many studies on CLIL and a short overview of two different articles is given below. Thus, these articles discussed hereafter were primarily chosen to demonstrate two different aspects of CLIL – teaching of the subject and teaching of the language. The first article mainly deals with CLIL influence on the language and the second one on the subject. Therefore, a short overview of the advantages of CLIL is given depending on some research. One of the studies chosen for this research paper was carried out in Andalusia. The study took an approach to CLIL research as it included both linguistic analysis and the implementation of language planning of supranational language

polices. The participant selection included three major variables: urban/rural, primary/secondary education, and L2 (English, French and German). The results of the study address four of the core research questions: linguistic outcomes and competence levels, acquisitional routes and individual differences in CLIL programmes, L2 use in CLIL classrooms and CLIL educational effects beyond the L2. The collected data of this study show that CLIL learners outperform their mainstream peers. The authors (Lorenzo et al 2010:428) claim that “the global scores were 62.1 per cent for the bilingual groups in comparison with 38 per cent for the control groups”. Thus, this is clear evidence that CLIL has good influence on the results of students. To prove the usefulness of CLIL the authors (Lorenzo et al. 2010:429) have suggested that “the advantage extends to structural variety and pragmatic efficiency, hence encompassing language growth at lexico-grammatical and discourse level”. The article is mainly concerned with the CLIL usefulness on students’ linguistic skills, but it would also have been interesting to find out about the subject aspect of the approach.

The second article chosen for this research paper gives an overview of thinking and learning processes of science and mathematics, teaching students through a foreign language in Finland. The process in this study was considered cognitional development. 669 Finnish mainstream L1 learners aged 7-15 in a public comprehensive school took part in the study. The students were divided into four age groups. The experimental group, about half of the students, was taught through English, French or Swedish. This group was compared with the students who were taught through Finnish. Cognitional development was studied in terms of individual concepts and conceptual structures that were called “meaning schemes”. The data was collected in four stages – in springs and in autumns over two years. The collected data show that in the first age group the differences between the target group and the control group in mathematics were minimal, but the differences in the science study were about 1.5% in favour of the target group. The differences were also notable in the other three age groups all in favour of the control group. Still, most of the

differences remained within one percent with minor exceptions. Thus, it can be concluded that a demanding and language-enriched learning environment has a positive effect on the Finnish mainstream CLIL learner's cognitional development (Jäppinen 2005).

These two articles confirm that CLIL has a positive effect on students' studies. The first one has pointed out CLIL's positive effect on the students' language skills whereas the second article demonstrates CLIL's effect on students' science and maths knowledge. The second research also proves that CLIL is suitable for students with mixed abilities as it was carried out among mainstream students and not students chosen by any standards. The author of the present work did not find any notable disadvantages of CLIL within different research carried out by other scholars.

1.3. Problems regarding Content and Language Integrated Learning

It seems that it is mostly talked about the advantages of CLIL but not about the problems. A lot of research confirms the success of students who have taken part in different studies. CLIL definitely raises expectations. Parents and students who are familiar with the advantages of CLIL usually prefer continuing CLIL. Nevertheless, it is important to learn about the difficulties other people have had. Therefore, it is reasonable to point out some problems concerning CLIL that have emerged (Mehisto et al 2008). There are four major problems regarding CLIL.

Firstly, understanding the conception and overcoming the misconception has been pointed out as a disadvantage. Many adults find it unnatural to study in a foreign language. Especially studying science seems to be overwhelming. These adults also found it difficult to learn foreign languages as children. It used to be almost impossible to imagine integrating different subjects while they were students. Thus, it influences their conceptions how teaching process should be organised. Some people are even convinced that the students who study subjects in foreign languages cannot acquire knowledge as fast as the students who use mother tongue to study different subjects. In reality the results of

students using CLIL are as good as those of the students who are taught in their mother tongue or even better. CLIL does not inhibit gaining knowledge, it rather helps the process. CLIL students achieve even better results in reading, writing and listening tests in their mother tongue. Two examples can be found in the previous section 1.2. (see page 12). Therefore, it can be stated that CLIL students develop better metalinguistic awareness, meaning that they can compare different languages better, choose words more consciously and convey their conception more precisely. Additionally, there is also a misconception that CLIL is meant only for very talented and intelligent students. Nevertheless, many countries from Luxembourg to Singapore are in favour of multilingualism. CLIL students generally show good results in these countries. Thus, there is the misconception but studies prove them to be wrong. In order to improve people's understanding of the conception of CLIL there should be held discussions by CLIL experts before a school decides to choose CLIL (Mehisto et al 2008).

Secondly, there are not many teachers ready to work according to CLIL methodology. Teachers to be are not taught according to CLIL programmes in universities in different countries yet. Therefore, the number of CLIL teachers is limited. Even if a teacher has the necessary skills, s/he might not be dedicated to achieve the subject and language integrated goals. There are often teachers at schools or preschools who command the CLIL language. Nevertheless, they have never even considered CLIL or are too critical about their language skills. General recommendation for these teachers is to take a short language course to freshen up their language skills. Also, they should consider taking part in the teacher exchange programmes with other countries where the CLIL language is spoken as mother tongue. Therefore, CLIL teachers need proper training and a lot of support (ibid.).

Thirdly, teaching according to CLIL methodology consumes more work for teachers and the shortage of study materials is seen as a problem as well. CLIL teaching demands more preparation time and efficient collaboration of teachers. Also, the shortage of

materials is a problem. It takes a lot of time to create new materials or organise the available ones. Furthermore, students' needs have to be considered and collaboration with parents should be more efficient. Likewise, making new contacts with other CLIL teachers is time consuming. Not all teachers are eager to devote themselves to this extra work. Different CLIL teachers should talk about their experience with CLIL. It helps teachers learn from other teachers' experience and nothing new needs to be created. It makes the work of CLIL teachers easier and less stressful (Mehisto et al 2008). CLIL teaching materials have been created in Estonia, mainly for Russian elementary school students whose language of instruction is Estonian since 2000 by SA Keelekümbluskeskus (*Keelekümbluskeskus*). Thus, CLIL teaching preparation takes a lot of time and effort from the teachers.

Fourthly, school boards need to be rational concerning the circumstances of CLIL. Usually more intelligent and talented students are included in CLIL groups depending on tests or students' marks. Therefore, it makes CLIL elite. It creates prejudice and it is wrong. There have been carried out some research the results of which clearly show that CLIL is suitable for students with different abilities. An example of research confirming the abovementioned can be found in the section 1.2 as well (see page 12). It is recommended to include children to CLIL groups depending on the current list of applications. In some countries demand exceeds offer and students are just drawn by chance. It is also important that school boards are familiar with CLIL methodology in order to support CLIL teachers. Although, CLIL studies should not be favoured comparing with traditional learning and all the languages that are taught in a school need a high status, CLIL teachers should be supported more by school board because of their bigger workload. Sometimes it happens that there are two different groups of teachers formed – CLIL teachers and traditional teachers and no collaboration takes place between them. School boards have to support the collaboration between teachers and help arrange it (ibid.).

1.4. Educational service

It is stated that national policies of foreign languages teaching are of relatively recent origin. If the learning of languages is pointed out as a national need, but not as a national priority, then innovations such as CLIL will have notable difficulty in making progress. Even larger countries realise that there is a need to upgrade and diversify levels of foreign language teaching approaches. It is emphasised that the interest towards integration of curricula content in education will continue to grow. Integration is often linked to the notion of relevance due to the fact that teachers and students know, without relevance it can be difficult to achieve significant learning process. It is also stated that the impact of the increasingly available new technologies means that young people's attitudes towards accessing real-life in education, as opposed to stimulation, will increase rapidly. One of the major influences on educational development is partly a response to the "mindset" change of the younger generations through the access of the Internet. CLIL is seen as part of a slow but firm innovation of education that looks likely to find its place in education (Marsh 2002).

David Marsh (2002: 183) referred to Takala (1998), who has effectively pointed out the nature of CLIL's educational service:

CLIL is an educational service for pupils/students. It is they who realise the curriculum through their learning endeavours. Effective learning requires teacher support but also, more fundamentally, active learner involvement. CLIL probably sets even more demand on learner self-directiveness than more traditional forms of study. For this reason, it is advisable to incorporate the learner perspective from the beginning and have a learner development component built into CLIL.

1.5. Content and Language Integrated Learning in Estonia

The population of Estonia is about 1.35 million of which ethnic Estonians comprise 68%, ethnic Russians 26% and Ukrainians 3%. All together there are over 120 ethnic groups in Estonia. Estonian is the mother tongue for 67% and Russian for 20% of the population. Asser and Mehisto (n.d.: 1) also state that "during a census two years prior to the restriction of independence in 1991, *circa* 15% of Russians and 8% of Ukrainians

reported fluency in Estonian. In 2000, these census figures were 33% and 38% respectively” (Asser, Mehisto *Estonia* n.d.). These figures definitely demonstrate that there is an increasing demand for CLIL studies in Estonia as the numbers have grown remarkably over almost a decade.

Estonian is the official language in the Republic of Estonia. In 1995 a language law was approved that regulates the use of language in the public and private spheres, according to which people working with the public have a prescribed degree of proficiency in the state language. Since gaining the independence there have been some changes in Estonia – English has replaced Russian as the dominant *lingua franca* for international communications. Asser and Mehisto also add that “management and service sector jobs often require fluency in Estonian, Russian, English and Finnish” (ibid.).

There are many Estonian and also Russian-medium schools in Estonia, which have a long tradition of intense foreign language teaching. Different subjects are taught in a foreign language like culture study, history and country study. CLIL studies in Estonia date back to 1960 when the modern-day Tallinn English College and Tallinn Secondary School 21 started teaching different subjects in a foreign language. Thus, it states the beginning of CLIL studies at the gymnasium level. Somewhat later other schools started teaching geography in English in five different schools in Tallinn, Tartu, Rapla and Rakvere and in German in Kadrioru Secondary School at the basic school level. After thirty-eight years the CLIL studies were ended in Tallinn English College, whereas the other schools had ended them even earlier. The Tallinn Gymnasium of Humanities began teaching different subjects in English in 1970 and have continued it up to date (Mehisto et al 2008).

In the early 1990’s wider application of CLIL took place in Estonia. Russian-speaking parents insisted their children to be presented of dual lingual instruction as it was for their own interest. It was supposed to help improve their Estonian language skills and also increase their opportunities for further education in Estonian universities. Furthermore, there was an ‘Estica’ curriculum with complementary teaching materials created by a Tartu

University research team. These materials were used to teach home and cultural studies and also history in Estonian (Asser, Mehisto *Estonia* n.d.).

Moreover, the departments of German language were opened within two gymnasiums in Tartu and Tallinn. The students of the departments of German language were prepared for the Abitur either in Estonia or in Germany. Therefore, some subjects were taught in German and some in Estonian. There were teachers from Germany who instructed their students according to German curriculum in German. The collaboration of the Republic of Estonia and the Federal Republic of Germany created the instructions for final examinations. The graduates of Tallinn German Gymnasium received two diplomas – Graduation Certificate of German Abitur, which gave them an opportunity to continue their studies in German universities and also an Estonian Graduation Certificate (Mehisto et al 2008).

The idea of the language immersion had been introduced to Estonia in 1992 by Ülle Rannut, Mart Rannut and Silvi Vare. Nevertheless, the active discussions on the use and opportunities of language immersion began in 1998 in an international seminar. The program itself was launched in four different schools in Estonia in September in 2000 by the Ministry of Education and Research. It supports curriculum and teaching materials development, as well as, the training of teachers and educational administrations. Finally, declining enrolment is forcing schools to compete for students and work harder to improve the delivery of quality programming. CLIL programmes are often noticed as providing extra value (Asser, Mehisto *Estonia* n.d.).

CLIL as an approach has been described within the 2010 National Curriculum of Estonia by Maire Kebbinau. Firstly, the term itself has been explained and different types of CLIL have been pointed out the same way as it has been done previously within the current project. According to the National Curriculum of Estonia, subject lessons include language learning and the teaching of learning skills. Knowledge is presented in more meaningful and supporting ways using different charts, figures, diagrams, key concepts

and the necessary terminology. A lot of discussions take place within language lessons to understand and apply the knowledge of subject. Students are taught how to acquire new knowledge and skills to improve their learning process. Also, students learn how to connect the previous and new knowledge and the ways to present it. They are guided to evaluate and direct their learning process alone and within a group as well. Within the integration of language and subject students' studies are based on learning skills and a meaning is created in collaboration. CLIL provides an opportunity in every subject to understand and acquire target language in context. The collaboration of language and subject teachers supports students' subject as well as language learning. CLIL is a tool to achieve new knowledge and experience (Kebbinau 2010).

The basic features of CLIL are also pointed out within the National Curriculum of Estonia and these are the multiple focuses, safe and enriching learning environment, authenticity, active learning, support structure and collaboration. These features should be followed creating beneficial environment, preparing and giving lessons, in collaboration with colleagues and teachers and assessing teacher's own and students' activities (ibid.).

It is stated that there is an increasing demand for CLIL in Estonia as various CLIL programmes have been successful. CLIL is propagated by parents of CLIL students and the students themselves. Therefore, the future of CLIL seems to be promising. Plurilingualism is quickly becoming popular. Furthermore, at least 60% of native Russian students' curriculum in forms 10-12 has to be through the medium of Estonian since 2007 (Asser, Mehisto *Estonia* n.d.).

Nevertheless, the same problems are at presence in Estonia regarding CLIL as they have been stated previously in the present project. The shortage of qualified CLIL teachers is one of the major problems, which is likely to grow exponentially as the programme expands and students move into senior forms. It will take a coordinated national and local effort to address the issue. Also, the need for school administrations who understand how to support CLIL teachers and manage programming becomes more and more important.

Moreover, coordinating programmes nationally will become increasingly complex. According to the authors “Programme accreditation is currently being explored as one possible management tool” (Asser, Mehisto *Estonia*: 62). As the programme is becoming more popular schools might be tempted at the point of programme entry to select academically stronger students. However, it is wrong as it is suitable for students with different abilities and therefore, students should have equal opportunities in Estonia. The issue should be returned to regularly in order not to lose sight of this fundamental fact (Asser, Mehisto *Estonia* n.d.).

Miina Härma Gymnasium is the only school in Tartu that offers English based studies. It is an IB World School, which offers the Diploma Programme and the candidate school for the Primary Years Programme. IB Programme offers students from all over the world equal opportunities to study anywhere in Europe. The programme was started at Miina Härma Gymnasium in 2011 and has been a success (*IB studies* 2013). Therefore, Miina Härma Gymnasium was chosen to carry out research on within the present thesis.

1.6. Qualities of good CLIL teachers and strategies for teachers towards quality CLIL

When a school chooses to start teaching students according to CLIL programme some questions might arise and these will be pointed out on the example of Tallinn English College. Who is going to teach students – a language teacher or a subject teacher with some foreign language skills? Will the students’ subject knowledge suffer due to teachers’ insufficient subject knowledge? Are students’ language skills enough to learn in foreign language? There seems to be an agreement that a subject teacher who has got a good command of a foreign language is suitable for teaching CLIL students. Only a teacher who is good at his/her subject can teach the most important aspects of his/her subject in an understandable and emotional ways within a short period of time. It can only take place in classes of small number of students just like in language groups. The optimal number of students is agreed to be 10-13. Working in small groups provides the opportunity of individual approach by teachers and a sufficient control over students, which guarantees

consistent work and the comprehension of subject knowledge. Teachers usually work according to standard subject programs and no indulgence is done (Mehisto et al 2008).

Language teachers think that teaching different subjects in foreign languages is necessary and thankworthy. It makes the learning process more interesting, provides students an opportunity to learn the language in natural ways and the language is used in context within CLIL lessons. It also deepens connection within the subjects and helps creating harmonic and educated people (ibid.).

There have been worked out six strategies in order to improve the quality of CLIL. Firstly, there has to be rich input – meaningful, challenging and authentic. Content in lessons should be meaningful in a sense that it focuses on the global problems mankind faces while connecting it with the daily lives of students and their interests. Students learn more when they are motivated and can link new input to prior knowledge, experience and attitudes. Special emphasis should be on interactive materials as video clips, flash-animations, web-quests and pod-casts because they constitute a rich source for designing tasks that foster creative thinking and create opportunities for meaningful language output. Using these sources provides students with self-directed and differentiated learning as well as a chance to prepare autonomously for the next lesson. Nevertheless, teachers have to remain the language role-models who actively show and teach students how to perform language operations. There should be an appropriate balance between teacher-directed and learner-directed activities, meaning that teachers have to provide students with the necessary, modelling scaffolding and motivation. Meyer has emphasised “Especially in CLIL classrooms, teacher feedback, systematic and professional error treatment; is crucial for successful learning” (Meyer 2010b: 5).

Scaffolding of learning has been pointed out as strategy number two, meaning that students need to receive a lot of teachers’ support to deal with authentic materials successfully and that as much *input* as possible can become *intake*. Therefore, they need scaffolding to help them cope with large input of all sorts. When students’ language skills

advance scaffolding can be reduced. Scaffolding serves different purposes as stated by Meyer (2010a: 15):

It helps students understand the content and language of any given material. It enables students to accomplish a given task through appropriate, supportive structuring and it also supports language production (=pushed output) by providing phrases, subject-specific vocabulary and collocations needed to complete assignments. It helps students to verbalize their thoughts appropriate to the subjects manner. In other words, scaffolding done right will boost students' cognitive academic language proficiency (CALP).

CLIL teachers depend a lot on authentic materials, which include many unfamiliar words for students who do not study in their mother tongue since these materials are not created with the need of foreign language learners in mind. However, it does not mean that these materials would not be suitable for CLIL students. The students should not concentrate on single words but need to start to understand the text within the context. The students have to lose their fear of unknown words and structures. Teachers can focus on what their students understand and help them express their thoughts appropriately. Teachers must encourage their students' natural curiosity and the desire to learn. Also, students need to be taught how to learn efficiently. In order to assist skill learning, instructional activities should "set up contexts in which these skills can be displayed, monitored, and appropriate feedback given to the shape of their acquisition" (Lyster 2007: 149). Meaningful and systematic practice is of great importance in the CLIL lessons (Meyer 2010a).

Next, rich interaction and pushed output are seen as a strategy of CLIL. It is stated that language acquisition is strongly influenced by the use of the foreign language in interaction. It is suggested that "feedback obtained during conversational interaction promotes development because interaction connects input, internal learner capacities, particularly selective attention, and output in productive ways. /.../ Students' interaction

and output are triggered by tasks which is why task design is at the heart of every CLIL lesson and one of the key competences for every CLIL teacher” (Meyer 2010a: 17).

It is encouraged that teachers create so-called communication gaps, meaning that there is something that students do not know and in order to find out the missing information they have to use different ways of communication in the target language. It can be either finding the information from a text, a table or from another student. In any of the previously mentioned cases students have to use their language meaningfully and, therefore, cooperative interaction takes place. After finding out the necessary information, students have to report it to the teacher or an overall discussion takes place in the lesson (Meyer 2010a).

As the fourth strategy, it is suggested to add the (inter-)cultural dimension in CLIL lessons. People are more willing to cooperate the better they know each other; therefore, students need to learn about other cultures. However, knowing facts about other countries and cultures might not be sufficient for successful communication; neither are foreign language skills alone. There are many other aspects that cultures differ from “including view of self, perceptions of time, and verbal and non-verbal communication styles, which need to be taken into account also.” (Meyer 2010a: 19). Therefore, intercultural communicative competence needs to be the ultimate goal when teaching according to CLIL methodology if a teacher wants to prepare students to succeed in a globalized world. Students do not need to know only key issues in foreign cultures but “they also need to become aware of the hidden cultural codes and the appropriate linguistic and non-linguistic means and strategies to address them and they need to be taught how to keep the flow of communication going without offending the partner.” (Meyer 2010a: 20). Thus, students need to look at different topics from different cultural angles and understand that other cultures are different depending on their values and beliefs. It is seen as the most valuable experience that students can gain through CLIL (ibid).

Strategy number five is to make it H.O.T. H.O.T. is an acronym of the words higher order thinking, which requires that students “connect them [facts] to each other, categorize them, manipulate them, put them together in new or novel ways, and apply them as we seek new solutions to new problems.” (Thomas *H.O.T.* n.d.). Higher order thinking is extremely important to succeed in the Information Age. It does not take place automatically in CLIL lessons; furthermore, it needs systematic instruction, both in the target language and in the mother tongue. Meyer (2010a: 21) has stated that therefore,

the core elements of CLIL i.e. input, tasks, output, and scaffolding have to be balanced in such a way that various cognitive activities are triggered. Effective teaching means creating environments in which students are engaged, challenged, and saturated with various types of thinking – without being overwhelmed.

Teachers need to show students how to express their thoughts in an increasingly complex manner (Meyer 2010a).

The last of the strategies that have been pointed out is sustainable learning. The purpose of sustainable learning is to make sure that what is taught to students, stays in students’ long-term memory. Competent learners are those who can retrieve knowledge whenever there is a need and apply it to solve problems. Ideally it happens spontaneously and students’ passive knowledge is turned into active knowledge. In CLIL lessons it is extremely important since both the learning of the target language and the subject takes place. Also, students have to be able to talk about the respective topics in their mother tongue as well. Different techniques can be used to make learning more sustainable; for instance, creating connections with students’ attitudes, experience and knowledge, making the learning process transparent or providing clear structuring and promoting autonomous learning and introducing portfolio work etc (ibid.).

1.7. Ten guidelines for CLIL in maths and science teaching

Below, there are given ten tips for maths and science CLIL teachers, which have been adopted from Science, Maths and CLIL (*10 guidelines* n.d).

1. Assess students' language proficiency together with the teacher of English language. Have her (at least initially) check your texts and worksheets with respect to adequate level. Don't ask too much of the students, but at the same time do not simplify texts too much. The tasks should be a manageable challenge.
2. Language based tasks like clozes, jumbled phrases, text puzzles etc. will help students to improve their ability to discuss scientific issues (possibly independent of the language used).
3. Combine reading and listening comprehension with written tasks and oral discussion both according to your own competence and abilities (e. g. availability of a native speaker) but do not completely omit one of these issues of language perception.
4. Never forget that the aim of foreign language learning is not linguistic perfection but to enable written and oral communication. English is seen as lingua franca.
5. Mix language based tasks with hands on activities. (The latter should at least sometimes also be formulated in English).
6. Have a good mix of tasks intending the elaboration of new stuff and revision or practice.
7. Promote students' preparedness to discuss the tasks at hand among each other (in conformity with actual didactic concepts regarding learning as negotiation of meaning). Task should mainly be done in pairs or groups.
8. Modern foreign language didactics is no longer based on the assumption that the foreign language has to be used exclusively. So do not hesitate to give support by employing the first language.
9. Topics should preferably be context related so that a broad scope of activities involving linguistic discourse are possible.
10. Try to involve the mother tongues of second-language-learners in multilingual classes at least by introducing multilingual word tables.

It is emphasised that the CLIL teachers should collaborate with language teachers to create more meaningful and correct worksheets language wise. Teachers ought not to forget that CLIL is more about communication and the use of the language and not the linguistic perfection. Therefore, the activities used in CLIL classrooms have to involve all the four language skills: listening, writing, reading and speaking. Teachers need not to be worried about using the mother tongue as it supports the learning. Thus, all the ten tips given above are very useful for maths and science CLIL teachers to follow in order to achieve better result with their students.

CHAPTER 2. ACTION RESEARCH

The second chapter provides an overview of the action research conducted in the scope of the present thesis. It is divided into five sections. Firstly, the aims and a summary of the methods of the study are presented. The following sections, 2.2 and 2.3, introduce and discuss the results of the interviews both with the students and the teachers. The section 2.4 presents and discusses the results of the chemistry tests comparing the CLIL and the control group. The section 2.5 includes general discussion and conclusions on the research.

2.1. The aims and the methods of the study

The research itself is a case study. Methodologically, the case study is a 'hybrid' in a way that it generally utilizes a range of methods for collecting and analyzing data, rather than being restricted to a single procedure. Thus, a case study allows investigating how a certain phenomenon, e.g. CLIL, functions in context (Nunan 1992).

The purpose of the study was to carry out research in order to find out the advantages and problems regarding CLIL. The primary research took place in Miina Härma Gymnasium and it comprised three parts: interviews with the teachers (see Appendix 1), interviews with the students (see Appendix 2) and chemistry tests (see Appendices 3 and 4). Thus, there were interviews carried out on the advantages and problems regarding CLIL both with the teachers and the students. Also, a test of chemistry on the properties of metals was conducted, in which the correct and incorrect answers were counted and their proportion analysed. Therefore, the study involves both qualitative and quantitative research. Traditionally, it has been stated that there is a binary opposition between qualitative and quantitative research. Nevertheless, more recently it has been argued that in practical terms qualitative and quantitative research are in many respects indistinguishable, and that "researchers in no way follow the principles of a supposed paradigm without

simultaneously assuming methods and values of the alternative paradigms” (Reichardt and Cook 1979: 232).

The purpose of choosing qualitative methods within the present project was mainly to gain an understanding of underlying reasons and motivations of the teachers and the students of Miina Härma Gymnasium regarding the advantages and problems of CLIL. Also, prevalent trends were uncovered in the thoughts and opinions of the respondents within the interviews. In general, qualitative research generates rich, detailed and valid data that contribute to in-depth understanding of the context. That was exactly what was achieved interviewing the CLIL students and teachers of Miina Härma Gymnasium.

The interviews consisted of seven questions (see Appendices 1 and 2) with both the students and teachers of the abovementioned gymnasium. The main idea within the questions was to find out the advantages and problems regarding CLIL from different points of view, the students’ and teachers’. The interviews took about ten minutes per person and the answers were recorded. The results will be discussed in the sections 2.2 and 2.3 below.

Quantitative research was also chosen because of it giving an opportunity to analyse the results of the chemistry test statistically. It is stated that statistical analysis usually refers to a collection of methods used to process data and report overall trends and it provides ways to objectively report on how unusual an event, e.g. CLIL, is based on historical data (*Statistical Analysis* n.d.). Quantitative methods also allow generalization of the result from a sample to a population of interest. Also, the results are more objective according to the Figure provided in Appendix 5.

The test comprises ten questions on the matter of the properties of metals, both physical and chemical. The test consists of questions, the aim of which is to check some knowledge and also some questions, the purpose of which is to see whether students can apply their knowledge while completing practical tasks. The test was taken by the CLIL group and control group of form eleven students of Miina Härma Gymnasium. Both the

groups comprised nine students. The results will be analysed and discussed in comparison to each other in section 2.4. Also, some conclusions will be drawn.

2.2. The results of the interviews with the teachers

Thus, five teachers were interviewed within the present research project. The teachers chosen for the interview teach chemistry, physics, geography, biology and history. Their backgrounds regarding the English language studies are mostly similar, excluding one teacher. She had studied English at the university and later became a subject teacher. Also, she has taken different subject courses. The others are subject teachers with various language skills and none of them has taken any language courses. Thus, four of these teachers teach their subject both in English and in Estonian. The remaining teacher is an English teacher who has become also a teacher who teaches a subject (geography) in English. These teachers were chosen mostly due to the fact that they were all natural science teachers excluding one, the history teacher. The history teacher was chosen in order to make the number of respondent teachers the same as that of the CLIL students'.

Firstly, the teachers were asked (see Appendix 1) whether they are aware of the term Content and Language Integrated Learning. So, the teachers were provided with the acronyms both in English and in Estonian, and asked if they had ever faced these acronyms. Two of the teachers confessed that they had never heard of this term or the acronyms. One of the teachers said that she had heard the acronyms but did not remember what they stand for. One of the teachers did not know the acronyms but had heard the terms themselves. Only one of the teachers was familiar with the acronym and the term both in Estonian and in English. It might be explained with the fact that she has the philologist's background and has come across it somewhere in different courses for teachers of English. Although, most of the teachers interviewed use CLIL in their lessons, they are not aware of the term or the methodology itself.

Secondly, the teachers were asked to compare two lessons they teach in English and in Estonian. They had to point out the differences and similarities between the lessons. One of the teachers (the English language teacher) was asked to compare her English language lesson and the subject lesson in English. The answers were quite different. Four teachers out of five pointed out the subject itself and the structure of the lessons as similar. The fifth teacher brought out just the language as the similarity as she is the English teacher primarily. One of the teachers told that she always highlights new terminology both in Estonian and in English. The CLIL students need to know the terminology in their mother tongue as well. The students whose language of instruction is Estonian need to know the terminology in English as there are a lot of materials in English that the teacher uses in her lessons. For example, different figures or scientific movies that are in English. Therefore, the students need the terminology in English as well. She mentioned that fortunately the terminology in Estonian and in English in her subject is relatively similar. It was also mentioned that in most cases it does not matter whether the students' language of instruction is English or Estonian. Thus, language is not seen as an obstacle when learning new material.

Teachers' insufficient language skills were pointed out in most of the cases as the major cause of difference. The teachers themselves did not feel confident with their English skills. Thus, their instructions in English are really simple and they are not able to explain more complex things in English, except for the teacher whose major is English. She feels very confident explaining her subject in English and she also stated that the subject is the major difference in her case as she does not teach the subject in Estonian.

All the teachers interviewed said that there are more sources to use in English, which gives them an opportunity to create more worksheets and more varied materials. These materials could not be used with the students who learn in their mother tongue as their English skills might not be sufficient in all cases. A teacher cannot make an assumption that everybody understands the subject in English in the case of the control group. One of

the teachers pointed out that the CLIL students can do more work in pairs or groups and the students also have to analyse and use their logical thinking more in CLIL lessons. They have to go through the subject themselves and make the necessary discoveries as the CLIL groups are usually smaller according to the teachers interviewed.

Next, the teachers were asked, which lesson – CLIL or a regular lesson – takes more time to prepare and they were also asked to give reasons. Four teachers out of five confessed that the preparation of the CLIL lessons consumes definitely more time. However, the reasons were somewhat different depending on the teacher. The major reason was that there are no certain materials to use. Nevertheless, there are a lot of different sources to use and it takes much time for teachers to read all the materials through and find the ones that are suitable for their lessons. There are many different textbooks and almost infinite source – the Internet. It takes a lot of time to find the suitable materials, as stated before. Three teachers out of five pointed out that their English speaking skills are quite limited and therefore they need more time to prepare. They need to look through the necessary terminology and also check the pronunciation of the words if they do not want to be in an embarrassing situation in front of the classroom. They also have to be prepared for the discussions, which might follow the lecture. One of the teachers stated, however, that it takes more time to prepare a lesson with mother tongue students. The CLIL groups tend to be homogeneous and therefore, it takes less time to prepare a lesson for the CLIL group and more time in the case of multiple talented students. Some students attain only the basic knowledge of the subject and a teacher has to take it into account. On the other hand, there are also brighter students, who need extra preparation as well. Thus, it takes more time to prepare a lesson for these students.

Subsequently, the teachers were asked to elicit the most pleasant and the least pleasant experience within the CLIL lessons. All the teachers said that the CLIL lessons create an excellent atmosphere to use English naturally. The students can acquire the necessary terminology in context and use their English language skills meaningfully. One of the

teachers pointed out that she enjoys working with new materials. It gives another perspective to the subject. She understands that there are different methods used in the English based literature compared to what the Estonian textbooks provide. Thus, it helps broaden teacher's horizons and gives her alternative methods of teaching. The number of different materials available was also highlighted by three teachers. One of the teachers pointed out that there is a friendly medium in the CLIL lessons. She said that she learns with the students because the students help the teacher with the pronunciation or with the terminology too. She enjoys it that the teaching is mutual in her CLIL lessons. It was mentioned once that being a CLIL teacher is a great challenge for the teacher.

On the other hand, the teachers have had unpleasant experience as well. Three out of five teachers complained about their own English skills. Therefore, sometimes their explanations might be limited in English. Also, they are supposed to help the students with the language too and feel helpless at times. Still, they admit that it is their problem and they have to work harder and prepare the lessons more thoroughly. Likewise, the students' English skills were pointed out not to be homogeneous. There are also weaker students in the CLIL groups. Thus, it might be sometimes difficult to present the new material to the students. Nevertheless, the teacher has to be prepared to explain the material from different perspectives. In one of the interviews it was revealed that the most unpleasant aspect of being a CLIL teacher is that it takes a huge amount of time to prepare. Therefore, a teacher's family life might suffer because of it. The other teachers did not mention it directly but it can be assumed based on the previous interview that they have the same problem.

The two major advantages that the CLIL teachers of Miina Härma Gymnasium see for students are the acquisition of English in the natural environment and the adoption of the subject's core terminology in English. Thus, the CLIL students have an advantage compared to the students who do not study according to CLIL methodology. It is easier to start their university studies in a foreign country. It might be said students' opportunities

are equalized with foreign students and these CLIL students would probably be accepted more easily by foreign universities due to the fact that their English is more advanced. These students are used to listening, writing and speaking in English, which is an achievement in itself. They also know the strategies how to work with materials in English. Nevertheless, one of the teachers pointed out that it does not matter which language is used for instruction since brain progresses because of being stimulated by the creation of cause-consequence relationships. It was drawn attention to that it is not just the integration of two subjects but sometimes the teachers also talk about the events that take place in Estonia or even in the world. Thus, it is the integration of at least three subjects – English, the core subject and also social studies. It definitely helps broaden students' horizons.

The teachers were also asked to talk about the problems regarding CLIL. It has turned out that English can be an obstacle while teaching a subject because four teachers out five confess that their English is not as good as it is supposed to be. They do not feel comfortable explaining difficult matters in English. Their explanations are simplified and might not be sufficient at times. Also, understanding tasks might be a problem, if they have been written using more advanced language structures. Therefore, these teachers have to pay more attention on the language while preparing their lessons. As a result, it is quite a serious problem finding qualified teachers. Two teachers said that also the students have problems expressing themselves in English whenever there is a need and they might not totally understand the subject. At first the students usually concentrate on translating every single word and it could be a problem for understanding the subject holistically.

Lastly, the teachers were asked who would make a better teacher - the teacher who is a philologist but has obtained the subject or a professional subject teacher, whose English might be somewhat limited. Obviously, both the teachers have to help improve students English and the subject as well. Four teachers out of five strongly agree that only a subject teacher can teach a subject properly. They see language as a tool and the language mistakes would not stop comprehending the subject. It is also agreed that science involves

modelling of the nature and a philologist could not do that as well as a specially trained person does. Philologists are not usually able to think abstract or imagine things that are in the nature but not visible to eyes, e.g. atoms and molecules, according to the respondents. One of these four teachers also states that it would be possible for a philologist to teach at basic school level. This teacher would be suitable if s/he has a deep gymnasium education in the field of science. Only one of the teachers thinks that it is an advantage being a philologist beforehand. It might be due to the fact that she is a philologist herself. It is easier for her to understand the materials in English and only to look up the core terminology words in her mother tongue in a dictionary. Also, she states that the feedback from the CLIL students on the CLIL teachers' English is quite negative. Most of the CLIL teachers do not have a philologist background and therefore do not have the necessary language skills. They are not able to help students improve their language, which is also a purpose of CLIL. A teacher has to be able to improve students' language and subject skills at the same time. Unfortunately, it does not always take place in the CLIL lessons in Miina Härma Gymnasium. Nevertheless, this teacher points out that she would not imagine teaching physics or chemistry in English. She is a geography teacher, which is not considered as difficult science as the two abovementioned subjects. Thus, it is quite difficult to say which teacher is better. It seems that one side of the CLIL always suffers.

To summarise, the results of the interviews with the teachers of Miina Härma Gymnasium are somewhat surprising as the most of them did know the term Content and Language Integrated Learning, even though they work as CLIL teachers. The major advantages that were drawn attention to were the use of English in the natural environment and subjects' terminology in English. They state that it provides their students with more opportunities to continue their studies in the future. Also, most of the teachers highlighted the fact that there are more materials in English to use than in Estonian. However, they also saw this as a drawback as it consumes a lot of their personal time to work through these materials. Another problem regarding CLIL mentioned by the teachers were the

insufficient English skills of theirs and therefore their explanations might not be good enough at times.

2.3. The results of the interviews with the students

Five students of Miina Härma Gymnasium were interviewed within the present research project. All these students study in form eleven and belong to the CLIL group of year eleven too. There are also four other students who belong to the same group but they were not chosen to be interviewed within this research. The students chosen for the interviews were all Estonians while the other four come from different countries, e.g. Russia and Latvia. Thus, the factors caused by the nationality that might have influenced the results of the present thesis were eliminated. Still, the background of the chosen students is different. They come from different places all over Estonia and were chosen randomly. A student does not have to have attended Miina Härma Gymnasium's basic school to be accepted as a CLIL student. Thus, all students from anywhere have equal opportunities to be included to the CLIL group. Within the interviews with the teachers an agreement was reached as they seemed to agree that the students of the basic school of Miina Härma Gymnasium usually have better skills of English. Nevertheless, the students accepted from different basic schools might achieve better results in English at the end of gymnasium level as they tend to work harder. The students who come from the basic school of Miina Härma Gymnasium might have a bit arrogant attitude and lose themselves within the future studies. They do not work as much as the new students do and as a result will not achieve as good results as they are expected to. The questions created for the students were rather similar to the questions, which the teachers had to answer as the purpose remained the same in both the cases. The questions have been provided in the Appendix 2.

Firstly, the students were similarly to the teachers asked whether they are aware of the term Content and Language Integrated Learning. The students were provided with the

acronyms both in English and in Estonian, and asked if they had ever faced these acronyms. None of the students had ever heard of these acronyms. However, three of the students claimed that they had come across the term itself after they had been explained what these acronyms stand for. Also, they understood that they are instructed according to the CLIL methodology by their teachers.

All the CLIL students interviewed have learned their subjects also in Estonian, at the basic school level. Therefore, the students were asked to think of the similarities and differences between the two lessons that they had had in Estonian and in English. All the five students pointed the subject itself as the major similarity. They said that basically it does not matter which language is used for instructions it is the subject that is still learnt. No other similarities were mentioned.

On the contrary, there were many differences noted by the students. Three out of five students stated that the terminology of the subject in English is different compared to the Estonian terminology. It made learning somewhat more difficult at first but as the time went on the students got used to it and it was not as difficult as it had been at the beginning. Unfortunately some of the English subject terminology is not translatable into Estonian. Even the Estonian scientists use the English terminology as the language of science is predominantly English. The scientific work is usually published in the international editions. Nevertheless, three students stated that it seems more logical and even easier learning in English as there are many different sources to use. They said that they have to work independently more than they had done it in the previous school years. Thus, it is a big help to find the huge amount of materials in English online as it is much easier to find materials in English than in Estonian on the Internet. One of the students also said that she likes that there is more experimental work in CLIL classes.

Thirdly, the students were asked whether it is an advantage or a disadvantage that they are instructed in English in their gymnasium studies. All the five students answered that it is definitely an advantage that the language of their instruction is English. The

reasons were quite similar as three students stated that it helps them prepare for their future university studies abroad because at the end of their CLIL studies they have had enough experience in learning in English. That gives them a huge advantage compared to the students who studied in Estonian. Also, the amount of materials in English was pointed out by two students once again. The materials which are available in Estonian are mostly textbooks. They seem rather limited when compared to the materials that are available in English according to these students. It was pointed out that they enjoy learning in English independently as well.

Next, the students had to talk about the most pleasant and the least pleasant experience regarding their CLIL studies. Three students out of five answered there is more experimental work in the CLIL lessons, which helps comprehend the theory better and also memorize it. One of the students said that she likes that her English has improved a lot because of the CLIL lessons as she has a chance to practice her English in the natural atmosphere. A challenge to communicate to foreign students in English was mentioned in one case.

Also, some unpleasant experience was revealed within the interviews with the students. The least pleasant experience was mostly connected to not understanding the subject's terminology totally in English. The terminology is not translatable in some cases and there might be some misunderstandings because of it. These misunderstandings might be crucial whenever there is a test and a student does not understand a term. Thus, the student's mark might depend on it.

The two major advantages that the CLIL students of Miina Härma Gymnasium see are the acquisition of English in the natural environment and the adoption of the subject's core terminology in English. Three students brought up the issue of starting their future studies in an English-speaking country. Therefore, studying according to the CLIL methodology provides them with preparation for their future studies. The students confess that they enjoy learning and reading academic texts in English. They feel that their language has

developed a lot and are also much more confident with their language skills compared to the beginning of their studies. It is now quite simple to make connections within the subject as well. Some of the students even feel that their brains work better when they use English for their studies, which might be true as it could be difficult to learn science in the mother tongue but now they do it in English.

Subsequently, the students were asked to point out the problems regarding CLIL. The major problem is still the terminology in English, which was drawn attention to by three students. Some of the core terminology is not translatable into Estonian, as mentioned earlier in the interviews, and that is a problem for some students. They do not understand the subject completely due to the language problems. Also, they mentioned that sometimes they have problems expressing themselves in English. The other serious problem that the students talked about was not knowing the subject terminology in Estonian. They learn it all in English and are able to have discussions on different subject matters in English but they cannot do the same in Estonian any more. That might be a serious problem for a small country like Estonia someday. Furthermore, it could be a problem if they decide to take a National Examination in that subject.

Lastly, the students were asked what the major advantage is that they have, compared to the regular students, after finishing their CLIL studies. All the five students said that they have better opportunities to start their studies at some university abroad. They all stated that their dream is to get accepted by a university whether in the United States of America, the United Kingdom or in any other part of Western Europe. They are all very satisfied, because of their CLIL studies at Miina Härma Gymnasium. It was also pointed out within the interviews that these students feel very confident after studying for a year and a half according to the CLIL methodology. Their language skills have improved a lot thanks to the environment that the CLIL provides for them. It would be easier for them to start their future studies in an English-speaking university because they have some experience now how to study in English. It is much easier to express themselves in English

now than it was at the beginning. One of the students said she knew the subject matter at the beginning but had trouble expressing herself. It is not the case anymore. These students definitely have a purpose in their lives and know how to achieve their ambitions.

To conclude the findings, the students did not know the term Content and Language Integrated Learning either, similarly to the teachers. The main advantage pointed out by the students was the use of English in the natural environment as well. They said that it prepares them for their future studies if they ever decide to study abroad. The problems regarding CLIL that were mentioned by the students were mostly connected to the English language. At times it could have been difficult to understand the subject but as the time passed they felt more confident. Not knowing the terminology of the subject in Estonian was pointed out as another problem.

2.4. The results of the chemistry tests

Giving an evaluation to what students have acquired in the subject is an inseparable part of school life. Evaluation expresses the interests and concerns of teachers regarding the goals of teaching and also the teaching itself. The best justification for evaluation is the desire of teachers to improve teaching and studying. Evaluation does not just show how well teachers teach or students study but it also helps decide whether the teaching or learning methodologies work. It helps us collect some information to make conclusions about how to achieve the goals of teaching more easily as well (Lindgren, Suter 1994).

There have been followed the guidelines given by Edgar Krull in his handbook *Pedagoogilise psühholoogia käsiraamat* to create the test for the present project. The most common objective test type is the multiple choice test, which consists of the nucleus of the questions and several answers to choose from. Multiple choice questions are often called objective due to the fact the scoring is done according to a certain specifications avoiding the subjectivity of the checker. Usually there is only one correct answer and the others are the so-called allurements. No more than four allurements are usually used. It is a common

misbelief that multiple choice questions are only good to check the facts. Actually, this way it is possible to check the higher learning goals like the skills of analysis, valuation and synthesis, for example, using several questions asking the same thing. Firstly, the knowledge behind a theory is checked within a question and afterwards the application of the same knowledge within another question. Students do not need to know that the questions are connected to each other; however, they have to understand and process the knowledge to answer the other question (Krull 2001). Thus, the most suitable test type for this research project is the multiple choice test as the results are easily scored and processed in computers. Only the questions seven, eight, and nine in the test are of an open answer type. It was possible to answer the questions in short.

The purpose of the test (see Appendices 3 and 4) of the present thesis was to get feedback on how the CLIL students of Miina Härma Gymnasium have comprehended the chemistry terminology in English, the physical and chemical properties of metals and also how they can apply their knowledge to practical tasks. Likewise, a group of control students, whose language of instruction is Estonian, was tested. Thus, these two groups, both comprising nine form eleven students of Miina Härma Gymnasium, completed the test. The results of the two groups were compared.

The test has been created in good accordance with the National Curriculum of Estonia. The material of the test was not presented by the teacher immediately before the test as there had been a period of time between the test and the lessons. There were ten questions in the test and the test itself was anonymous. Various materials were used to create the test, such as *Chemistry Essential for Dummies* (Moore 2010), two editions of *Chemistry for You* (Ryan 1996 and 2001) and *Keemiatestid IX ja X klassile* (Tõldsepp 1995). The first three textbooks were used to make sure that the chemistry terminology was accurate.

The students were asked to answer the questions or circle the correct response in the case of multiple choice questions. Also, they were told to indicate the reason for not giving

the answer - whether it was because they did not know it or did not know the necessary terminology in English. All the students tested were allowed to use the periodic table of elements as an additional material.

The CLIL students achieved better result in the test, average being 6.78 of maximum 10 points. The average of the control group was 5.1. One of the CLIL students scored the maximum of ten points whereas in the control group the best result was seven for two students. The lowest number of points was one out of ten for the control group, which was question number three. There was no question that would have been more difficult to answer for the CLIL group, the weakest score was four out of ten for questions two, six, and seven. Below, the overview of the results of the CLIL students' chemistry tests is given in comparison to the control group. The results are given question by question and are also presented in Figure 1.

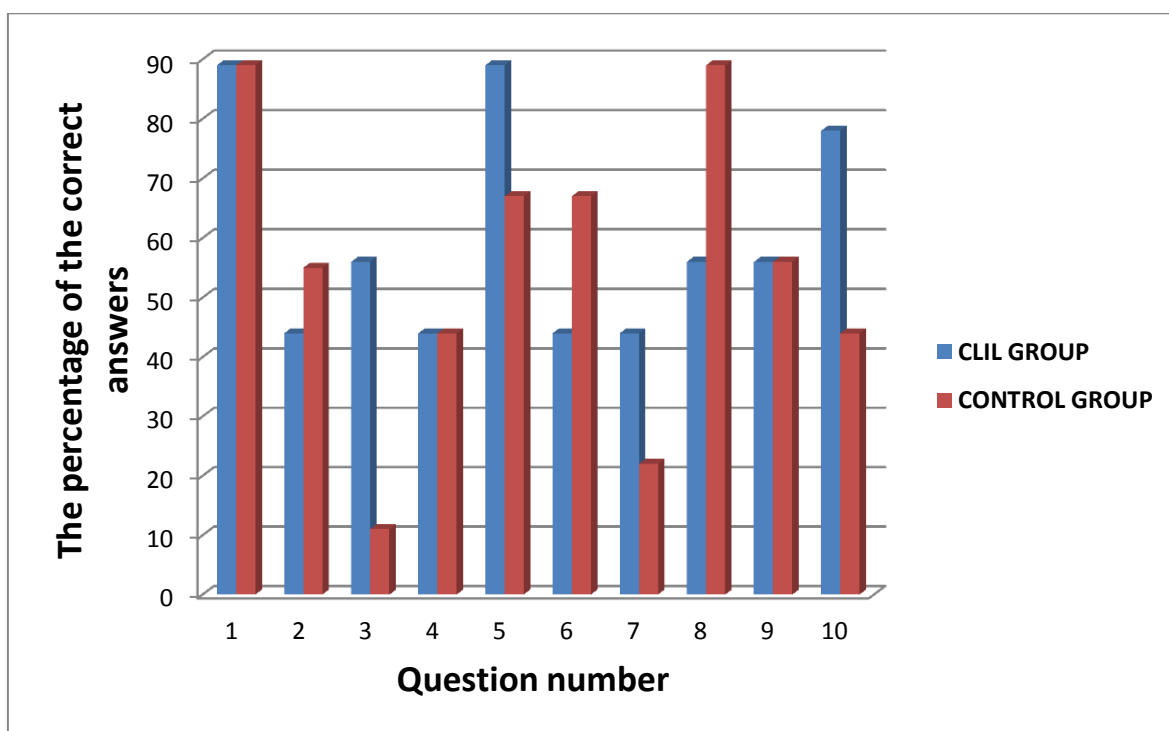


Figure 1. The results of the chemistry tests.

1. Among the elements that are known these days there are
 - a) more metals than non-metals.
 - b) about the same number of metals and non-metals.
 - c) more non-metals than metals.

This question was answered very well by both of the groups. There was only one person in both of the groups answering it incorrectly choosing answer “c” as the correct one, while the correct answer was “a”. Thus, it means that the percentage of the correct answers was 89 for both the groups and making it the best answered question of the test. That comes as no surprise because this question was chosen as the first question on purpose. According to Gagne’s Model (see Appendix 6), the attention of students should be gained at first as there should be no difficulties answering this question using the periodic table of elements (*Gagne’s Nine Levels... n.d.*).

2. The metallic properties of elements become stronger from top downwards within a group because
 - a) the number of electrons in the outer electronic layer grows.
 - b) the atomic radius grows.
 - c) the atomic radius decreases.

The purpose of the question was to check whether the students have understood the general properties of metals, more specifically the reason behind the metallic properties. The control group answered it better than the CLIL group, the points being five and four correspondingly. It gives the percentages 55 and 44. All the students who answered incorrectly chose “a”, which is totally incorrect as the number of electrons remains the same within a group. It is somewhat surprising that the control group achieved better results with this question as this tendency is supposed to be easier to understand for students than the tendency in question number three.

3. The metallic properties of elements become weaker from the left to the right with in a period because
 - a) the nucleus’s charge grows.

- b) the number of electronic layers grows.
- c) the nucleus's charge decreases.

The purpose of the third question was similar to the purpose of the second question to check the reasons behind the metallic properties. This question was answered much better by the CLIL students. Five of them chose the answer "a", which is the correct one. There was only one correct answer by the students of the control group, making it the most difficult question for them, which was expected as the changes of metallic properties within the period are more difficult to understand. None of the allurements was dominant within the answers to this question. The results of the CLIL group are somewhat surprising, compared that the third question was answered better than the second one. The share of the correct answers is 56 for the CLIL group and 11 for the control group. It can be concluded that the control group students have not understood the relationship between the nucleus's charge and the metallic properties. It has to be emphasised that these results for this question were predictable as stated before.

4. The production of metals from ores is achieved through
- a) reduction.
 - b) distilling.
 - c) oxidation.

This question was answered equally well by both the groups, scoring four points out of nine, which gives 44 per cent of correct answers. It is a rather difficult question for students as they tend to be confused by the terms oxidation and reduction. It has always been a difficult case for teachers to teach redox reactions because of the fact that there are many similar terms, which are confusing for students. Furthermore, students need to understand that the addition of an electron reduces the charge of an atom. That seems to be a problem for many students – how can adding something reduce something? Nevertheless, students should understand that an electron is negatively charged and therefore, adding an electron reduces the charge.

The purpose of this question is to apply some knowledge in a practical task, where students need to know what an oxidizer is and apply it in the given situation. They should know that metal ions in ores have a positive charge; therefore, they only act as oxidizers. The ions of metals cannot give away any more electrons as they have none in their outer layer. Thus, in the form of an ion their last but one electron layer has become the outer layer, meaning that they can add electrons now. The poor results are probably explained by the fact that it was about redox reactions and also two of the CLIL students pointed out that they did not know the English term ore. None of the students chose distilling as the correct answer showing they know that distilling is not connected to redox reactions.

5. Metallic elements are good electricity conductors because

- a) there are many electrons in metallic elements.
- b) the electrons of outer layers of metallic elements can move all over the crystals.
- c) the atoms of metallic elements can move all over the crystals.

This question was answered very well by the CLIL students as eight of the students answered correctly, giving the percentage of the correct answers 89. On the other hand, six of the control group students managed to get their answers correct, which is 67%. The answer “c” seemed to dominate within the incorrect answers, demonstrating that students mix up the two terms – atoms and electrons. One student of the CLIL group, whose answer was incorrect, chose also the answer “c”, showing that it does not matter, which language is used for instructions, a student can still confuse the terms. All in all, it was quite a well-answered question, the right answer being “b”.

6. Metallic elements behave in redox reactions as

- a) oxidizers and are reduced themselves.
- b) reducers and are oxidized themselves.
- c) reducers and oxidizers, depending on the reactions.

The answers to this question were rather poor for the CLIL group as only four students out of nine answered it correctly, which gives 44%. The control group students answered it

much better as six (67%) students out of nine chose the correct answer, which is actually surprising. As stated before, the redox reactions are one of the most difficult topics in chemistry. Students tend to confuse the terms as they seem quite similar to them.

7. Alkali and alkaline earth metals react with water. What is produced?

This was the first of three open answer questions. The question was answered badly by both of the groups. Four of the CLIL students and only two of the control group answered it correctly, giving the percentages 44 and 22 correspondingly. The best answer here would have been alkali. Also, a base or a hydroxide is suitable. The CLIL students who did not write the correct answer stated that they did not know the necessary terms, which is also true about the control students. They also did not know the correct terms as the wrong answers were mainly the names of substances from different inorganic substance classes like oxides or salts. Thus, it can be pointed out that knowing or not knowing the terminology of a subject is not dependant on the language of instruction.

8. How do the chemical properties of sodium and gold differ from each other?

The results of the CLIL students (56%) were poorer than those of the control students' group (89%). It might be because of not knowing the term sodium, which was the purpose of the question to check whether they know it or not. However, the CLIL students did not indicate the reason of not knowing the answer here, as they wrote nothing there in the test. Still, one of the CLIL students answered that sodium is easily shaped but gold is not. This cannot be considered a correct answer because the question was about the chemical properties and shaping is a physical property. The only correct answer here is that sodium is much more active chemically than gold.

9. Write a balanced chemical reaction equation for copper sulphate reacting with iron in water solution.

The students who wrote an equation $\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$ were right. There were five students (56%) in both of the groups who did similarly. Only one student of both

the groups did not know the equation at all and the others had something wrong in the equation. They seemed not to know what to do with the mentioned water and tried to write it in the equation, which is not totally wrong. But it is wrong when it starts to influence what is produced. There were some students who had a hydroxide produced, which is completely wrong. Students have to know that iron is more active than copper and it pushes the latter out of its compound.

10. Which of the following statements is true about this chemical equation $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$

- a) the sodium behaved as a reducer.
- b) the sodium was reduced.
- c) the oxidation number of sodium decreased by one.

It was quite well answered by the CLIL group as seven students out of nine (78%) answered correctly. Unfortunately, the control group did not achieve as good results as the CLIL group. Only four out of nine answered correctly, which is 44% of correct answers. The results of the CLIL group are somewhat surprising because of the question being about redox reactions. The control group results were predictable as students tend to confuse terms reducer and being reduced because they are very similar. Thus, the answer “a” dominated among the wrong answers.

Furthermore, questions four, six, and ten are connected. Question six checks the knowledge behind the terms, whereas questions four and ten check the application of the knowledge. The CLIL group answered question number six, which is a question about the theory, receiving the same percentage as for the question number four. Somehow the control group managed to get 67 per cent of the correct answers for question six, which shows that they are better at theory than at practice. They know the theory but do not know how to apply it in practical tasks. Question ten was more difficult for the control group achieving 44%, whereas the CLIL group managed to get 78% of their answers correct, showing that they know how to apply their knowledge in the practical task. Some of the CLIL students had tried to determine the oxidation numbers of the elements in the

chemical reaction equation, which help the students to decide which element is oxidizer or reducer. That proves the fact that they know how to apply the knowledge they have learned previously but none of the control group students did that. Questions four and ten clearly show that a multiple choice test can check higher learning goals as stated by Edgar Krull in his handbook *Pedagoogilise psühholoogia käsiraamat* (Krull 2011) because these questions require the application of certain knowledge.

The results of the chemistry tests were quite poor and in most cases the results were quite predictable with some exceptions. The most difficult questions were connected to redox reactions, which have always been confusing for students. The CLIL students are better at the application of different knowledge than the control group according to the results of the tests. Within the interviews the CLIL students said that there is more practical work in CLIL lessons than there had been in their previous studies. Thus, there might be a connection between the focus in teaching and the results of the test.

2.5. General discussion on the results of the research and conclusions

After analysing the results of the interviews with both the students and teachers of Miina Härma Gymnasium it was revealed that the majority of them did not know the term CLIL, which is a bit surprising as they are all connected to CLIL in some ways. The teachers teach according to CLIL methodology unconsciously. It would probably help achieve better results if they acquainted themselves with the methodology. The advantage of CLIL that was highlighted the most by the teachers interviewed was the natural environment for English use. Students can practice their English naturally using the necessary subject terminology in English. Therefore, communicative language learning is used as part of CLIL. Paul Overland (*Benefits and Strategies... n.d.*) has stated that “communicative language learning tries to bring students beyond grammatical competence to a point where they are able not only to decode a language, but can begin to manipulate the language in private dialog”. That is in good correspondence with different authors such

as Mehisto, Marsh, and Jesus etc, who have carried out research on CLIL too, as they state the use of language in the natural environment being an advantage of CLIL, see page 10.

The teachers of Miina Härma Gymnasium definitely enjoy teaching their subjects in English as it is a challenge for them as well. However, most of them confess that their English is not as good as it is supposed to be and their subject explanations might suffer because of that. Nevertheless, they state that if they take more time for the preparation of their lesson, nothing is impossible. They have to go through their lesson in detail to be certain that everything works. It is good to have an English teacher as a CLIL teacher because students' language skills would improve but the knowledge of the subject might suffer due to it. On the other hand, if a subject teacher starts teaching the subject in English, then the English skills of the students might not develop as much as they are supposed to. Thus, it means that it is very difficult to find a qualified CLIL teacher. According to the most of the teachers interviewed, the best CLIL teacher is the subject teacher who knows some English. It is all in good correspondence with the theoretical part of the present thesis, as Mehisto, Asser and Jesus etc (2008) also claim on the example of Tallinn English College that the subject teacher who knows some English is the best CLIL teacher, see page 21.

Furthermore, the lack of ready-made materials was pointed out by most of the teachers interviewed. They all stated that there are many more materials in English to use than in Estonian. At first, it was seen as a good thing because new materials can also broaden teachers' horizons. However, they have to work them all through to make them usable for themselves within the CLIL lessons and that takes a lot of time. Working as a teacher definitely consumes a lot of teacher's spare time and it might have a bad influence on teacher's family life, as it was stated by a teacher interviewed. The lack of ready for use materials was pointed out in the chapter one as well, see page 15.

The results of the interviews with the CLIL students of Miina Härma Gymnasium were somewhat different. They all stated that being a CLIL student gives them a huge

advantage compared to regular students because of their studies in English. They have practice in studying in a foreign language and if they decide to continue their studies abroad in the future at different universities, their experience would make it easier. They know what it means to learn in a foreign language and know the basic subject-related terminology as well. CLIL is seen as a platform, which makes their future life easier. It is a preparation for their future job abroad as well, because if employers were to choose a foreigner to do some work, they would choose the one whose English is better. This is something that was discussed in the previous part of the thesis too, see page 11.

However, the students pointed out some problems regarding CLIL as well. Some of the students said that they start to forget their Estonian as all the learning that takes place is in English. It might be a big problem for such a small country as Estonia in the future. The purpose of the present thesis is not to be too negative but the position of Estonian may be weakened by the increasing use of English in education.

The students also stated that their English was an obstacle at the beginning of their CLIL studies as they had never had any practice. They were able to understand different matters in English, but they were not able to use the language properly. They pointed out that it gets better and better as they have more practice. They can express themselves within the subject in English by now.

The comparative chemistry tests showed rather surprising results. First of all, the results were quite poor, averages being 6.8 out of 10 for the CLIL group and 5.1 for the control group, while the test itself was quite an easy one. Therefore, it can be said that the CLIL students of Miina Härma Gymnasium form a mixed ability group rather than being selected as the most talented students. According to some scholars (Mehisto et al 2008), CLIL is suitable for average students and is not only for more intelligent students, see page 15. It seems that the CLIL teachers of Miina Härma Gymnasium are not that well familiar with the methodology of CLIL as it was also revealed within the interviews. If they

followed the guidelines recommended for the CLIL teachers of maths and science (see page 25), their students might have achieved better test results.

It can also be stated that the CLIL group answered the questions better, which is in good correspondence with the research carried out by other scholars (e.g. Lorenzo et al 2010 and Jäppinen 2005), see page 12. CLIL students usually achieve better results than the groups whose language of instruction is not a foreign language. The reason behind that might be inner motivation as the CLIL students who were interviewed seemed very interested in the CLIL studies of theirs. They were very eager and excited giving the interviews. It seemed that they were very motivated and therefore might achieve better results than the control group students. These students definitely know better what they want to achieve in their lives, such as being accepted by foreign universities in the future. Thus, these students have got their ambitions and perspectives in mind. It often happens that most of the students who have graduated from gymnasiums do not know what they want to do with their lives. Therefore, the ambition might be the reason behind the better result of the CLIL students.

The major trend in the test is that the CLIL students achieved better results at applying theory to more practical questions, whereas the control group seemed to be better at the questions that checked some knowledge. It is also worth noting that knowing the subject terms or not does not seem to be dependent on the language of instruction.

CONCLUSION

In recent years CLIL (Content and Language Integrated Learning) has attracted much attention in Europe and other parts of the world. CLIL involves teaching any subject in a foreign language. The term was originally defined in 1994 and launched in 1996 by the University of Jyväskylä and the European Platform for Dutch Education (Darn 2006). Furthermore, there has been carried out research demonstrating CLIL has positive effect on students' academic progress (see page 12). Nevertheless, it is stated that there is no coherent conceptual framework of CLIL that may be applied in all cases.

The present thesis investigates the advantages and problems regarding Content and Language Integrated Learning. The first chapter gives an overview of the different methods CLIL involves, advantages and drawbacks of CLIL, CLIL's educational service, CLIL in Estonia and ten tips for CLIL maths and science teachers. Thus, generally there are five major advantages pointed out regarding CLIL. They are linked to learning and development outcomes relating to culture, environment, language and learning. It is stated that CLIL has been identified as one way to achieve positive results in intercultural knowledge and understanding because language can be used as a tool for showing similarities and differences between people of different backgrounds. Secondly, CLIL can be used as a platform to prepare students from different countries within Europe for their future studies or work abroad. CLIL equalises the opportunities of students from all over Europe. Also, students' all the four language skills are improved through CLIL. CLIL studies involve much communication, even in written form through information and communication technology modes. Therefore, CLIL helps improve communicative language skills. Another benefit regarding CLIL is that it deepens awareness of both mother tongue and the target language. Moreover, students' subject knowledge is developed. CLIL provides opportunities to study content from different perspectives. The last of the advantages is the learning itself. Special emphasis is on learner-based methodologies to improve learning by giving attention to individuals' needs in terms of

social and analytical skills. Therefore, individual learning strategies are improved through CLIL.

On the contrary, there are four major drawbacks that have been pointed out in the literature overview of the present thesis. Firstly, many adults find it unnatural to study in a foreign language. Especially studying science seems to be overwhelming. These adults also found it difficult to learn foreign languages as children. It used to be almost impossible to imagine integrating different subjects while they were students. In reality, the academic results of the CLIL students are as good as or even better than of those students who do not study according to CLIL approach. Secondly, the lack of good CLIL teachers seems to be a problem. Even if a teacher has the necessary skills, s/he might not be dedicated to achieve the subject and language integrated goals. Some subject teachers are too unconfident about their language skills and, therefore, not willing to teach CLIL classes. Also, there are no ready to use materials and it consumes a lot of time of CLIL teachers to organise the ones that are available. As a result, it means that the workload of CLIL teachers increases. Moreover, school boards need to be rational concerning the circumstances of CLIL. Usually more intelligent and talented students are included in CLIL groups depending on tests or students' marks. Therefore, it makes CLIL elite. It creates prejudice and it is wrong. It has been stated that CLIL is suitable for students with different abilities. It is recommended to include children to CLIL groups depending on the current list of applications. In some countries demand exceeds offer and students are just drawn by chance.

The empirical part of the thesis (Chapter 2) introduces the method and the results of the action research carried out at Miina Härma Gymnasium. The present thesis comprises both the qualitative and quantitative analyses as there were carried out interviews with five students and five teachers of the abovementioned gymnasium. Also, CLIL students and control group students, both consisting of nine form eleven students, took a chemistry test

on the properties of metals and the results were discussed and analysed in comparison to each other.

The teachers chosen for the interview teach chemistry, physics, geography, biology and history. Their backgrounds regarding the English language studies are mostly similar, excluding one teacher. She had studied English at the university and later became a subject teacher. These teachers were chosen mostly due to the fact that they were all natural science teachers excluding one, the history teacher.

The results of the interviews with the teachers of Miina Härma Gymnasium were somewhat surprising as most of them did not know the term Content and Language Integrated Learning, even though they work as CLIL teachers. The major advantages that were drawn attention to were the use of English in the natural environment and subjects' terminology in English. They state that it provides their students with more opportunities to continue their studies in the future. Also, most of the teachers highlighted the fact that there are more materials in English to use than in Estonian. However, they also saw this as a drawback as it consumes a lot of their personal time to work through these materials. Another problem regarding CLIL mentioned by the teachers were the insufficient English skills of theirs and therefore their explanations might not be good enough at times.

Furthermore, five students of Miina Härma Gymnasium were interviewed within the present research project. All these students study in form eleven and belong to the CLIL group of year eleven too. The students chosen for the interviews are all Estonians; nevertheless, the background of the chosen students is different. They come from different places all over Estonia and were chosen randomly. Thus, all the students from anywhere in Estonia had had equal opportunities to have been included to the CLIL group.

At the interviews it was revealed that the students did not know the term Content and Language Integrated Learning either, similarly to the teachers. The main advantage pointed out by the students was the use of English in the natural environment as well. They said that it prepares them for their future studies if they ever decide to study abroad. The

problems regarding CLIL that were mentioned by the students were mostly connected to the English language. At times it could have been difficult to understand the subject but as the time passed they felt more confident. Not knowing the terminology of the subject in Estonian was pointed out as another problem.

A chemistry test on the properties of metals was also carried out in Miina Härma Gymnasium. The most suitable test type for this research project was the multiple choice test as the results were easily scored and processed in computers. Only the questions seven, eight, and nine in the test were of an open answer type. It was possible to answer the questions in short. The purpose of the test (see Appendices 3 and 4) was to get feedback on how the CLIL students and a control group of form eleven students of Miina Härma Gymnasium have comprehended the chemistry terminology, the physical and chemical properties of metals and also how they can apply their knowledge to practical tasks. The test was created in good accordance with the National Curriculum of Estonia. The material of the test was not presented by the teacher immediately before the test as there had been a period of time between the test and the lessons. There were ten questions in the test and the test itself was anonymous.

The results of the chemistry tests were quite poor and in most cases the results were quite predictable, with some exceptions. The most difficult questions were connected to redox reactions, which have always been confusing for students. The CLIL students are better at the application of different knowledge than the control group, according to the results of the test. At the interviews the CLIL students said that there is more practical work in CLIL lessons than there had been in their previous studies. Thus, there might be a connection between the focus in teaching and the results of the test.

The main aim of the present thesis was to collect qualitative data on the advantages and problems regarding Content and Language Integrated Learning. It was achieved very well as there can be found similar findings by other scholars as well. The qualitative data is supported by the quantitative data, although the latter might be somewhat limited as the

number of respondents was only nine for each of the groups – the CLIL and the control one. Therefore, one can find some ideas for future research and increase the number of respondents. The present thesis is based only on the data from Miina Härma Gymnasium, which is situated in Tartu. However, there are other schools that teach according to CLIL methodology in Estonia. There are four IB World Schools in Estonia: Audentes School, International School of Estonia, Miina Härma Gymnasium and Tallinn English College. Moreover, the concept could be expanded to Russian-based schools in Estonia, which could also provide extensive material for analysis.

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Appendix 1: Interview questions for the teachers of Miina Härma Gymnasium

Kirjutan magistritööd teemal LAK-õppe (CLIL) eelised ja sellega seonduvad probleemid.

Sellest lähtuvalt oleksin tänulik, kui vastaksite mõnele küsimustele.

1. Kas Te teate, mida termin (LAK-õpe) tähendab?
2. Kuna Te õpetate oma ainet nii inglise kui ka eesti keeles, siis palun võrrelge kahte tüüpilist tundi erinevates keeltes. Mille poolest on need tunnid sarnased ja mille poolest erinevad?
3. Kumma tunni ettevalmistamine nõuab rohkem tööd? Mis Te arvate miks see nii on?
4. Millised on Teie kõige meeldivamad ja kõige ebameeldivamad kogemused LAK-õppe tunnis?
5. Mis on LAK-õppe eelised võrreldes tavapärase aine õppimisega? Miks?
6. Mis on LAK-õppe puudused võrreldes tavapärase aine õppimisega? Miks?
7. Kes on Teie arvates ideaalne LAK-õppe õpetaja? Kas aineõpetaja, kes valdab keelt mingil määral või ikkagi keeleõpetaja, kes peab endale tegema selgeks aine?

Appendix 2: Interview questions for the CLIL students of Miina Härma

Gymnasium

Kirjutan magistritööd teemal LAK-õppe (CLIL) eelised ja sellega seonduvad probleemid. Sellest lähtuvalt oleksin tänulik, kui vastaksite mõnedele küsimustele.

1. Kas Sa tead, mida termin LAK-õpe tähendab?
2. Kuna Sa oled eelnevalt õppinud keemiat eesti keeles ja nüüd õpid inglise keeles, siis palun võrdle tüüpilisi keemia tunde eesti ja inglise keeles õpetatult? Mis on sarnane? Mis on erinev?
3. Kas see, et ainet õpetatakse inglise keeles on takistuseks või pigem eeliseks? Miks?
4. Mis on Sinu kõige meeldivamad ja kõige ebameeldivamad kogemused LAK-õppe tunnis?
5. Mis on LAK-õppe eelised võrreldes tavapärase aine õppimisega? Miks?
6. Mis on LAK-õppe puudused võrreldes tavapärase aine õppimisega? Miks?
7. Kas LAK-õppe programmi läbimine annab Sulle mingisuguseid eeliseid võrreldes nende õpilastega, kes õpivad emakeeles?

Appendix 3: Test for the CLIL group: The Properties of Metals

Answer the questions or circle the correct response in the case of multiple choice questions. If you do not know the answer, please indicate the reason whether it is because you do not know the answer or do not know the necessary terminology in English.

- Among the elements that are known these days there are
 - more metals than non-metals.
 - about the same number of metals and non-metals.
 - more non-metals than metals.
- The metallic properties of elements become stronger from top downwards within a group because
 - the number of electrons in the outer electronic layer grows.
 - the atomic radius grows.
 - the atomic radius decreases.
- The metallic properties of elements become weaker from the left to the right within a period because
 - the nucleus's charge grows.
 - the number of electronic layers grows
 - the nucleus's charge decreases
- The production of metals from ores is achieved through
 - reduction.
 - distilling.
 - oxidation.
- Metallic elements are good electricity conductors because
 - there are many electrons in metallic elements.
 - the electrons of outer layers of metallic elements can move all over the crystals.
 - the atoms of metallic elements can move all over the crystals.
- Metallic elements behave in redox reactions as
 - oxidizers and are reduced themselves.
 - reducers and are oxidized themselves.
 - reducers and oxidizers, depending on the reaction.
- Alkali and alkaline earth metals react with water. What is produced?
Answer:
- How do the chemical properties of sodium and gold differ from each other?
Answer:
- Write a balanced chemical reaction equation for copper sulphate reacting with iron in water solution.
Equation:
- Which of the following statements is true about this chemical equation

$$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$$
 - The sodium behaved as a reducer.
 - The sodium was reduced.
 - The oxidation number of sodium decreased by one.

Thank you for your answers! ☺

Appendix 4: Test for the control group: metallide omadused

Palun tõmba õigele vastusele ring ümber või kirjuta vastus oma sõnadega, kuhu vaja.

1. Tänapäevani tuntud keemiliste elementide hulgas on
 - a) metalle rohkem kui mitmetetalle.
 - b) metalle ja mitmetetalle enam-vähem ühepalju.
 - c) mitmetetalle rohkem kui metalle.
2. Elemendi metallilised omadused tugevnevad rühmas ülevalt alla, sest
 - a) väliskihi elektronide arv kasvab.
 - b) aatomiraadius kasvab.
 - c) aatomiraadius kahaneb.
3. Elemendi metallilised omadused nõrgenevad perioodis vasakult paremale, sest
 - a) tuumalaeng kasvab.
 - b) elektronkihtide arv kasvab.
 - c) tuumalaeng väheneb.
4. Metalle saadakse maagist
 - a) redutseerimise teel.
 - b) destilleerimise teel.
 - c) oksüdeerimise teel.
5. Metallid juhivad hästi elektrit, sest
 - a) metalli aatomid saavad liikuda üle kogu kristalli.
 - b) metalli aatomites on palju elektrone.
 - c) metalli aatomite väliskihi elektronid saavad liikuda üle kogu kristalli.
6. Metallid aatomid käituvad redoksreaktsioonides
 - a) oksüdeerijana, kusjuures ise redutseeruvad.
 - b) redutseerijana, kusjuures ise oksüdeeruvad.
 - c) nii oksüdeerijana kui ka redutseerijana, vastavalt olukorrale.
7. Leelis- ja leelismuldmetallid reageerivad veega juba toatemperatuuril. Mis on saaduseks?
Vastus:
8. Mille poolest erinevad naatriumi ja kulla keemilised omadused üksteisest?
Vastus:
9. Kirjuta tasakaalustatud reaktsioonivõrrand, kui vasksulfaat reageerib rauaga vesilahuses. Reaktsioonivõrrand:
10. Tutvu tähelepanelikult järgmise reaktsioonivõrrandiga: $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$
Millised järgnevatest väidetest on tõesed?
 - a) Na redutseerus.
 - b) Na käitus kui redutseerija.
 - c) Na oksüdatsiooniaste kahanes ühe võrra.

Täna vastamise eest! ☺

Appendix 5: Terms commonly associated with quantitative and qualitative approaches to research (adapted from Reichardt and Cook 1979)

Qualitative research	Quantitative research
Advocates use of qualitative methods	Advocates use of quantitative methods
Controlled with understanding human behaviour from the actor's own frame of reference	Seeks facts or causes of social phenomena without regard to the subjective states of the individuals
Naturalistic and uncontrolled observation	Obtrusive and controlled measurement
Subjective	Objective
Close to the data: the 'insider' perspective	Removed from the data: the 'outsider' perspective
Grounded, discovery-oriented, exploratory, expansionist, descriptive, and inductive	Undergrounded, verification-oriented, perspective, confirmatory, reductionist, inferential, and hypothetical-deductive
Process-oriented	Outcome oriented
Valid: `real`, `rich`, and `deep` data	Reliable: "hard" and replicable data
Ungeneralisable: single case studies	Generalisable: multiple case studies
Assumes a dynamic reality	Assumes a stable reality

Appendix 6: Gagne Nine Levels Learning Diagram



RESÜMEE

TARTU ÜLIKOOL

INGLISE FILOLOOGIA OSAKOND

Sixten Hinnov

THE ADVANTAGES AND PROBLEMS REGARDING CONTENT AND LANGUAGE
INTEGRATED LEARNING ON THE EXAMPLE OF MIINA HÄRMA GYMNASIUM

(Lõimitud aine- ja keeleõppe eelised ja puudused Miina Härma Gümnaasiumi näitel)

Magistritöö

2013

Lehekülgede arv: 66

Annotatsioon:

Käesolev töö käsitleb lõimitud aine- ja keeleõppe eeliseid ning puuduseid. Käesoleva töö eesmärgiks ongi esmalt anda ülevaade teemakohase kirjanduse põhiideedest LAK-õppe eelistest ja puudustest. Teiseks põhieesmärgiks on uurida, mida näevad LAK-õppe eelistena ja puudustena Miina Härma Gümnaasiumi LAK-õppe õpetajad ja õpilased, olles ise reaalselt osaks LAK-õppes.

Töö koosneb kahest osast. Esimene peatükk põhineb kirjandusel ja annab ülevaate LAK-õppe erinevatest meetoditest. Käsitletakse LAK-õppe eeliseid ja puuduseid ning antakse ka väike ülevaade LAK-õppes Eestis. Samuti on selles peatükis välja toodud hea LAK-õppe õpetaja omadused ning kirjeldatakse strateegiaid paremate tulemuste saavutamiseks seoses LAK-õppega. Viimasena antakse soovitusi loodus- ja reaalainete õpetajatele, kuidas paremini läbi viia lõimitud aine- ja keeleõppe tundi.

Teine peatükk tutvustab magistritöö raames läbiviidud uurimuse protsesse ja tulemusi. Uurimuse põhiline eesmärk oli välja selgitada LAK-õppe eelised ja puudused Miina Härma Gümnaasiumi näitel ning saada tagasisidet, kuidas LAK-õppe õpilased on omandanud keemialase terminoloogia ja oskavad rakendada tundides omandatud teooriat. Uurimuses osales viis Miina Härma Gümnaasiumi LAK-õppe õpetajat ja viis LAK-õppe õpilast, kellega viidi läbi intervjuud, mida töö autor lindistas. Samuti viidi läbi keemiaalane test metallide omadustest. Testi täitsid üheksa LAK-õppe õpilast ja võrdlevalt ka üheksa tavaõppe õpilast. Seejärel analüüsiti tulemusi vastavalt, kvalitatiivselt ja kvantitatiivselt.

Põhilisteks LAK-õppe eelisteks töid Miina Härma Gümnaasiumi õpetajad välje keele omandamise loomulikus keskkonnas ja aine terminoloogia omandamise inglise keeles. Rõhutati, et LAK-õppe programmi läbimine annab õpilastele suured eelised nende edasisteks õpinguteks välismaal. Eelisenä toodi välja ka materjalide rohkus inglise keeles. Samas mainiti, et see võib olla ka puuduseks, kuna materjale on palju, aga sobilikud tuleb ise välja otsida ning see võtab väga palju aega. Probleemiks mainisid õpetajad ka enda ebapiisava inglise keele oskuse.

Õpilased töid samuti välja suurimaks eeliseks keele omandamise loomulikus keskkonnas, mis annab neile eelised tulevikus välismaale õppima minekuks.

Probleemidena rõhutasid õpilased, et LAK-õpingute alguses oli neil väga raske harjuda inglise keelse õppega, kuid hiljem polnud keel enam õpingutel takistuseks ja nad tundsid ennast enesekindlamalt. Ainealaste terminite mittetundmine emakeeles osutus ka probleemiks õpilaste jaoks.

Keemia testide tulemused olid suhteliselt kehvad ja paljudel juhtudel ka ennustatavad. Test oli mõnevõrra paremini sooritatud LAK-õppe grupil kui võrdlusgrupil. Kõige keerulisemad olid küsimused, mis olid seotud redoksreaktsioonidega, mis on üleüldiselt väga keeruline teema õpilaste jaoks. Testi tulemustest selgub, et LAK-õppe õpilased vastasid paremini rakenduslikele küsimustele ja võrdlusgrupi õpilased teadmisi kontrollivatele küsimustele. LAK-õppe õpilaste intervjuerimise käigus selgus, et nende LAK-õppe tunnid on praktilisemad kui sama aine tunnid varem. Seega võib näha seost õpetamise fookusel ja testi tulemustel.

Käesoleva magistritöö põhieesmärgiks oli koguda kvalitatiivseid andmeid LAK-õppe eeliste ja probleemide kohta, intervjuerides Miina Härma Gümnaasiumi LAK-õppe õpetajaid ja õpilasi. See õnnestus väga hästi, kuna saadud tulemused on heas kooskõlas teiste õpetlaste poolt pakutavate tulemustega. Kvalitatiivseid tulemusi toetavad ka kvantitatiivsed tulemused, mida ei ole võimalik üldistada suurematele gruppidele, kuna testi täitsid ainult üheksa Miina Härma Gümnaasiumi LAK-õppe õpilast. Seetõttu oleks võimalik edasi uurida sama probleemi suurema arvu õpilastega üle Eesti. Eestis on veel teisigi IB koole: Audentese Kool, Eesti Rahvusvaheline Kool ja Tallina Inglise Kolledž. Samuti võib uurimust laiendada vene keele põhiste koolidele, mis võiksid anda laiaulatuslikku materjali uuringuteks.

Märksõnad: LAK-õpe, reaalinete õpetamine gümnaasiumis, keemia didaktika, inglise keele didaktika.

Lihtlitsents lõputöö reprodutseerimiseks ja lõputöö üldsusele kättesaadavaks tegemiseks

Mina __Sixten Hinnov_____

(autori nimi)

(sünnikuupäev: _17.12.1981_____)

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____ Advantages and Problems Regarding Content and Language Integrated Learning on
the Example of Miina Härma Gymnasium _____,

(lõputöö pealkiri)

mille juhendaja on _____ Asst. Lect. Natalja Zagura _____,

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Tartus, _13.05.2013._Sixten Hinnov (*kuupäev*)