The Future of Nordic Education:
CLIL and Curriculum Analysis of Finnish and Swedish Basic Education

Maria Björkenheim
Pro Gradu Thesis
English Philology
Faculty of Humanities
University of Oulu
Spring 2015
# Table of Contents

1. Introduction.......................................................................................................................... 1  
   2. Introduction to CLIL........................................................................................................... 3  
      2.1 History of CLIL............................................................................................................. 3  
      2.2 Developmental and educational theories behind CLIL.................................................. 4  
      2.3 Frameworks of CLIL teaching....................................................................................... 7  
      2.4 Studies on CLIL............................................................................................................ 11  
      2.5 Conclusions on CLIL.................................................................................................. 13  
   3. Nordic education now........................................................................................................... 14  
      3.1 Education in Finland.................................................................................................... 14  
         3.1.1 Teacher education in Finland.................................................................................. 16  
      3.2 Education in Sweden.................................................................................................... 17  
         3.2.1 Teacher education in Sweden................................................................................ 17  
      3.3 Similarities and differences........................................................................................... 18  
         3.3.1 Differences in teacher education.......................................................................... 19  
      3.4 OECD and PISA.......................................................................................................... 19  
   4. The future............................................................................................................................ 22  
      4.1 The future of education ............................................................................................... 25  
      4.2 CLIL and the future of education................................................................................ 27  
   5. Research approach and curriculum analysis....................................................................... 30  
   6. Parameters for the curriculum analysis............................................................................ 32  
      6.1 The curricula ............................................................................................................... 32  
         6.1.1 Finnish national curriculum overview.................................................................... 33  
         6.1.2 Swedish national curriculum overview............................................................... 33  
      6.2 Value words.................................................................................................................. 34  
   7. Analysis of the Finnish curriculum...................................................................................... 36  
      7.1 Finnish curriculum – English........................................................................................ 39  
      7.2 Finnish curriculum – Biology........................................................................................ 42  
   8. Analysis of the Swedish curriculum.................................................................................. 46  
      8.1 Swedish curriculum – English...................................................................................... 48  
      8.2 Swedish curriculum – Biology...................................................................................... 49  
   9. Results.................................................................................................................................. 52  
      9.1 Comparison of value words......................................................................................... 52  
      9.2 Results of analysis....................................................................................................... 54  
  10. Discussion and conclusions................................................................................................. 56  
 References................................................................................................................................. 60
1. Introduction

English is the de-facto lingua franca of the world, and functional fluency in it is vital for success in the world today, and even more so in the future. Globalisation, easiness of immigration and relocation require citizens of all countries to be able to have conversations beyond greetings and the weather – people need the ability to discuss concepts and ideas. Content and language integrated learning (CLIL) helps build functional bilingualism, even if students do not have a bilingual home background, or environment. In countries like Finland and Sweden, where the national language is confined to a relatively small area and population, at least functional fluency in more languages is required.

Though Finland is a bilingual country (Finnish and Swedish), and the Swedish language is close enough to allow partial understanding of its Scandinavian relatives (Norwegian and Danish), a more globally minded approach to languages is necessary in both countries. The governing bodies need to ensure the possibilities for comprehensive foreign language acquisition, without compromising the integrity of the native languages of these countries. One way to assist language acquisition in a natural way and aim for functional fluency, is by supporting content and language integrated learning in schools.

There are many ways in which governments can facilitate this for their students and citizens. With educational legislation and curriculum design the countries can provide the groundwork for the increasingly multicultural future. For the past five years I have worked as a teacher in bilingual schools in both Helsinki and Stockholm, and my degree in education is at the international program from the University of Oulu. These educational and intercultural experiences have lead to becoming more and more interested in CLIL as one way to help reform the education systems in both countries, so that they are educating students for the future, instead of the past.

The educational system as we currently know it needs updating. At the moment it seems that the way education is organised in Finland and Sweden does not serve the students in the best way possible, and by extension neither does it serve the society at large. Despite OECD organised PISA studies showing reasonably high scores in a variety of subjects in Finland and Sweden, students themselves do not necessarily enjoy being in school (OPH, 2015). In addition claims have been made that the PISA testing gives a very narrow view of what is important in education. For example in the key findings of the PISA 2012 results one fear is that poor skills in mathematics limit a
persons ability to acquire a well-paying job (PISA Key findings, 2012, p. 6). The goal of education and learning should not be to prepare people solely for gainful employment, but rather the holistic development of one's intellect and skills, as varied as they may individually be.

It is worth questioning what educational success means today, and tomorrow. The world has changed faster than the educational systems have. The reliance on quantifiable standardised tests and result-comparisons give a limited view of success (or failure). There is less and less need for memorised factual knowledge, and increased emphasis on problem solving skills, innovation, and ability to collaborate with a variety of people. Even though these skills are more difficult to measure in standardised testing, they should be among the main objectives of education. The current Finnish national curriculum is from 2004, but the new curriculum is in the process of being implemented. The new curriculum was published in 2014, and schools across Finland will be using it from 2016 onwards. In Sweden the primary school curriculum is from 2011, so the education systems in both countries are operating under fairly recent guidelines. These documents should hopefully encourage education which embraces individual and holistic development, rather than statistical ranking and test scores.

My aim is to find answers to the following research questions regarding both Finland and Sweden;
1. Do the curricula support and foster holistic and sustainable education that will provide students with skills required in the future? Why/Why not.
2. Do the curricula provide an adaptable platform for CLIL teaching? Why/Why not.

The theoretical section of this thesis will begin with an introduction to what CLIL is, with a brief outline of its history, educational philosophies behind it, and outlines for practical implementation. The section following offers a discussion on the current status of education in Finland and Sweden, and how they hold up in light of the foresighted future, and why CLIL is a valid tool for the future of education.

After this theoretical groundwork comes the empirical section of the thesis. I will analyse selected areas of the Finnish and Swedish national primary education curricula using a systematic review methodology. This is then followed by the conclusions and discussion, and implications and suggestions for future studies.
2. Introduction to CLIL

Content and language integrated learning, often referred to as CLIL for short, describes an approach to teaching and learning which goes beyond traditional foreign-language learning, and subject studies. As the name itself states, language and content are seen as intertwined, and something to be approached together, instead of separately. This section of the thesis will introduce the main frameworks of CLIL, its current standing in Europe, and why CLIL is a valuable educational approach for schools to adopt.

CLIL describes an educational situation where a topic or content is approached by using a foreign language as the main medium (Coyle, 2008, p. 97). CLIL is set apart from traditional language-teaching methods, such as focusing on grammar exercises and vocabulary lists, or covering a topic and translating unfamiliar terminology. The core aim instead is to cover the content using authentic language materials and exercises to consolidate the learning process. CLIL holds the topic and language connected to each other. In CLIL the language and content support each other in the learning process. (Coyle, 2008; Marsh 2002, p. 59).

2.1 History of CLIL

CLIL can be seen as a more European interpretation of the Whole Language Movement, which began in the 1980’s in North America. Similarly to CLIL, the movement is based on constructivist learning theories, and it emphasises concepts such as using language as a tool for meaning-making; language is individual and social; authenticity is important; cognitive and linguistic development progress simultaneously; and language skills are acquired through content learning. (Laurén, 2008, p. 63).

Canada especially has a long history of bilingual and immersion teaching, and in the early 1990’s Europe began to pay more attention to these concepts in policies as well (Ruiz de Zarobe, 2008, p. 61). In 1995 the European Commission and European Union proposed that each European citizen should be proficient in three languages. This is listed as the fourth general objective in the European commission’s White Paper. This objective would be met in part by mobilising schools to offer at least one foreign language from primary school, supporting the development of innovative teaching

The European Commission’s action plan (Promoting Language Learning and Linguistic Diversity: An Action Plan 2003) shows that the language acquisition goals were still held vitally important and widely supported (eight years after the initial White Paper goals). The quality standard mentioned in the 1995 document is known as The European Indicator of Language Competence, and life-long learning is also emphasised (Europa 2003, para. 3). More recently CLIL has been officially stated as a method for reaching these language goals. This is evidenced for example by the currently ongoing E-CLIL project, which began in 2011. It is EU funded, and aims to build a web-based resource centre for CLIL teaching. The mission objectives are listed as follows;

- It will provide support to current and future CLIL education programmes all over Europe.
- It will disseminate high quality and already proven materials and resources for content and language learning.
- It will enrich teachers' and children’s knowledge of other European cultures. (European CLIL Resource Centre for Web 2.0. Education, 2012, para. 2)

In the space of a couple of decades (1995 - 2011) CLIL has become an increasingly important aspect in European educational policies. What began as generally desired goals for promoting multilingualism, has been channelled into more specific endorsement of using CLIL in education. It is likely that the significance of content and language integrated learning will only increase in time, with more and more countries, regions and schools adopting CLIL teaching into their curricula.

2.2 Developmental and educational theories behind CLIL

Despite having a seemingly inherent emphasis on language learning as evidenced by the name, CLIL differs from purely linguistic approaches, which generally veer more towards rationalist and universal grammar views on language acquisition. CLIL stems from a constructivist learning theory; meaning what an individual learns, and the skills they acquire, are built on the foundations
of their previous knowledge and skills. It is an approach which acknowledges the significance of individual, independent, and social learning. (Laurén, 2008, p. 26-28).

The constructivist learning theory is based on the works of Vygotsky, Piaget, and Bruner, to name a few influences (Laurén, 2008, p. 63). According to Piaget’s theories of development, learning is based on one's own reference points and prior knowledge, and reflecting on new information from these grounds. Students create a mental framework of their experiences and ideas, and the more experiences one has, the more detailed and intricate the framework. The more intricate the mental framework, the more capable a person is to face more complex concepts as well. This cognitive development is continuous, and continuously modified by new experiences. This idea is the basis for life-long learning as well. (Auger & Rich, 2007).

In Piaget’s view learning comes through the learners own active experience. No one can build a ready mental framework for another person, as the understanding has to be individually internalised according to one's unique framework. This process can however be facilitated by others through interaction, and scaffolding understanding towards more complex concepts. As the learner begins to internalise the new information, skills, or knowledge, these are transformed into the ever-growing framework. (Piaget, 1964).

This idea of scaffolding learning is also explored in Vygotsky’s concept of zone of proximal development. According to his theory, a person can learn skills and concepts beyond their actual developmental level with the help of someone who can guide them in reaching further. The role of the other individual is that of a facilitator, who can recognise the potential reach of the learner, and aid in achieving that. This area of potential abilities is what is referred to as the zone of proximal development (ZPD). (Vygotsky, 1978). The idea behind the ZPD is perhaps most succinctly expressed in the quote "what the child is able to do in collaboration today he will be able to do independently tomorrow" (Vygotsky, 1987, p. 211). Vygotsky sees learning and development as a sociocultural process, where learning begins as an interpersonal experience, and is later an intrapersonal process, when the learner begins to gain mastery of the skills in development (John-Steiner & Mahn, 1996, p.192).

The term ‘scaffolding’, in the sense of helping learners reach their potential, was introduced by Bruner. Though Vygotsky never used the term, the idea of ZPD is concerned with scaffolding. The student is aided in their process by a facilitating figure who provides guidance and support. The
notion of scaffolding is meant as a temporary measure. The aim is to support the student with scaffolding until they gain independent understanding or mastery of the skills. (Ninio & Bruner, 1978)

Van Lier's (2000) view on language acquisition being ecological can also be seen in the workings of CLIL. Van Lier's sociocultural theory views learning from an ecological perspective. The learner is immersed in the whole habitat of self and culture, where meaning-making and learning stems from the entire multi-sensory experience. Learning is seen as more than a sum of its parts. The process cannot be retraiced into small details or a seamless flow of actions and consequences (Van Lier, 2000, p. 246-247). The entire learning process intertwines the self, identity, cognition, socio-cultural setting, motivation, and a myriad of other influences interacting together. It is a process embedded in physical, social, and symbolic context (Van Lier, 2004). Sociocultural learning theory includes concepts of scaffolding, reciprocal teaching, and collaborative learning, highlight the social basis of learning, and the interactive processes that promote development. (Renshaw, 1992, p. 2). All of these aspects are also at the core of quality CLIL education.

The constructivist approach to learning places a stronger emphasis on the learner, than whomever is possibly helping with the process. Thus the role of the teacher is different from the traditional understanding of the word. Instead of being viewed as the person in charge of distributing knowledge, the teacher is a facilitator of learning. Often instead of referring to ‘teachers’, constructivist texts use terms such as ‘facilitator’ or ‘instructor’, and in place of ‘teaching’ the preferred phrases are ‘guidance’, ‘learner support’, and the previously discussed ‘scaffolding’. The constructivist approach is student centered, with the teacher/facilitator/instructor being in charge of providing specific guidance and scaffolding to enrich and benefit the individual student en route to internalising, transferring and understanding the knowledge or skills in question. (Laurén, 2008)

CLIL is a constructivist approach which aims to support the students in gaining understanding, knowledge and skills related to the world around them, and providing an authentic language use platform for the process. Due to the innate duality of dealing simultaneously with content and language aspects, the teacher needs to be well equipped in practices for scaffolding. As such organising CLIL education is not necessarily the easiest task (Coyle, 2008). One has to consider the language levels of both the learners and teachers, and how these affect the content which is studied. When a topic is covered in a foreign language, initially the learners may find the task more challenging, as building comprehension skills will take time. On the other hand if teaching is
catered solely to suit language levels, the content runs a risk of being too simplified and basic to offer a meaningful learning experience. If the language level is too demanding, or the content too simple, the entire exercise runs the risk of being ineffective and demotivational. (Coyle, 2008)

One of the difficulties of defining CLIL stems from the fact that it is interpreted and implemented in a variety of ways across a variety of countries. There does not seem to be a hard and fast rule that sets strict parameters around the term, but it is rather seen as an umbrella term (Coyle, 2008, p. 100). This means that different schools in different linguistic surroundings can organise CLIL teaching according to the requirements they face. For example, CLIL education will look different in a multilingual environment versus a bilingual one, or even a monolinguial one. It will look different based on factors such as the cultures, environments, contents and languages in which the education is taking place (Coyle, 2008, p.100).

2.3 Frameworks of CLIL teaching

As CLIL is in itself already an umbrella term, covering a variety of interpretations on the exact nature of language and content integration, perhaps it is no wonder that there is no single, canonised teaching methodology either. That being said, Coyle (2005, 2005a, 2008) has developed comprehensive frameworks for CLIL teaching, which are introduced below. This style of CLIL teaching is based on the 4C’s, the 3A’s, and it incorporates Bloom’s revised taxonomy, and takes Gardner’s multiple intelligences into account.

The 4Cs Framework (Coyle, 2008, p. 103-4) is a method through which quality CLIL education can be provided, however it is organised. The four C’s stand for content, communication, cognition, and culture. When the CLIL education is planned with the interrelationships of these concepts integrated, the end result is a pedagogy that combines learning theories, intercultural understanding, and language-learning theories. The framework is often represented with a pyramid-like image;
This image shows that the entire approach is based on the cultural context. Developing intercultural understanding and competencies is an important aspect of CLIL. Around the cultural context communication, content and cognition are in constant interaction, and supporting each other. The content of teaching relies on the cognitive skills of the learners, as well as the levels and ways of communication available. Coyle (2005a, p. 5) gives the following succinct definitions for the terms within the pyramid;

- Content - progression in knowledge, skills
- Communication - interaction, using language to learn
- Cognition - engagement: thinking & understanding
- Culture - self and other awareness/citizenship

If these four key areas are applied in lesson planning, and actualised in teaching, the students would be presented with a topic suitably challenging for them; one they can explore and discuss on a variety of language levels from simple vocabulary to independent explanations; they will have tasks engage in a multifaceted way and help develop thinking skills; and with the help of linguistically and content-wise authentic and relevant materials (e.g. news articles, museum visits, and interviews, instead of artificial content created solely for textbook purposes).

In quality CLIL education these 4C’s draw from a variety of learning theories – for example cognitive learning theories such as Bloom's Taxonomy, and socio-cultural learning theory. These are applied in lesson planning to ensure motivating and fulfilling learning experiences, tailored to suit the needs of the learners. (Coyle, 2005a, p. 6).
Benjamin Bloom is credited with creating a ranking order of thinking skills people use. They have been divided into categories of cognitive, affective and psychomotor skills, and the categories have been ranked from less demanding (e.g. remembering), to more complex cognitively (creating, for example). These thinking skills, and how to best support their development in education, is a big part of the CLIL ideology as well. When the aim is to introduce content alongside language education, the learner's mind should be well stimulated and motivated with suitably challenging tasks. (Bloom et al. 1956; CLIL resources for higher education, 2014).

The Bloom's taxonomy ranking is also known as higher order thinking skills (HOTS) and lower order thinking skills (LOTS). Both HOTS and LOTS have cognitive, affective and psychomotor skills within them. The figure below shows a view of thinking skills ranging from lower to higher cognitive demands, and a variety of tasks with which these skills can be practiced. (CLIL resources for higher education, 2014)

![Bloom's taxonomy](image)

**LOTS** (lower order thinking skills)  
**HOTS** (higher order thinking skills)

- **remember**  
  - recognise  
  - list  
  - describe  
  - identify  
  - retrieve  
  - name  
  - locate  
  - find  
- **understand**  
  - interpret  
  - summarize  
  - infer  
  - paraphrase  
  - classify  
  - compare  
  - explain  
- **apply**  
  - implement  
  - carry out  
  - use  
  - execute  
- **analyse**  
  - compare  
  - organise  
  - deconstruct  
  - attribute  
  - outline  
  - find  
  - structure  
  - integrate  
- **evaluate**  
  - check  
  - hypothesize  
  - critique  
  - experiment  
  - judge  
  - test  
  - detect  
  - monitor  
- **create**  
  - design  
  - construct  
  - plan  
  - produce  
  - invent  
  - devise  
  - make  

**Figure 2: Bloom's taxonomy. Anderson & Krathwohl, 2001**

The 4 C's of CLIL – i.e. ensuring that the lessons have content, communication, cognition and culture actively explored - can also be seen as having a socio-cultural learning approach, as well as
the cognitive model discussed above. Sociocultural theory sees mental and social worlds as inseparable, and as continuously influencing each other. Individual cognitive abilities and skills help a person comprehend the world around them, but the world around a person influences the ways those cognitive skills develop and are perceived (Lantolf, 2000, p. 79).

Scaffolding is present in the sociocultural approach as well. Language, gestures, technologies, and other processes of social interaction help a person in constructing their framework of knowledge. As this process is inherently social and cultural, students learn to communicate and act in culturally appropriate ways, and become members of whichever society they are encultured in. This allows chances for active participation and meaningful interaction. (Scarino & Liddicoat, 2009, p. 27).

Sociocultural theories see cognitive development as having two levels – an interpersonal and intrapersonal level. With the help of scaffolding and interaction with others, students begin to grasp concepts within their ZDP, and as the skills and knowledge are mastered, they are integrated as part of the individual's mental framework. Language is vital to the process of successful meaning-making, which is necessary for learning to occur. (Scarino & Liddicoat, 2009, p. 27)

As the CLIL education is planned, they should have content that is relevant to the skills and interests to the learners; have a suitably demanding cognitive challenge; inspire and support communication in a variety of social contexts and with different media; and take into account the culture in which the learners, teachers, content, and languages are embedded. Keeping both cognitive- and sociocultural learning theories in mind should help ensure quality CLIL education.

In addition to the aforementioned 4C’s, there is also another alliterative acronym related to CLIL teaching - the 3A’s. These refer to how language is used in the learning process in relation to the content. There is a differentiation between analysing the language of learning; adding to the language for learning; and applying language through learning to the content.

The first ‘A’ - analysing for the language of learning - is the most closely related to traditional language teaching. This aspect of CLIL involves looking at the vocabulary, grammar, and comprehension skills necessary for the particular content. When looking at adding the language for learning (the second 'A') to the content the focus is on scaffolding the students so that they can grasp even the more challenging concepts with the target language. Context clues, classroom discussions, study skills, and task descriptions are a vital part of this stage, and has the students as
well as teachers integrating the content and language. Application of content through language (the third 'A') is then in the end of the learning process, when the students gain ownership and mastery of the topic, and can apply their content and language skills, and not just repeat or regurgitate facts. When students can explain and utilise their skills independently, they have reached a conceptual understanding of the content, and the language gives them the means in which to express that. (Coyle, 2005a, p. 7-8)

One visualisation of the challenges of CLIL teaching is represented by the CLIL Matrix, shown below. The challenge of the CLIL teacher is to provide lessons with suitably high cognitive demands, and help the students reach these levels by scaffolding the way from lower linguistic demands towards higher ones. Ideally the lesson contents would progress from stage 3 toward stage 4 in the matrix. Stage 2 activities would be oversimplified and likely boring, and stage 1 pretty much an impossibility.

Figure 3: CLIL Matrix (Coyle, 2005a, p. 9).

2.4 Studies on CLIL

There is a fair amount of research being conducted on the efficacy of CLIL, and it seems that this particular approach to teaching is being increasingly implemented around European classrooms (e.g. Lorenzo, 2012; Gradinetti et al., 2013; Llinares & Pastrana, 2013; Diaz et al., 2014; Llinares & Pascual Pena, 2014), and CLIL is gaining foothold as far away as Australia as well (Ross, 2012). As the approach is still fairly new, and lends itself to a variety of interpretations, there is a wide spectrum of studies as well. Though this section includes reviews on studies on CLIL and higher education, the purpose of the thesis is ultimately to focus on the possibilities of CLIL and the future
of primary education. The basic tenets of CLIL education are still widely applicable through various levels of education.

It is probably fairly evident, that this particular thesis holds a somewhat biased view towards CLIL, and the opportunities it provides. However the practicality of organising CLIL education is not necessarily as straight-forward as one may initially think. There is more to the approach than just switching languages of instruction. Gradinetti et al. (2013) describe the resentment teachers and students in Italy experienced, as they were 'forced' to change part of their science education into a content and language integrated approach. This left experienced and qualified teachers who lacked language skills worried that they could not sufficiently cover the subject matter in another language, and foreign-language teachers felt poorly equipped to help with the more complex content (p. 355).

The solution came from revisiting the teaching materials and styles, and re-designing them to accommodate a more learner-centered perspective. As both the teacher and students were sub-fluent in the target language, the instruction could no longer be top-down flowing – i.e. the teacher talking, and students passively listening. Tasks were designed to either focus being demanding cognitively or linguistically, but not both simultaneously (p. 358-360). Gradinetti et al. (2013) analysis of the CLIL lessons shows that teacher monologues diminished, and student-lead learning time increased, as both students and teachers were an active part in building the knowledge network. (p. 362)

A Diaz et al. (2014) looked at how the motivation of CLIL students differs from foreign-language students in Spain, and if there is any difference in learning results. In their study of 393 students of ages 13-16, they found CLIL students to be more motivated. A Diaz et al. state that their study “did show significant differences, as the CLIL students were intrinsically more motivated and more instrumentally oriented, while they also showed a higher interest in Fls (foreign languages) and cultures and a greater motivational strength.” (2013, p. 219).

To be fair, CLIL education and research does not just generate positive results, and there are criticisms to the approach as well. Bruton (2013) argues that CLIL education is organised at the expense of traditional foreign-language education, and due to the heightened focus on CLIL, students out of its reach are left behind (p. 595). The positive results of CLIL education may be attributed to other factors – socio-economic backgrounds, motivation, parental support, pre-existing language aptitude and academic skills of students taking part in CLIL classes (and thus CLIL research). Bruton's view seems to be that CLIL is an approach suited to some, but not all, and the
way it is organised runs the risk of alienating a large number of students (2013).

Bruton raises a valid point, and a major concern of CLIL education is, that it cannot simply be textbook-based and teacher-lead instruction. In order for a content and language integrated learning approach to be successful, a great deal of planning and scaffolding is necessary. Often teachers are required to step out of their comfort zone, and away from the role of someone who automatically has all answers. The approach demands a lot from students as well – higher levels of participation, motivation, and effort are necessary. But then again – these issues and challenges are hard to see as strictly negative. It can be argued that it is only reasonable that education requires innovation, renewed effort, enthusiasm and motivation from all parties involved in the process.

2.5 Conclusions on CLIL

The acronym discussed in some detail in this chapter is an umbrella term meaning education which combines content and language teaching. There is no rigid CLIL methodology, and the teaching can be realised in a variety of ways. Though CLIL education is not canonised, and it is still a fairly young concept in the realm of educational philosophies, teaching frameworks have been built to help ensure a high quality of CLIL can be provided. It even seems that CLIL itself is scaffolded. The European Union promotes the use and development of CLIL, whether it is despite the lack of rigid rules, or because of it, is difficult to say. In any case a lot of effort is being put into supporting the spread and organisation of CLIL across the EU countries. As the Union grows, and its citizens are increasingly encouraged to travel, study, live and work abroad, adopting CLIL educational policies across the area will help ensure a population fluent and prepared for the demands of a multilingual and multicultural future.
3. Nordic education now

This section of the thesis will first offer an overview on the current status of educational systems in both Finland and Sweden, and the role of OECD/PISA in evaluating educational success. The overview will continue with a brief discussion on what the issues and challenges are with the current system, and why it needs revising and updating. The following pages will then introduce some future foresights from a variety of sources, and what these predictions then mean in light of education, and what is required from it.

3.1 Education in Finland

The main objective of education in Finland is to offer all of its citizens equal opportunities for educational development (OPH.fi). Thus regardless of socio-economic backgrounds, or geographic locations, each student should have the same quality and standard of education available to them, free of charge.

The following image shows the division of ages and stages of education in Finland. Compulsory education lasts for nine academic years, the first six of which are generally considered primary education. During these years the students usually have a class-room teacher instructing in most subjects, and in the later years subject specialists take over. Students are placed in schools based on the proximity to their homes, but there is also a certain degree of choice available to the parents. (Cimo, 2012, p. 15).
The ministry of education publishes the national curriculum, which is revised approximately every ten years. The current version is from 2004, and a new one is set to be published in 2016. The national curriculum works as a set of guidelines for organising education, but the system has been fairly decentralised for the last few decades. This means that those providing the education are accountable for the organisation and quality of education. Municipal governments decide how much autonomy is awarded to the schools. (OPH.fi, 2014)

The national curriculum contains the core content and learning objectives for all school subjects, but does not strictly dictate precisely how and when each area is to be covered. Schools, and individual teachers, can plan and organise educational units, and choose whichever teaching materials and methods suit their needs best. (OPH.fi, 2014)
3.1.1 Teacher education in Finland

Teachers in Finland are highly trained, and the profession requires University level studies. In primary and secondary education all teachers are required a Master’s degree. The same requirement is for vocational education teachers, through there are some vocational education paths where the teachers could also just have a Bachelor’s degree. In a primary and secondary school setting teachers are generally highly independent professionally, and their judgement is trusted on a school, district, and national level. There are no inspectorates, as the aim of a high level of teacher education is to ensure that those who choose the profession are well qualified pedagogically, and competent subject-matter wise. (OPH.fi, 2015)

The most common path for primary school teacher education is through a Master's programme in Educational Sciences. An alternative path is through completing pedagogical training after the completion of an initial Bachelor's or Master's degree. This path is more common with subject teachers, who thus gain a strong level of competence in their subject of choice first, and then focus on learning about learning, didactics, pedagogy, educational psychology and philosophy, and so on. This path also serves those who choose to switch to a career in education later in life. (OPH.fi, 2015)

A language teacher would thus have two options for their personal education path – first study for the Master's degree in Education, and supplement it with language philology studies as a minor subject. The depth of the English language studies would depend on if one wishes to teach at a primary or secondary education level. The other pathway to becoming a language teacher would be to first gain a Master's degree in English language and philology, and then supplement that degree with pedagogical training.

In addition most teachers are required to partake in further training yearly. The training is offered by a variety of providers, and it is funded by the state. The aim of this further training is to make sure that teachers are up to speed in current educational policies and reforms. Schools can also apply for funding to further increase the competence of their faculty. (OPH.fi, 2015)
3.2 Education in Sweden

Sweden also has nine years of compulsory education, and the students enter the system at age 7. These nine years of education have been divided into elementary (years 1-3), middle (years 4-6), and secondary school (years 7-9). Sweden also ensures that all students have equal rights, and access to quality education through the entire country. (Sweden.se, 2014)

The responsibility for funding education is largely placed with municipalities. Local taxes and municipal budgets are the main source for educational funding. Sweden has a fair amount of independent (or private) schools, but they are still free for students to attend. Schools are not allowed to collect tuition fees, but they can accept donations. (Sweden.se, 2014a)

Sweden holds national tests in Swedish, Mathematics, Social Sciences, Science and English to all year 6 students each year. The curriculum also states that schools are responsible for introducing and including modern technology in teaching, and making sure students are well versed in its uses. (Sweden.se, 2014)

3.2.1 Teacher education in Sweden

From July 2011 onwards the Swedish Parliament has required a certification for teachers and preschool teachers in Sweden. The aim for the certification is to increase the skills of the teachers, and to ensure higher quality of educational services to students. The National Agency for Education now requires that teachers also have a degree in Education in addition to holding a degree on the subject(s) which they teach. The certification is specialised according to the the area of education the teacher will work in according to year-level and subject; preschool, early primary years, middle primary years, secondary (etc); and Swedish, English, Math, Science, Social Science, etc. Schools should thus only offer permanent employment to those with teacher certification, though exceptions are allowed in absence of qualified teachers. In these cases the non-qualified teachers can only be hired on a yearly basis. (Skolverket.se, 2014)

In order to receive the certification a teacher needs to be proficient in the Swedish language, and
must have a diploma of Education. The diploma of Education can be obtained in a university or other institution of higher education in Sweden (or a country whose university degrees are transferrable in Sweden); or a Qualified Teacher Status Certificate issued by the Swedish National Agency for Higher Education. (Skolverket.se, 2014).

3.3 Similarities and differences

As evidenced above, the education systems in Finland and Sweden are indeed largely similar. For example they are structurally similar in compulsory education years – school begins at 7 years of age, and nine years later the students graduate at age 16, ready to pursue their next path of education of choice. The basic philosophy of education and equal treatment for all students, no matter what their background, also holds true in both Finland and Sweden. Both countries also include a balance of academic and non-academic subjects in their curricula, and the academics include both STEM (science, technology, engineering, mathematics), and humanist subjects.

Teacher education is in high regard in both countries, and require university level education in order to become a qualified teacher. The length of school days and school years are similar in both countries, with approximately the same amount of holidays distributed throughout the year. The academic year does not follow the calendar year, but rather from August to June, leaving the majority of the summer season for holidays in both countries.

Student well-being is listed as a high priority in both countries, with nurses, counsellors and psychologists made available for the students regularly (Sweden.se, 2014, p. 13; CIMO, 2012, p. 7-8). In addition healthy living is promoted with physical education, and the free and well balanced school lunches. How well these aspects of student care are organised can vary a lot, depending on the municipality (and their finances). Despite plans and policies to the contrary, this inevitably results in some degree of inequality between areas, and the resources available to students.

The Swedish educational system is somewhat more controlled from above, than the Finnish one. Sweden holds national tests during primary school years, whereas Finland only has national exams at the end of secondary education. School inspections were abolished in Finland in the 1990's, but Sweden has a School Inspectorate, which “scrutinizes schools” (Skolinspektionen.se, 2011, p. 1; CIMO, 2012, p. 13)
3.3.1 Differences in teacher education

Finnish primary school teacher education is based around obtaining a Master's Degree in Education from a Finnish university. This degree qualifies one to be a class-teacher for the primary years (1-6), meaning that one teacher could potentially teach all subjects to one class throughout their primary school years. The emphasis is heavily on the educational sciences, and making sure the teacher is a well rounded pedagogue, instead of being necessarily a specialst in any given subject.

Swedish teacher education has a stronger focus on specialising the qualifications of a teacher – defining the set year-levels and subjects a teacher certifies for. This would mean that teachers would be subject specialists from the onset of primary school, with one teacher focusing on a smaller amount of subjects for a smaller amount of years. This depends of course on how certified the teacher is, and it is possible for one teacher to hold multiple qualifications across subjects and year-levels.

From this point of view it seems that the Swedish teacher education system is more rigidly set in certain boundaries, though the Finnish side is the one absolutely requiring a University level Master's degree. Then again Swedish schools are regularly reviewed under the school inspectorate, so as such it is understandable that the teacher education is more strictly defined in terms of qualifications for subjects and year-levels one can teach. The Finnish teacher education system aims to develop more autonomous teachers suited for the Finnish system. In schools this would mean that Finland is slightly more likely to have class-teachers who cover all subjects for their class during primary school years, and Sweden is slightly more likely to have subject teachers even in the early years. Both ways of organising primary education can (and are) used in both countries, so in this case the differences are not necessarily that great.

3.4 OECD and PISA

When it comes to comparing educational systems, OECD and PISA are often quoted as highest authority in this area. The Organisation for Economic Co-Operation and Development (OECD) is
an international platform for governments to work together to find solutions to universal challenges. Tasked with understanding the driving forces of economic, social and environmental change, the organisation gathers and analyses a wide variety of data. The organisation is also concerned with foresighting the future, and how school systems can prepare the next generations for the rapidly changing world. (OECD, 2014, p.2-3)

PISA – Programme for International Student Assessment, is an investigation conducted by OECD every three years. The aim is to evaluate the quality of different countries' education systems by testing their 15 year old students in reading, mathematics, and science. There are also optional assessments in problem solving and financial literacy, that the participating countries can choose to include in their assessments. The most recent set of assessments were conducted in 2012, with over 500 000 students participating from 65 countries. Finland and Sweden were among these. (OECD, 2014a, p. 1-3, 7)

The PISA test results have been widely publicised, and for a number of years running Finland has scored good results in all categories, whereas Sweden finds itself lower in the list (OECD, 2014b, p. 5). There have been various debates on the reasons for the success, or lack thereof, in these assessments. For example the fact that education is free for all students, and that they all have equal rights to access the same quality of education, independent of their social, economical, or any other background factor, are seen as variables influencing positive results. In addition importance of student care, and the high level of teacher education are mentioned. (OECD, 2010). But those particular aspects are true for the Swedish education system as well, yet their results lag further behind. Whether it is due to lower teacher salaries, socio-economic statuses of students, or less time spent on studying being reasons for low PISA scores, Sweden set about to reform its education system to boost better results. (OECD, 2014c; Sweden.se, 2014).

This being said, even the Finnish results declined in 2012, and while still scoring above average, Finland fell from the top three to barely within the top 15. Complacency with previously good results may have led to a lack of improvement and innovation in the school system, leaving students increasingly disinterested in their formal education (OECD, 2014d). Finland has been hailed by OECD as having the most cost-efficient educational system in the world, but the news prompted rather a reserved reaction, than enthusiasm – in a YLE interview the National Board of Education Counsellor Petra Packalen states that cost-efficiency is a false indicator for success. The focus on efficiency does not truly give an indication on how well students learn, or teachers teach. (YLE,
In addition to this, recently there have been more criticisms voiced towards the entire PISA system. In a letter written to the director of OECD's International Student Assessment, published by The Guardian, a stop to the tests is called for. Reasons for halting these world famous tests include the facts that they emphasise a slim range of academic skills, and are mainly concerned with how well students are prepared for future gainful employment above all. The three-year cycle of testing promotes short-term solutions in countries wishing to improve their educational ranking, and this tends to just lead to studying for tests and exam-skills, and the real reason for education is forgotten. (Andrews, 2014).

So if PISA results vary greatly even if countries have similar educational set-ups, and in the end the tests do not measure true educational success, but rather skills in taking standardised tests, there must be other criteria with which to determine how well prepared educational systems are for the future. In order to gain insight into that aspect, one needs to determine what skills and knowledge are vital for the future, and how the educational system as we know it can foster the development of those skills.
4. The future

Nothing is as difficult as making predictions – especially of the future. Though it is impossible to precisely say how the world around us will develop and change in the coming years, there are still indicators and trends to consider, and can help in making educated guesses. Developments in information and communication technologies have dramatically changed the world as we know it, and in a very short period of time. The skills needed, and ways of working in use today are vastly different from those that occupied a working day just a couple of decades ago. Thus it is likely that there are more changes to come, and school systems should be in the frontline of preparing students for the future. Unfortunately, more often than not, classrooms do not even reflect the world today in terms of required skills and use of technology, but instead lag in the past. (Robinson, 2010).

As the old adage goes, one must study for the sake of life, not for the sake of school. This is losing its meaning though, as in most cases students are no allowed to use the technologies they are fluent with during school, but rather have to lock them away for the day. Instead students' time and effort in school is spent learning how to pass tests and get good grades. Students learn the skills they need in life despite the often contrary efforts of schools. The education system widely in use today was developed in the wake of the industrial revolution. Quick note-taking skills in legible handwriting, mental arithmetic skills, and the ability to listen to instructions and act accordingly were skills needed in the work-force back then. But the world is different now. (Robinson, 2010).

The Institute for the Future (part of the Phoenix Research institute) published a list of 10 skills needed by future workforce (2011). According to them the work-force of the future needs to be people who can make sense, and are prepared for novel and adaptive thinking. They need to have good social intelligence, have trans-disciplinary skills, have new media literacy, and computational thinking skills. They need to have good cognitive load management, and have good cross-cultural competencies, with a design mindset ready for virtual collaboration. These demands stem from the increasing rise of smart machines and automation, longer life-span of people, and the growing global connectedness and spread of new forms of technology and media. (IFTF, 2011).

Similarly the UK government recently published their findings on what changes are likely to be expected in the work-force by 2030 (2014). In a similar vein to the above mentioned IFTF findings, the UK report listed the following trends as major influences driving the change;
• Demographic change, especially an ageing population.
• Growing diversity, increasing representation of gender and ethnic groups in the labour force.
• Growing household income uncertainty and regional inequalities.
• Growing desire for a better work-life balance.
• Changing work environments shaped by Information and communications technology (ICT), outsourcing, internationalisation and the need for greater flexibility.
• Converging technologies and cross-disciplinary skills, particularly the combination of biotechnology, information and communications technology, nanotechnology and cognitive science.
• Digitalisation of production: automated and additive manufacturing processes, involving 3D printing.
• ICT development and the age of big data, the power of digital devices and the potential to capture and use vast amounts of data.
• Changed economic perspectives due to globalisation and technological change, particularly volatility and uncertainty in the period post the 2008 crash.
• Shift to Asia, growing economic power and influence of countries in the East.
• New business ecosystems leading companies to be increasingly defined as ‘network orchestrators.’
• Growing scarcity of natural resources and degradation of ecosystems: finite environmental resources leading to higher extraction costs and environmental decline.
• Decreasing scope for political action due to constrained public finances, as well as greater levels of social transfers for the aging population, limits resources for education and
skills initiatives. (UKCES, 2014, ix).

These two studies from the opposite sides of the Atlantic came to similar conclusions concerning the future. The demands of what is required from the future workforce is influenced by facts such as people are living longer in increasingly heterogenous societies, and the advances and accessibility of science and technology bring about a whole new spectrum of multifaceted skills for people to utilise.

More and more jobs previously done by people, are being replaced by automation. This does not just involve assembly line factory work, but even jobs that have traditionally been taught as ones that absolutely need a human mind and control for it to be done. For example a lot of customer service, medical research, and logistics work no longer require people to do them. An automated work-force can do the same job more efficiently, with less error, for a longer time, and while adapting and learning. The CEO of Nissan has announced, that they are aiming to have autonomously driving vehicles available for consumers in 2020 (Nissannews.com, 2013). While this is exciting news in the advancement of science and technology, it also inevitably means that jobs requiring drivers (trucks, taxis, busses, to name a few), or professions training drivers, will start to dwindle sooner rather than later.

Frey and Osborne (2013) conducted a study on the likelihood of the computerisation of jobs within the next 10-20 years. They looked at 702 occupations, and one of the conclusions they came to, was that 47% of employment in USA can potentially be automated within the next couple of decades (Frey & Osborne, 2013, p. 38). While a lot of these automatable jobs are ones requiring minute dexterity or repetitive labor, administrative and service industry tasks can (and will) also be replaced with increasingly sophisticated robotics and software. For example a shopping experience no longer needs any human interaction, as one can collect, scan and pay for goods themselves, or just order them online completely. This eliminates the needs for shop assistants and cashiers, and even shelves can be stocked by robots. The Frey and Osborne study suggests that in order to avoid mass unemployment, there needs to be a larger focus on workers equipped to handle tasks requiring social intelligence, social skills, and creativity (2013, p. 45).

In a short video presentation, the CEO of Google Eric Schmidt asks the audience to imagine interacting with a computer that can assess what gaps you have in your skills or knowledge base,
and how to bridge the gap so that you can fill your potential and pursue your interests. Evolving technology will help us do this, and in the process free our minds and bodies from tasks that previously took up enormous amounts of mental and physical energy, and give the opportunity to re-apply that effort elsewhere. For example consider instead of having to perform repetitive tasks in factories, and how automation now does that. Instead of having to remember a variety of minute (if important) details (e.g. phone numbers), an appliance can do that. And these are already happening today. These, and other examples of automation, help free the mind and energy for other things - innovation, creativity, exploration. As it is, formal education should support and foster this development. (Schmidt, 2014)

Modern technologies are generally first developed for military purposes (e.g. GPS navigation), but eventually the advances trickle down to civilian life as well. There are already technologies in military use, that have begun to make their way to life out side of war zones (for example flying droids), and the steady increase of labor cutting technologies will continue to increase. Work forces are growing older and left largely unemployed, and educational requirements on the other hand keep people in school for years until they are qualified to enter the diminishing job pool (Friedman, 2012, p. 226).

4.1 The future of education

This is a step where the possibilities of technology clash with a rigid system which is focused on the status quo, and learning is scheduled based on making sure farmers' children are free to help during planting and harvesting seasons (Robinson, 2010). There have been some news reports of new innovations in education; from a CLIL point of view for example YLE reported of an Italian school using Finnish mathematics text books, and receiving good results. The teacher found that despite the material being in an unknown language to the students, the books encouraged and developed problem solving, independent learning, and gave motivation to learning new skills. The book itself provided scaffolding with colourful pictures, and basic dictionary skills helped with the rest. In the end though the teacher had to stop students from advancing too fast and too far – which is an approach that is completely counter-intuitive to learning. Despite the fact that students were motivated, and learning well, they had to stop from continuing on that path, due to the next set of skills being 'reserved' to being taught the following year (YLE, 2014).
In another math-related example, BBC reported of a tablet-computer application used in a school in Malawi, which saw students grasping concepts in six weeks, rather than the 18 months required with the traditional teaching methods (BBC, 2014). Times given and restricted to different activities might give teaching an air of efficiency, while actually achieving the opposite. With embracing the advances of technology students can reach their zone or proximal development faster, and more autonomously. The more independent and self-directed approach to learning new skills and concepts helps with creating more meaningful learning experiences, and eliminating unnecessary down-time and waiting for others to catch up. The more time is freed for education at an individual pace, the further students can develop in their potential.

A paradigm shift in the organisation of education is needed - the current system is outdated, and does not serve the world of today, or tomorrow. Too much time and energy is wasted in teaching and learning obsolete facts and skills, and not enough attention is given to the true core competencies required in the world. Maarit Korhonen, a Finnish teacher who has worked in Finnish schools for 30 years teaching students of a variety of socio-economic backgrounds, recently wrote a book titled 'Herää, koulu!' - Wake up, school! (2013). In her book she discusses the fact that not a lot has changed in formal Finnish education within the last three decades, though the world around school has gone forwards in leaps and bounds. According to Korhonen vital skills for the future include creativity, innovation skills, problem solving skills, team work, flexibility, fluency in technologies, global understanding, critical thinking, life-long learning, environmentalism, and self-directed learning. Her conclusion was, that these are changes that can be done today, it is just a question of effort on the organising side. (Korhonen, 2013)

Van Lier's notion of democratic education is one possible perspective for the educational reorganisation. In order to foster the development of justice oriented, personally responsible, and participatory democratic citizens requires education to veer away from rigid subject divisions, and more towards a holistic and non-conformist approach – though it will mean less standards, measurability, and quantifiable testing. (Van Lier, 2004, 81).

Automation and technology are developed for the sole reason of making our lives easier and more efficient. These developments should be embraced in schools as well, and utilised to help develop students' higher order thinking skills. A lot of traditional schoolwork relies heavily on evaluating lower order thinking skills, mainly because these are so easy to quantify and evaluate. But for the sake of true education, learning, and meaningful development, those in charge of organising
education should consider why waste time practicing skills even current technology can handle faster and more reliably (e.g. recognise, remember, identify). At the very least the effort should be on how to utilise the technology for these lower order thinking skills, but preferably on how to then utilise the information itself, and move towards more demanding higher order skills. A population's potential does not lie in its ability to recite and regurgitate facts, but rather in problem solving and innovation.

Now this is not to say that why teach math when we have calculators, or why read novels when the movie is made. The HOTS are built on an evolving cognitive framework, and LOT skills are vital there too. The more intricately constructed ones cognitive framework is, the more complex HOTS can be utilised and practiced. Once the basic skills are internalised, the scaffolding for higher levels can begin. The trouble with traditional educational systems comes from adhering to strict scheduling. There is a certain amount and depth of information that needs to be taught and learned in a certain time period, and after the said time period is up, the following amount of work at a new depth is attempted.

4.2 CLIL and the future of education

CLIL has the potential for allowing student centered learning at a natural pace, while giving opportunities to integrate current technologies and the latest innovations into classrooms as well. One of the main ideas behind CLIL is to move away from artificial separation of topics, but rather support holistic approaches and views.

As mentioned earlier, the basic building blocks of CLIL can be boiled down to a couple of succinct lists; content, communication, cognition and culture; and the languages of, for, and through learning. CLIL lends itself well to the evolving demands of education, as it is not a rigid set of rules, but rather a holistic approach to education itself. With content and language integrated learning, the idea is to use current and authentic learning materials to inspire and motivate the learner to be an active participant in their own quest for skills and knowledge. They are scaffolded in their efforts to building their own frameworks of knowledge, while actively building their communication and cooperation skills.

As language is inherently about something, it seems that it would make sense to promote change
towards a system in which learners communicate about matters important to them (instead of matters of consequence dictated to be discussed); they learn to build and express the various forms of identity and self through language; and have a chance to engage in meaningful interaction in the target language (versus scripted discussions about polite niceties). (Van Lier, 2004, 83).

A learning process such as this offers opportunities for developing the various skills needed in the future. Approaching a topic with the help of authentic learning materials from the real world (instead of relying solely on text books created for the purpose of learning said topic) requires the use of problem solving skills, communication skills, and fluency in technology. Critical thinking and team-work come into play as well.

With a content and language integrated learning approach applied to education, the development of skills required in the future can be greatly facilitated. The Finnish National Board of Education (FNBE) published a brochure on the aims for learning and competencies in 2020 (OPH, 2011). The brochure states that the education system will support the development of learners’ thinking skills, work and interaction skills, crafts and expressive skills, participation and skills to influence, as well as self-knowledge and responsibility. Development of these citizenship skills will start as early as during early childhood education and care.

In addition there is an emphasis on assessment as being important, which can hold the pitfalls of learning and teaching just for test success and PISA rankings. Here's hoping though, that the main emphasis will be on the FNBE to “support schools and other educational institutions in their educational tasks so that learners will become familiar with their rights, duties and responsibility for themselves and the society around them. Education is seen as an investment in the future” (OPH, 2011. p. 6). Learning and teaching will emphasise collaborative approaches, involvement and interaction, combined with building knowledge and competence. Everyone will be guaranteed equal opportunities to process and produce information and to make efficient use of information and communications technology in support of learning. Equity, fairness, openness and trust form the basis of FNBE’s activities. Leadership supports and motivates innovation, creativeness and competence development. (OPH, 2011. p. 8-14)

In 2013 the Government Offices of Sweden commissioned a similar report on the future challenges facing Sweden (Framtidskommissionen, 2013). The report details the social and political development of modern Sweden from the 1970's up to date, and aims to find solutions for how to
prepare for the world of 2020, and even 2050. In regards to education, the report finds that one main issue is that a majority of the current workforce will retire faster than new and qualified personnel can take over, especially in regions outside of major metropolitan areas. The report states that “severe staff shortages are expected in 2020. These involve personnel with teacher training, upper secondary training in care services, upper secondary training in transportation, and training in engineering” (Framtidskommissionen, 2013, p. 128). So regardless of technological advances or increased immigration and population growth – on a large scale the countryside and municipalities are facing difficult times, if they can not find incentives for qualified workforce to settle in.

The report suggests that it may be as low as 50% of workforce are adequately trained and qualified for their field of work, but in addition to that challenge, there is the question of which fields will even exist in the next few years. It is likely that a lot of yet unknown new professions will emerge, along with a need for education and training for those professions. But perfect matching of professions, training and locations for said training is not, and will not, be possible. Instead of building an educational system which reflects an ever-changing demand from business sectors and labour market, it makes more sense to ensure that the educational system facilitates a high degree of adaptability and flexibility. (Framtidskommissionen, 2013, 129-130).

So with such aims and thoughts for the future of education in these Nordic neighbours, and being aware of the demands of the future workforce, there's no time like now to begin. The thesis will now move on to the empirical section – taking a look at how can primary schools in Finland and Sweden start preparing their students for the world of tomorrow, and could this be achieved via CLIL.
5. Research approach and curriculum analysis

The research approach of this thesis is a systematic review of the Finnish and Swedish national basic education curricula, followed by curriculum analysis. A systematic review methodology refers to an approach focused on a research question that tries to identify and synthesize research evidence relevant to that question. This methodology is often used in medical research, but it is applicable in other fields of study as well. For example the Campbell Collaboration working under the Norwegian Knowledge Centre for Health Services is a research network focusing on systematic reviews being used in topics such as effects of social interventions in crime, education, and social welfare to mention a few. (Campbellcollaboration.org, 2015).

According to Onwuegbuzie (2012), a well executed literature review is the very foundation for quality research. The author has identified a variety of benefits that stem from thorough literature reviews, including finding relationships between theory and practice. (Onwuegbuzie, 2012, p 1). This approach should help in finding out how the theories of CLIL and foresighted future requirements can be practically applied in modern Nordic education within the current curricular parameters.

Conducting a systematic review is more than just following steps like defining the research problem, and looking at relevant secondary sources. Ideally a systematic literature review is a document which gives the reader a "logically argued case founded on a comprehensive understanding of the current state of knowledge about a topic of study" (Onwuegbuzie, 2012, p 2).

Still, systematic review does follow a certain protocol, no matter what the field of study. To be considered a thorough process true to the methodology, the study needs to have clear criteria for inclusion or exclusion; a well defined research strategy; careful analysis of the included material; and meta-analysis of the findings when applicable (Campbellcollaboration.org, 2015; Griffith University, 2015; Khan et al., 2003).

In the context of this thesis this means setting the research questions; offering a theoretical framework which will work as the basis for the analysis; the analysis of the selected and defined material; and interpretation of said analysis. The research questions this thesis aims to answer are
as follows; do the curricula support and foster holistic and sustainable education that will provide students with skills required in the future (why or why not); and do the curricula provide an adaptable platform for CLIL teaching (why or why not). Three areas from each curriculum have been selected for inclusion in this analysis – the general introduction, English language outlines and requirements, and Biology outlines and requirements. The chosen sections of the curricula are looked at through from the point of view of CLIL applicability, and promotion and development of students' 21st century skills.

The following section will further discuss the reason for inclusion of the selected areas, and then offer an analysis on the set parameters of the two Nordic curricula.
6. Parameters for the curriculum analysis

Finnish and Swedish state funded documents claim that they aim to prepare students for the world of tomorrow, starting today. The skills increasingly required in the future have a large emphasis on higher order thinking, communication, and intercultural skills, and a CLIL approach to education would provide a pathway to those ends. Curricula can support these notions by emphasising the need for interaction and active communication in language lessons, and higher order thinking skills in subject lessons.

This empirical section will thus examine the active communication and interaction requirements for second language learning stated in the curricula; and the higher-order-thinking skills required in a 'content' subject. The subjects under scrutiny are English as a second language (i.e. not the mother tongue requirements), and the content subject being viewed is Biology. I will also look at the general goals and guidelines which were used when the curricula were formed. I will first present the overview on the Finnish curriculum, its relevant language and content areas; and then give the Swedish curriculum the same treatment. Similarities, differences and suggestions will be discussed after.

6.1 The curricula

This study will also concentrate on a certain amount of year-levels, instead of attempting to cover the entirety English and Biology covered in all nine years of compulsory education in Finland and Sweden. As the curricula are divided according to year-levels, as well as subjects, this parameter is reasonably easy to set. The Finnish curriculum is divided into years 1-2, 3-6, and 7-9; the Swedish one into 1-3, 4-6, and 7-9. As the first bracket shares some common ground with pre-primary education, and the some of the last bracket falls into secondary education, I will be looking at the middle years in more detail. Even though the Finnish curriculum covers one year-level more than the Swedish one in this particular bracket (3-6 vs 4-6), there will still be enough material for analysis in both, and grounds for comparisons.
6.1.1 Finnish national curriculum overview

The Finnish National curriculum is in the process of being renewed. The Ministry of Education has accepted the new curriculum at the end of 2014, and it will be implemented in teaching from 1st August 2016 in year levels 1-6. The science subjects bring a slight exception to this, as the beginning year 6 students will still follow the biology, geography, physics and chemistry curriculum set in 2004. Over the next few years the old curriculum will be fully faded out in favour of the new set. By 2019 the new curriculum should be in use in all subjects and all year levels 1-9. Untill the new curriculum is fully implemented, schools are to follow the guidelines set in the previous version. (OPH.fi, 2015i).

Though it is almost a year and a half away from being implemented, I will be focusing on the new curriculum. It is, after all, what one can expect from the future of Finnish education.

6.1.2 Swedish national curriculum overview

The Swedish National curriculum was revised in 2010, and its implementation in schools began during the school year 2011/12, and by 2012/13 all subjects will be within the new curriculum and knowledge requirement system. One major change was the new grading, which transformed from a three step G-VG-MVG scale to a slightly more detailed E-A grading system. The older system graded students into one of the three levels of achieved knowledge requirements – godkänd, väl godkänd, mycket väl godkänd, which translate to passed, passed with distinction, and passed with honours. The newer E-A system allows for more detailed grading where A – Exemplary, B – Excellent, C – Good, D – Adequate, E – Acceptable, F - Fail, not passed (Skolverket.se, 2011). The Swedish curriculum states the core content which is to be covered in each subject during certain school years, and a set of knowledge requirements detail what is expected of the students at different year levels. (Skolverket, 2011, p. 6)
6.2 Value words

In order to efficiently identify areas relevant to this study, alongside a content analysis I will also be looking at certain “value words” to help recognise potential areas that support the notion of using CLIL in teaching, and help prepare students for the future. This study is still largely a qualitative one, but this an aspect of a quantifiable approach will increase the validity and reliability through a degree of triangulation.

The value words will be defined and searched for with a keywords-in-context approach. This means “identifying keywords and utilizing the surrounding words to understand the underlying meaning of the keyword in a source or across sources” (Onwuegbuzie, 2012, p. 12). The analysis itself will be a qualitative comparative analysis. It involves systematically analysing similarities and differences across sources – i.e. the two national curricula. This approach is “used as a theory-building approach, allowing the reviewer to make connections among previously built categories, as well as to test and to develop the categories further” (Onwuegbuzie, 2012, p. 12). Thus possible connections between the curricular educational parameters, and CLIL and foresighted future requirements, should emerge.

The value words looked at are listed in the table below. Obviously these words will only have true meaning within their context, but there is value and merit in semantic choices as well. This brief overview will give some indication if high order thinking skills and concerns about skills for the future are ingrained within the curricula.

Table 1. Value words.

<table>
<thead>
<tr>
<th>Value words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercultural / cross cultural communication</td>
</tr>
<tr>
<td>Creativity</td>
</tr>
<tr>
<td>Team work</td>
</tr>
<tr>
<td>Critique</td>
</tr>
<tr>
<td>Design</td>
</tr>
<tr>
<td>Analyze</td>
</tr>
<tr>
<td>Hypothesise</td>
</tr>
<tr>
<td>Experiment</td>
</tr>
<tr>
<td>Critical thinking</td>
</tr>
</tbody>
</table>
From a CLIL and future foresighting perspective the value words chosen are based on the basic focal points of CLIL, HOTS, and future skills. As there is a lot of overlap in qualities valued in CLIL and in foresighted future education, these two categories have been combined. In addition it is worth noting, that these word lists are by no means exhaustive, but rather a small indication of the values held in CLIL education and future predictions.

The value words are searched with a simple 'find' command (CTRL+f / CMD+f ) from the electronic versions of the two national curricula in question. As I have access to the Finnish language version of the Finnish curriculum, I will use translated versions of the value words. These translations are available in the value word table for the Finnish curriculum.

The content analysis of the Biology and English subject areas will then look into the context of those key words, and applicability of the value words in relation to CLIL and the future.
7. Analysis of the Finnish curriculum

A brief mention about the searched value words – as Finnish is a language with a lot of suffixes, some of the words were searched with the word root, instead of attempting to include all possible conjugations into the table. For example creativity – 'luovuus' was searched with 'luov' – which gives the results for words such as luova (creative), luovasti (in a creative manner), luovuus (creativity).

Table 2. Value words in Finnish curriculum.

<table>
<thead>
<tr>
<th>Value words</th>
<th>Finnish translations</th>
<th>Word roots</th>
<th>Number of mentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercultural / cross cultural communication</td>
<td>Kulttuurienvälinen viestintä/toiminta</td>
<td>luov</td>
<td>19</td>
</tr>
<tr>
<td>Creativity</td>
<td>luovuus</td>
<td>luov</td>
<td>142</td>
</tr>
<tr>
<td>Team work</td>
<td>ryhmätyö</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>kriittinen ajattelu</td>
<td>kriitti</td>
<td>114</td>
</tr>
<tr>
<td>Design</td>
<td>suunnittelu</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Analyze</td>
<td>analysoida</td>
<td>analysoi</td>
<td>55</td>
</tr>
<tr>
<td>Hypothesise</td>
<td>hypoteesi</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Experiment</td>
<td>kokeil</td>
<td>kokeil</td>
<td>83</td>
</tr>
<tr>
<td>Environmentalism/sustainability</td>
<td>ympäristönsuojelu</td>
<td>ympäristönsuo</td>
<td>-</td>
</tr>
<tr>
<td>Technology</td>
<td>teknologia</td>
<td></td>
<td>177</td>
</tr>
<tr>
<td>Content and language integrated learning / CLIL</td>
<td>CLIL</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Future</td>
<td>tulevaisuus</td>
<td>tulevaisu</td>
<td>98</td>
</tr>
</tbody>
</table>

The general guidelines of the Finnish curriculum begin with explaining the educational philosophy and learning theory that the document is based on. It states, that as a student learns, they build their identity, concept of humanity, world view, and their own place in the world. The learning process also helps build a relationship with oneself, other people, society, nature, and other cultures. (OPS, 2014, p. 14)

A couple of pages later there is a discussion on the role of technology, and how people have the responsibility of using technology in a way that secure the future for humanity and nature. Compulsory education should consider the opportunities and challenges of developing technology, and use it in the best way possible to build a path towards a sustainable future. In addition to using technology today in a variety of ways, students should grow into global responsibility, and see the

From the very beginning of the Finnish curriculum, it seems that compulsory education does indeed aim to help students develop into multitalented and civilised citizens of the world. Students are hailed as an active part in building their knowledge, and that they should learn to set goals, solve problems independently and in teams. Learning is seen as an inseparable part of growing as a person, and vital for the development of society (OPS, 2014, p. 16).

From these points it already seems that the Finnish curriculum is very concerned with making sure that students are given the best opportunities for being ready to face the future world. The importance of sustainability is often mentioned, as is the importance of being able to communicate and work with others. Finding solutions individually and in teams is another aspect inherent in the basic learning theory guiding the entire curriculum document.

The curriculum states, that language, varied use of senses, and kinesthetic learning are vital for the development of thought. While learning new skills and knowledge, students should learn to reflect upon what they have learnt, experienced, and felt. Positive experiences, feeling of success, and creative action spur learning, and inspire to develop ones skills even further. Learning is something that happens in interaction with other students, teachers, adults, communities, and learning environments. It comes from working alone and in groups, thinking, planning, experimenting, and evaluating these processes. (OPS, 2014, p. 16).

The Finnish curriculum thus sees the student as an individual, with a variety of skills and strengths, which should be celebrated and supported. There is a very visible emphasis on being able to meaningfully work both individually, and as part of a larger group. From the point of view of future foresights, an educational attitude such as this should help prepare students for the ever-changing demographics they are likely to encounter – both in the physical and virtual worlds.

One of the main goals of education is to create a base for the students' general skills and knowledge development, and to help broaden their world view. This requires skills and knowledge from a wide variety of areas. It is stated that the subjects being taught need to be based on scientific knowledge (OPS, 2014, p. 18). Students should be supported in having an open and curious mind, with critical thinking skills. They should be encouraged to recognise their own uniqueness, their strengths and areas of development, and to appreciate themselves. As the job-market and
employment opportunities are continuously changing due to influences such as technological advancements and globalised economy, it is increasingly difficult to predict the requirements facing the future workforce. Thus students should gain positive attitudes and interest towards the varied working world, already during compulsory education. (OPS, 2014, p. 23).

The passages above further demonstrate the fact, that the changing world and future foresighting has been an important point of consideration during the development of the national curriculum. The importance of information and communication technology is also underlined. ICT is seen as a tool for reinforcing students' group work skills, as well as developing their individual strengths. Varied learning environments should include those facilitated by ICT and media culture. The curriculum states that even the students' own appliances could be used as support for learning, while p. 29).

The role of technology is likely to increase in all areas of life (barring a global electro-magnetic pulse), and a diverse use of ICT is already a fact of life - even for primary school students. Thus the support and encouragement of ICT use already ingrained in the national curriculum should help schools to (at the very least) keep up to speed with modern technology, and help build the skills required down the road as well.

The guidelines of the Finnish national curriculum also mention integration in teaching. The organisation and length of integration can vary depending on student needs and learning objectives, but one of the mentioned integration methods is cross-curricular education (OPS, 2014, p. 31). According to the curriculum this would provide opportunities for intellectual curiosity, novel experiences, creativity, and different types of interaction, and opportunities to use language. Integrating subjects and having cross-curricular approaches can reinforce the application of skills and knowledge, and supports the concept of holistic learning. It can show students that the world is not rigidly divided into subject areas and encourages constructive participation (OPS, 2014, p. 32).

It seems that from the fundamental guidelines the Finnish national curriculum is very concerned with being able to provide quality education which will help prepare students as well as possible for the world of tomorrow. There is a lot of emphasis on collaboration and teamwork, sustainability, the use of ICT, and the importance of development of individual students' skills and strengths. In addition cross-curricularity is seen as a valuable approach, giving content and language integrated learning a reasonable window of opportunity.
The subject areas of the curriculum have three categories for grouping required knowledge and skills. There are the goals for each individual subject; then the content related to those goals; and then the more extensive knowledge requirements related to the goals and content. There are seven extensive requirements that the Finnish national curriculum aims to include across all subjects. These are thinking and learning to learn; cultural skills, interaction and expression; individual responsibility and life-skills; media literacy; skills in information and communication technology; employment-skills and entrepreneurship; and active participation, influencing, and building a sustainable future. (OPS, 2014, p. 173)

These extensive requirements have strong links with foresighted future skills discussed earlier in this thesis. Being aware of how one learns and being able to self-direct ones interests and studies will help in developing alongside the quickly changing world. Having the ability to meaningfully interact in a multicultural world with the help of technology will ensure that one remains an active part of the larger global community. Being ready to take individual responsibility, learning life-skills and entrepreneurship will help students gain autonomy and mastery in areas of their interest, and provide more opportunities for future employment than what might not even be currently envisioned. From this overview of the introduction to the basic premises of the Finnish national curriculum, it seems that the education system is well aware of the demands of the world today, and that the future demands a different set of skills, knowledge, and attitudes from people than before. And the curriculum aims to aid in guiding schools, teachers, and students towards that world.

7.1 Finnish curriculum – English

The section on the English language subject begins with stating that language is the prerequisite of learning and thinking. It is present in all activities within the school, and each teacher is also a language teacher. The curriculum states that learning languages helps the development of thinking skills, and aids in developing and appreciating a multilingual and multicultural identity. Whilst developing vocabulary and grammar skills, students will also develop their interaction and research skills. The curriculum states that learning a language has room for joy, creativity, and playfulness. (OPS, 2014, p. 253-4).

There seems to be a recognised interest in higher order thinking skills, and the importance of being a functioning global citizen. The curriculum reminds educators that language learning is to be more
than vocabulary and grammar — it is a building block of identities, and that language (like the people who use it) has a joyful and humorous side to it as well. Just because language learning is important, does not mean that it must be solely serious.

Teaching foreign languages is seen as an important part of raising students' awareness into the multifaceted linguistic and cultural world within the school, and around the world. Students are encouraged to interact and communicate in an authentic environment, and appreciate different languages, cultures, and people representing them. (OPS, 2014, p. 253-4)

Information and communication technology is seen as one way of ensuring an authentic linguistic environment, and it provides students with opportunities for active participation in the international world. Teaching foreign languages should enforce students confidence in learning languages, and to use them without fear of failure. Students should be provided with the chance for learning at an individual pace, and given support when necessary, and also those who are more advanced should have the opportunities to expand their skillset. Language learning helps develop media literacy, and it uses a variety of sources for study materials. Students' interests are to be taken into consideration when choosing relevant texts. Teaching languages should build bridges between languages, and provide students with communication skills they will be able to use in their free time as well. Students are encouraged to conduct research in the target language. (OPS, 2014, p. 254)

The importance of authentic language materials is an important aspect of CLIL. In order to truly engage in the language, learners need to be able to experience how the language is actually used. The use of media and ICT are mentioned as important learning tools, and these further enforce the concept of students being global citizens. Students are encouraged to actively participate and pursue their interests in the target language, making the learning experience more individualised.

The main content related to English language learning in year-levels 3-6 are growing into cultural diversity and linguistic awareness; language learning skills; and developing language skills, ability to interact, interpret and create texts. (OPS, 2014, p. 253-4)

The first content area suggests becoming familiar with cultural and linguistic diversity, and especially the wide spread of the English language, with the help of the internet. Students are encouraged to consider their own linguistic and cultural backgrounds, and to find the significance of language to an individual and the community. Students should practice polite and appreciative
interaction, listen to different ways of expression, look at different ways of writing, and observe how words transfer from one language to another. Students should consider how they can act in case they only have limited skills in a given language. (OPS, 2014, p. 253-4)

The second content area, language learning skills, states that students should learn to plan and work together, give and receive feedback, and take responsibility. Students should learn study skills, and actively use new vocabulary and grammar in their own expression, learn to take notes, and how to deduct the meaning of a word based on context clues. Students should also begin to self-evaluate their language skills. (OPS, 2014, p. 253-4)

From these first two content areas students should gain the skills to be able to work with a variety of people in diverse settings – skills vital not only today, but increasingly so in the future. Being aware of ones own skills and areas for development will help students gain independence and autonomy over their learning, and help them self-direct their efforts into the areas that require more attention.

The final content area related to English language requirements within years 3-6 is about learning to listen, speak, read, and write in English in a variety of topics. These topics include me, my family, my school, friends, hobbies and interests, and life and living in an English speaking environment. Additional topics are to be chosen together with the students, based on their immediate environment, interests, current affairs, and the students in relation to the world. Language should be used for a variety of purposes, ranging from greetings to expressing opinions. Vocabulary and grammar can be practiced with short stories, drama exercises, interviews, and lyrics. Students should be provided with chances to use the English language in challenging settings as well. Finding information in English online or in books should also be practiced, and students should have a lot of practice in pronunciation, intonation and other areas of spoken interaction. (OPS, 2014, p. 253-4)

Problem solving skills, and interaction and communication skills across a variety of media are highly valued in foresighted future requirements. The Finnish national curriculum aims to set English teaching in a way that will foster these developments, and guide students towards becoming functioning members of the societies of the future.

The goals for English language education within year-levels 3-6 are that the use of language would be context appropriate, natural, authentic, and meaningful for the students. Pair- and small group
work and learning together in various learning environments are emphasised. In order to reach the multilingual and linguistic education goals teachers are also expected to work together. Songs, games, and drama give students the opportunity to experiment with their growing language skills. Teaching should include learning materials from a variety of media. Students are encouraged to active participation, and independent responsibility in their own learning. They should also be familiar with the surrounding multicultural and multilingual environment, and given opportunities to practice international correspondence. English is to be used whenever it is possible. (OPS, 2014, p. 253-4)

From these grounds it seems that English language education is organised in a way that promotes the development of higher order thinking skills, provides opportunities for a wide range of expression, interaction and communication, and prepares students to become active participants in the global community. Looking at this framework from a CLIL or future foresighted perspective the educational goals and requirements seem filled with possibilities.

7.2 Finnish curriculum – Biology

Biology is no longer a separate subject in its own right, but it has been integrated into a part of Environmental studies. This grouping includes aspects of biology, geography, physics, chemistry, and health sciences, which are approached from a sustainable development standpoint. Environmental studies combine both natural and human sciences. Students are seen as a part of the environment they live in. The basic principles are respecting nature and human rights. (OPS, 2014, p. 278).

This collection of subjects is obviously cross-curricular in the traditional sense of educational subject division. As the world provides a holistic experience of itself, it makes sense that the subject dedicated to discovering the functions of the world is treated as holistically as possible. This approach is in accordance with views of future skills, as people need to be able to grasp larger concepts, and understand the relationships between phenomena.

As Environmental studies are based in a multitude of sciences, students are expected to become well versed in gathering, handling, presenting, judging and evaluating information in different situations. Scientific information is used as the basis of teaching, and developing critical thinking
skills is endorsed. The sustainable development of ecological, cultural, social, and economical worlds are subjects of study. One of the main goals is to guide students to understand the effects people's actions have on the environment today, and in the future. (OPS, 2014, p. 278)

Sustainability, and people's influence on the environment are things that clearly carry effects into the future. The fact that these values are so integral to this subject tells that the curriculum is concerned with helping students develop into citizens concerned with the global future.

In year-levels 3-6 teaching can be organised into units, where the surrounding world, and students as a part of the community are being observed. Students are guided to recognise their own growth and development, problem solving and research tasks are used to increase interest in various environmental phenomena. Towards the end of this grouping (i.e. year 6) students will also discuss what makes the different scientific disciplines unique from one another. (OPS, 2014, p. 278)

There are six different content areas that are covered within year-levels 3-6 in Environmental studies. These contents are chosen so that they support reaching educational goals, and take into account opportunities provided by the local environment. These content areas are to be adapted to suit the different year-levels accordingly. From these areas only the ones related to biology have been selected for closer discussion for the purposes of this thesis.

The first content area is 'I as a person'. This encompasses aspects of human biology – from anatomical details to different phases of development and growth. The individual changes and developmental expectations are discussed. Sexual development and reproduction is discussed in an age-appropriate manner. This content area also guides students to recognise the mental and physical messages they receive from their body, and to be aware of their own thoughts, needs, attitudes, and values. Healthy lifestyles are a part of this content area. In addition to the physical side of human biology, this content area also includes recognising and expressing emotions. (OPS, 2014, p. 281-283)

The second and third content areas relate more to geography and social- and health sciences. As this thesis aims to look at the content and aims of biology, these two contents are left without further discussion. But to be fair to the aim of this study, it is worth mentioning that as these contents are all included within one subject, it does provide students with the opportunity of building a more holistic understanding and concept of the world.
The fourth content area is exploring the environment, which relates to biology. The targets of exploration are dictated by what is specifically available within the local environment. The exploration should guide attention to differences between living and non-living nature, man made and natural environments, social and environmental phenomena, and different technological advancements that aid in exploring and developing these areas. Students should practice conducting research projects. Exploring and observing weather, and ground formations, as well as getting acquainted with the basic principles of forces are a part of this content area. Within these explorations students should also learn to recognise different lifeforms and habitats, and observe how plants grow. Students should also know what their rights and responsibilities are in their local environment. (OPS, 2014, p. 281-283)

The fifth content area covers natural cycles, principles behind actions in nature, and structures of the environment. Students will use a variety of materials to observe states of matter. Combustion, photosynthesis, and the water cycle form the basis of understanding what changes in states of matter are, and the indestructibility of energy and matter. Light and sound are explored, as well as the solar system, seasons, night and day, and how the planet is formed. Students will look at the interactions between different life-forms and their habitats, getting to know food chains, animal and plant reproduction, food production, and forestry. (OPS, 2014, p. 281-283)

The fourth and fifth content areas combine aspects of biology, physics and chemistry within them. They guide students towards becoming active participants of the local and global communities, with an understanding of their own impact on the environment. These content areas also emphasise research skills, and ability to conduct and evaluate experiments. When developed further, such aspects are expected of future work force – being able to see the causality in their actions, and to evaluate the process and results of research projects.

The final content area for Environmental studies in year-levels 3-6 is called building a sustainable future. This content covers protecting the diversity of nature, ways of slowing down climate change, sustainable use of natural resources, promoting healthy living, embracing ones own cultural background, living in a multicultural world, and the global wellbeing of humans today and in the future. This content area will have students considering the impacts of their actions on themselves, others, animals, nature, and society. They should practice environmentally conscious actions and
taking care of others within their own environment. Students should complete an active participation project, where they will practice making a difference either on a local or global scale.

This final content area seems to be directly concerned with making sure that students are already on the path to becoming active participants in the global community, and know what they can do to make a difference and influence the sustainable development and use of natural resources.

The goals related to learning environment and study skills in Environmental studies are based on students' own experiences related to people, the environment, actions, phenomena, and events related to everyday life. When choosing the ways to work with these contents and goals, teachers should consider active participation, first hand experiences, drama, stories, and the multidisciplinary scientific background. As much as possible, the different events and phenomena should be researched in their natural environments. Aside from classrooms and the school building, the surrounding environment and community should be part of the learning environments. In addition to this cooperation with museums, organisations and science-centers are encouraged. It is vital that students have the chance to participate and interact meaningfully, and to conduct their own research. (OPS, 2014, p. 281-283)

The Environmental studies subject has been constructed in a very future conscious manner. Guiding principles of the subject aim to help students develop into environmentally conscious members of society, who can see the influences people have on nature, and who can take responsibility for their actions. Environmental studies aim to give students a holistic concept of the world around them, and to see themselves as important components of that world. The skills practiced and developed within this subject are ones that will likely be needed beyond school years.
8. Analysis of the Swedish curriculum

The following table has the value words found in the general guidelines, core content subject syllabuses, and knowledge requirements for English and Biology.

Table 3. Value words in Swedish curriculum

<table>
<thead>
<tr>
<th>Value words</th>
<th>Number of mentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercultural / cross cultural communication</td>
<td>1</td>
</tr>
<tr>
<td>Creativity</td>
<td>10</td>
</tr>
<tr>
<td>Team work</td>
<td>-</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>18</td>
</tr>
<tr>
<td>Design</td>
<td>47</td>
</tr>
<tr>
<td>Analyze</td>
<td>16</td>
</tr>
<tr>
<td>Hypothesise</td>
<td>-</td>
</tr>
<tr>
<td>Experiment</td>
<td>6</td>
</tr>
<tr>
<td>Environmental</td>
<td>9</td>
</tr>
<tr>
<td>Technology</td>
<td>13</td>
</tr>
<tr>
<td>Content and language integrated learning / CLIL</td>
<td>-</td>
</tr>
<tr>
<td>Future</td>
<td>13</td>
</tr>
</tbody>
</table>

The Swedish national curriculum (SNC) begins with the reasons for teaching the chosen subjects in different school forms, followed by the aims and long-term goals of teaching in each subject. The core content goes through what should be covered, and it designed to allow teachers the opportunity to go into greater depth or supplement the topic, depending on students' skills. After the core content is discussed for each subject, the curriculum presents the national knowledge requirements, which define acceptable knowledge for each grade at different year-levels. (SNC, 2011, p. 6)

The Swedish national curriculum sees the role of school as being responsible for ensuring students receive the knowledge needed by a functioning member of society. These basic skills will also be the foundation for further education. Schools should provide a learning environment which supports a well rounded development of each individual, and aspects such as exploration, curiosity, and desire to learn are mentioned as the foundations of school activities. (SNC, 2011, p. 15)

The curriculum sees students individual skills, and differentiating the learning materials to suit these abilities, as a core aspect of education. Part of the foresighted requirements for the future, is having the ability to recognise and develop ones own strengths. Having a curriculum which encourages
extended challenges for those who need it, and extra support available as well should surely help pave the way for the doers, makers, movers and shakers of tomorrow. It is seen as an important task to prepare students to become capable citizens of the larger global community.

There are a handful of requirements the curriculum states that schools need to ensure are conveyed to the students by the time they leave school at the end of the 9th grade. Students need to have a rich and diverse grasp of the Swedish language in its spoken and written forms. They should also be able to communicate in English, using spoken and written language, and they need to have been given opportunities for using the foreign language in a meaningful way. Students should be able to solve problems, and find creative ways of implementing their plans into actions. Students should have the skills to work, research, and learn both independently and as a part of a team, and have confidence in their own skills and abilities. (SNC, 2011, p. 15-16)

By the time the students have completed their compulsory education, they should be able to demonstrate critical thinking, and form opinions based on available knowledge and ethical views. They need to have the skills to communicate and interact with people whether they have similar or different socio-economic, historical, cultural, religious, or linguistic backgrounds. Students are to have access and opportunities to various forms of artistic expression, and they also need to be able to use modern technology in communication, creative pursuits, learning, and searching for information. (SNC, 2011, p. 15-16).

The passages above show that the curriculum values adaptable skills, and aims to produce students who are able to make their mark in a multicultural and multilingual world. It is important to ensure a holistic education with access to various arts as well. From these standpoints it seems that the Swedish national curriculum is well suited for a CLIL approach, and there is a consideration of what skills students will need beyond their first nine years of education.

As the schools are responsible in ensuring the students reach the set goals, teachers are also specifically mentioned with their own general requirements. The curriculum states that teachers are to supervise structured teaching, and take the students into consideration as a class, and as individuals. Teachers are tasked with balancing and integrating knowledge in its many forms into their teaching. (SNC, 2011, p. 15).
In their teaching, the curriculum expects that teachers take into consideration the individual needs, experiences, and circumstances of each individual student. Students' desire to learn and self-confidence should be reinforced by the teacher, and the teachers should ensure that each student is given the opportunity to develop according to their own capacity and ability to progress and learn. (SNC, 2011, p. 15-16)

Teachers are also reminded to make sure they themselves keep updating their professional skills, and should receive support in language and communicative development. Teachers should progress towards increasingly independent tasks and personal responsibilities, and have opportunities for cross-curricular work. (SNC, 2011, p.15-16).

The fact that teachers are encouraged to keep updating their professional skills shows an appreciation for life-long learning. In addition cross-curricular approaches are mentioned as worth pursuing, further indicating that the curriculum is adaptable for content and language integrated learning purposes.

8.1 Swedish curriculum – English

The Swedish national curriculum states that language is used as the main tool for all thinking, learning, and communication. Having a command of multiple languages can help give a person new perspectives of the world, provides opportunities for interaction, and gives a better understanding of different lifestyles. The English language encompasses all areas of life, including politics, education and economics, and therefore knowledge of the language will provide an individual with more chances to take part in more social and cultural contexts, as well as provides opportunities for international studies and work. (SNC, 2011, p. 32)

The curriculum states that students should have the opportunities to develop their understanding of spoken and written English, and be able to express their own thoughts and interact with others in English. Students should also have the ability to adapt their use of the language depending on the purpose of its use. Having good communication skills is linked to confidence, and the ability to solve problems in interaction even with limited language skills. Through studying English students should also be able to discuss and reflect living conditions, and social and cultural aspects of life in
There is a clear link with learning the English language, and having more opportunities to understand and be a part of the global community. The Swedish national curriculum is concerned with making sure that Swedish students are aware of and understand the global social, political and economical affairs which affect their lives. Understanding and being able to use the English language is vital in this effort.

The core content of English language studies in year-levels 4-6 in the Swedish national curriculum includes a variety of communication skills. Students should be able to discuss familiar topics such as daily situations, people, and places, but also have some skills in expressing views, emotions, and experiences. They should be able to convey these thoughts in a variety of different types of interactions (conversations, interviews, etc.), and have access to different types of spoken English from a variety of media sources. Students should develop problem solving skills in deducting the meaning of unfamiliar words and phrases from context clues, and have the chance to contribute to conversations. (SNC, 2011, p. 33-35)

These content areas emphasise the need to understand, and to be understood as the main concerns of English language teaching in Swedish schools. Taking part in discussions, and being able to confirm understanding by asking questions come across as important values. To be able to reach a passing grade (E) at the end of year 6, students need to understand the most essential content of clearly spoken simple English, and similarly be able to create their own content at the very least in simple English and on familiar topics. There is a lot of emphasis on understanding and producing at least the simple basics of the language. (SNC, 2011, p. 35)

8.2 Swedish curriculum – Biology

The introduction to the Biology curriculum begins with explaining how sciences originate from curiosity, and by the innate wish to know more about ourselves and the world we live in. The societal implications of studying biology are noteworthy, as health, sustainable resource use, and the environment all fall within the scope of this subject. Studying biology will not only provide
students with knowledge about the environment, but give them the tools to better understand and influence their own well being. (SNC, 2011, p. 105)

The teaching of biology should aim to feed students' curiosity about themselves and nature, as well as providing knowledge about biological facts and contexts. Students should be able to question the how's and why's of human development and nature based on own experiences, and even global current affairs. This scientific discipline offers the opportunity to conduct research and experiments, and to access information from a wide range of sources. This is to encourage students to develop their critical thinking skills, and how to use scientific methods when approaching a problem to be solved. Through their studies in biology, students should be able to conduct systematic studies, use concepts of biology, and accurately apply its theories and models when explaining how the human body or nature works. (SNC, 2011, p. 105-106).

The Swedish national curriculum presents Biology as a subject where students will learn not only about their own body, but also the surrounding world. They should learn how they can keep both as healthy as possible, and how to find and access more information. Critical thinking and scientific rigor is expected in biology studies. Being able to use a variety of sources for finding and applying information is a skill certainly beneficial in the future as well. Development of higher order thinking skills are also in demand.

The core content of biology in year-levels 4-6 include areas such as understanding people's impact on nature and sustainable development; the diversity of life; photosynthesis, ecological relationships; nature as a resource locally and globally; living and non-living nature; people's rights and responsibilities in nature; body and health (including mental health and sexuality); important discoveries and the development of science; development of life. Skills students should have include conducting small field studies and experiments, from planning to execution to evaluation. These studies should be documented with graphic representations, presentations, and written reports. (SNC, 2011, p. 105-108)

This wide range of knowledge and skills are not strictly related solely to biology, but rather the world and the human experience as a whole. Should a student be able to develop an understanding
of these content areas, and be able to utilise the emphasised skills, they would have a thorough grasp of higher order thinking skills, and adaptable abilities relevant in the future as well.

By the time students finish year 6, they should at the very least be able to take part in discussions concerning the abovementioned content areas of biology, and find relevant information from texts to use in their own work. Students should also show that they can follow instructions in conducting small experiments or field studies, and contribute to the planning, execution and evaluation of them. They should be able to make some suggestions on what variables could be changed in the experiments, or how the process could be improved, and they can show some documentation of their studies. (SNC, 2011, p. 110)

Even at the lowest level and minimum requirements, students should show that they can work with others in a meaningful manner, and use their skills and knowledge together with others. Though group- or pairwork is not directly mentioned, the curriculum holds strong value in contributing to discussions, and putting forward questions and ideas. If students will not find a budding scientist within themselves, they should at least be provided the tools with which to develop the skills for being a part of a team working together for a common goal – for example conducting an experiment.
9. Results

This section will provide an overview of the value word search, and curriculum analyses. The value word results are presented first.

9.1 Comparison of value words

Table 4. Comparison of value word amounts

<table>
<thead>
<tr>
<th>Value words</th>
<th>Finnish curriculum</th>
<th>Swedish curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercultural communication</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Creativity</td>
<td>142</td>
<td>10</td>
</tr>
<tr>
<td>Team work</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>114</td>
<td>18</td>
</tr>
<tr>
<td>Design</td>
<td>-</td>
<td>47</td>
</tr>
<tr>
<td>Analyze</td>
<td>55</td>
<td>16</td>
</tr>
<tr>
<td>Hypothesise</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Experiment</td>
<td>83</td>
<td>6</td>
</tr>
<tr>
<td>Environmentalism</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Technology</td>
<td>177</td>
<td>13</td>
</tr>
<tr>
<td>Content and language</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>integrated learning / CLIL</td>
<td>98</td>
<td>13</td>
</tr>
<tr>
<td>Future</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some value words posed challenges in the search process. As Finnish is an agglutinative language, there are a number of suffixes which change the meaning of the word with as little as one letter. The word for design – suunnitella- proved particularly difficult to search for. The same word also means 'plan', and it is often mentioned in context of planning individual learning paths, giving feedback, and the very name of the document itself – opetussuunnitelma. Even with various word root trials (suunn, suunnit, suunnitt, etc) the search results ranged from 14 to 868 in a variety of contexts. Therefore this particular term was abandoned.

'Environmentalism' was another term which gave no direct results in the Finnish search. The translation used in the search – 'ympäristönsuojelu' (direct translation 'environmental protection') and it's root variable 'ympäristönsuo' produced no results. This is not to say that the Finnish curriculum does not value the environment, but rather that it is conveyed in using different versions
of the word for 'environment – ympäristö, ympäristöteot, luonto, and so on. The Environmental studies subject heavily emphasises environmentalist and sustainable values.

A similar conclusion should be drawn from the Swedish curriculum and the lack of mentions of 'team work'. This does not mean that the Swedish national curriculum only promotes individual effort and achievement, but rather that this particular term has not been used. Semantic choices such as working together, working with others, working in groups, et cetera, convey the same meaning.

The Swedish curriculum did not have any mentions of 'hypothesise', but as it is a very specific term, it is not rewarded the same 'benefit of doubt' as environmentalism and team work discussed above. It is a term closely linked with the scientific process, and though the Finnish curriculum did not mention it often, 'hypothesise' still appeared thrice. Hypothesising is a higher order thinking skill, and it is relevant to the study of all sciences. It requires the understanding of what variables one is working with, and what are reasonable expectations for the outcome. It seems reasonable to assume that the students and work-force of the future will also need these skills, which is why it would be important to have it rooted within the national curriculum already.

Neither 'CLIL' nor 'content and language integrated learning' provided any results in either the Finnish or Swedish curricula.

There is a marked difference in the length of the two curricula. The English translation of the national Swedish curriculum is 264 pages, and the equivalent Finnish counterpart has 585 pages. By virtue of this fact alone, it is likely that the Finnish curriculum will have numerically higher amounts of included value words. Therefore I have included another comparison (table 5), which looks at terms which were found in both curricula, and then calculated the percentage chance of that term being on any given page of the curricula. The percentages give fairer grounds for comparison, as it eliminates the sheer volume of pages as being the defining variable.

Table 5. Chance of a value word being on a page in each curricula (percentage)

<table>
<thead>
<tr>
<th>Value words</th>
<th>Finnish curriculum</th>
<th>Swedish curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercultural communication</td>
<td>19 / 585 = 0.032%</td>
<td>1 / 246 = 0.004%</td>
</tr>
<tr>
<td>Creativity</td>
<td>142 / 585 = 0.243%</td>
<td>10 / 246 = 0.04%</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>114 / 585 = 0.194%</td>
<td>18 / 246 = 0.073%</td>
</tr>
<tr>
<td>Analyze</td>
<td>55 / 585 = 0.094%</td>
<td>16 / 246 = 0.065%</td>
</tr>
<tr>
<td>Experiment</td>
<td>83 / 585 = 0.142%</td>
<td>6 / 246 = 0.024%</td>
</tr>
</tbody>
</table>
The Finnish national curriculum includes more mentions of CLIL and future skills and requirements related value words, than the Swedish national curriculum. Whilst this is not a direct indication of which curriculum is more CLIL oriented, or which is more future-minded, it does show a certain emphasis on the semantic importance.

9.2 Results of analysis

Both the Finnish and Swedish curricula have clearly grounded views in that school needs to prepare students for life beyond the educational institution. The curricula often emphasise the importance of developing skills which are necessary in all areas of life. Whilst there are content specific knowledge requirements students should achieve in subjects such as English and Biology, the majority of the goals and requirements relate to achieving a more holistic understanding of oneself and the world.

The Finnish curriculum is significantly longer than the Swedish one, and the Finnish curriculum was published after official government research into the foresighted requirements of education and the work force of the future. Though the Swedish curriculum is also from this same decade, the Finnish one has more clearly stated concerns about the future, and the role these students will play in it.

The Finnish education system seems to be in the middle of a much needed update. The previous curriculum is from 2004, and whilst just over ten years does not seem so far away, the world has moved forward in leaps and bounds – especially in terms of technology. Whilst the internet was already a familiar utility, smart phones were not around in the abundance of today, nor had social media grown to the enormous size it is today (Minor, 2014). The everyday reality of accessing information and having technological advancements increasingly available has changed what classroom work looks like. The new curriculum aims to take these changes into account as best as possible, and also creates space for future inventions to be incorporated. The Finnish curriculum sets guides for involving students in their learning process, and encourages taking student interests into account, and using technology they are already familiar with. These students would receive a
holistic education, based on constructivist and socio-cultural learning theories. The individual is in charge of building their own framework of knowledge with the help of scaffolding and support, and with being exposed to and familiarised with the local and global communities.

The Swedish curriculum is not any less supportive of individual student development, but it seems that there is a larger concern on making sure that all students are able to at least be understood and have a chance to participate. From a comparison of these two curricula, it seems that the envisioned student in the Finnish system is a more active participant, whereas the Swedish system sees a somewhat more passive achiever. Perhaps it is due to the top-down control of inspectorates, national tests, and highly specified qualification areas, that the Swedish system appears to have a heavier emphasis on helping students develop skills to achieve minimum required knowledge, and pass the tests. The Finnish curriculum looks to have more emphasis on critical thinking, learning skills, and being able to evaluate ones own strengths and weaknesses.
10. Discussion and conclusions

The two research questions this thesis aimed to answer are

1. Do the curricula support and foster holistic and sustainable education that will provide students with skills required in the future? Why/Why not.
2. Do the curricula provide an adaptable platform for CLIL teaching? Why/Why not.

The short answer is yes, they do – on both accounts. Both the Finnish and Swedish basic education curricula emphasise the awareness of life around and after compulsory education, and the need for students to become functioning members of society. This includes the promotion and development of 21st century skills in education, and these are taken into account in the guidelines for the various subjects to be taught. Cross-curricular approaches are encouraged in both the Finnish and Swedish curricula, and both documents also place special value on the importance of the English language. As such there are no limits to applying a content and language integrated learning approach into organising basic education in either Finland or Sweden.

From a future foresighting perspective, these two Nordic curricula place a lot of value on the quality of their students' education, and aim to provide equal opportunities to all students regardless of socio-economic or geographical background. Both national curricula emphasise a variety of skills and abilities, which are to be supported and taught from pre-primary all the way to the end of high school. STEM-subjects are only one area of required skills and knowledge, as arts in various forms and physical exercise are also allotted weekly time, and guidelines for development. This holistic development of individual skills and abilities is a key aspect in helping citizens of the future grow. Life-long learning, curiosity, and adaptability are values which are embedded in both curricula, and these are important characteristics of the work-force of the future.

While CLIL is not directly endorsed in either curricula, both still provide a solid base for its implementation. Cross-curricular approaches are lauded, languages and communication skills are emphasised. Seeing as the European Commission has already chosen CLIL as an officially endorsed education method (European CLIL Resource Centre for Web 2.0. Education, 2012), it seems likely that there will be an increased demand for it in the future. The curricula are written in a way which provides opportunity for the implementation of a CLIL approach, even if the method is not directly mentioned.
The fact that the Finnish curriculum has begun to move from artificially separated subjects into more inherently cross-cultural approaches (as in the case of Environmental studies combining Biology, Chemistry, Physics, Geography, and Health studies), tells that the educational approach aims to be more holistic. As the world itself is rarely divided with clear-cut lines, but rather holds an abundance of cross-influencing networks, it is high time that schools begin to reflect this reality as well.

Both curricula value language studies, and see the link between language and identity as one the school system should support. The role of English especially as a global lingua franca is undeniable, and thus it is given a special status in relation to other foreign language teaching in both countries. The need to achieve functional fluency in English is realised in both curricula, and English studies aim to give the students a lot of opportunities for meaningful interactions in this target language.

The Finnish national curriculum is approximately twice the length of the Swedish one, but on the other hand the Finnish educational system is less controlled from above than the Swedish one. Sweden has school inspectorates which make sure that schools and teachers operate as expected. Teachers in Sweden are required a specific subject and year-level qualification in order to be certified teachers. The Finnish system seems to trust individual schools and teachers with more independence – the teachers have Master's degrees in educational sciences, and the national curriculum sets the guidelines to be followed. There seems to be an implied mutual trust and respect between educators and those upholding the system.

The length of the curricula likely had an impact on the amounts of value words found, but even if one reduces the value words per curricula into percentages (see table 5), the Finnish curriculum has more mentions of CLIL and future-skills relevant terminology. Even with keeping in mind that the words need to be considered in the contexts they appear in, the Finnish curriculum comes across as more conscientious of future skills and requirements related vocabulary.

The Finnish national curriculum is also more recent than the Swedish counterpart, though both documents are from the same decade. The Finnish curriculum was published after the Finnish National Board of Education published their research results of future workforce requirements (OPH, 2011), so one can only assume that these findings were taken into account in the curricular planning. The Swedish government has conducted similar research (Framtidskommisionen, 2013),
but this was published after the current curriculum was already in use. This explains why the Finnish national curriculum seems to be more future skills and requirements oriented than its Swedish equivalent.

The value word search for 'CLIL' gave no results in either the Finnish nor Swedish document, merely meaning that at this stage it is not an officially endorsed approach in either national curricula. This does not mean that CLIL would not be a suitable approach for teaching in Finland and Sweden. CLIL is inherently cross-curricular, and if applied in a well planned manner, it can lead to saved time, and provide holistic, socioculturally ecological and cognitively challenging education. Still, the existence of the CLIL opportunity is not enough, but it needs people to make it happen.

But in the end, the fact remains that curricula can only do so much. They set the framework in which to operate, but it is down to the schools and teachers to transform the (at worst) stale and stagnant institution into the inspiring powerhouses of tomorrow.

This study looks at the curricula and its futuristic or CLIL minded uses from a strictly theoretical point of view. Following studies in this area could approach the topic from a more practical angle, and attempt to find out how these curricula can be actualised in relation to CLIL or future skills requirements. For example case studies of CLIL education following either the Finnish or Swedish national curriculum, or examining lessons planned on the basis of quality CLIL requirements and curricular parameters, would give a more concrete view of how the Finnish and Swedish national curricula lend themselves to this particular educational approach. For a view of future effects one would need more long-term studies, where former students can assess whether the education they received prepared them with the skills needed, or a comparison of predicted lists of future skills requirements being set against what is actually relevant in the work-force in 2020.

To maximise validity and reliability I have aimed to make sure that the findings are verifiable repeatable. The two documents under examination – the Finnish and Swedish national curricula – are publicly available online to anyone who wishes to download them. I have explained the methods for searching value words, and presented the results accordingly. The systematic literature review has aimed to support a thorough discussion into the significance of CLIL and future foresighting in relation to national curricula and education.
To ensure that the thesis remains true to its goals, there has been continuous feedback and monitoring from the thesis supervisor. During monthly meetings the progress and direction has been evaluated. In addition the research questions have been repeated throughout the thesis to ensure that the direction of the study does not falter half way through.

The value word search and analysis provides quantitative triangulation to the mainly qualitative nature of this thesis. The method of collecting the numerical data has been provided in the results section, as well as an explanation on how these numbers were processed to reach a viable comparison.
References


YLE (2014, September 5). Yet another study: Finland has world’s most cost-efficient education system. YLE News. Retrieved from http://yle.fi/uutiset/yet_another_study_finland_has_worlds_most_cost-efficient_education_system/7454319 15/10/2014