Irīna Griņevska

Indra Odiņa

Riga Secondary School No.34 and University of Latvia

Designing the Sequence of Content Acquisition for Science and Language Integrated Learning Programme for Grade 1 Students

ABSTRACT

The article deals with the action research of designing the sequence of content acquisition of English and science integrated learning programme to improve learning and engagement of Grade 1 students during their lessons of science in English. The research sample are Grade 1 students learning science in English, the teachers teaching science in English, teachers teaching science according the curriculum, and the English language teachers at Riga Secondary School No.34. Research took place in spring, 2014, and spring, 2015, and lasted for one year.

The process of creating the sequence of content acquisition of English and science integrated learning programme involved the following cycles: the exploration of theoretical background, relevant documents and teachers' opinions on teaching content and language; the analysis of the course books for teaching science in Latvia and the authentic materials from UK for Grade1 students; designing Programme 1 for integrated English and science learning, piloting the content and materials of Programme 1, defining and introducing the improvements in Programme 2 and evaluation of the Programme 2. The data were collected by questionnaires, interviews, classroom observation and field notes.

Action research provided quantitative and qualitative data for adjusting content, language, instructions and activities to improve student learning. The research helped to see what improvements needed to be introduced for the enhancement of the programme for teaching science and English for Grade 1 students, as well as to eliminate the drawbacks occurred in teaching process. Designing the sequence of content acquisition of integrated language and content programme combines the exploring the students' interests and the aims of the subject curricula.

Key words: *science, language, content, integrated learning, CLIL, cross curricula approach, programme design.*

Introduction

Languages play a key role in curricula across Europe. Attention needs to be given to the development of frameworks and methods which will improve the quality of language education. The European Commission has been dealing with the aspect of bilingualism and language education since the 1990s, and has a clear vision of a multilingual Europe in which people can function in two or three

languages. In the increasingly globalised modern world, Grade 1 is an important time for children to learn a new language. Aside from enhancing their educational and career prospects, learning languages is fun, opening up new experiences and a chance to understand different cultures and make new friends. Many Europeans consider mastering other foreign languages useful for the future of their children.

The basis of content and language integrated learning (CLIL) is that the content of subjects is taught and learnt in a language which is not the mother tongue of the learners. Learning is improved through increased motivation and the study of natural language seen in context. When learners are interested in a topic they are motivated to acquire language to communicate.

Learning science should develop and sustain students' curiosity about the world, enjoyment of scientific activity and understanding of how natural phenomena can be explained. Science education should enhance learners' questioning, wonder, seeking to find the meaning and understanding of the world around. The main purpose of science education, according to Harlen (2010: 7) is "to enable every individual to take an informed part in decisions, and to take appropriate actions that affect their own wellbeing and the wellbeing of society and the environment".

Dalton-Puffer (2007) concludes that CLIL students can reach significantly higher levels in a foreign language than by conventional foreign language classes. A large-scale study of CLIL in Germany (Ergebnisse der DESI-Studie) in 2008 found out that the CLIL learners had a higher foreign language competence when they were 15 years old than their non-CLIL control groups. Lasagabaster (2008) highlights that CLIL programmes in education can boost students' reading skills for students to manage English textbooks later on at university level. The study found out that 74 % of CLIL students scored satisfactorily on the IELTS Reading for Academic Purposes Module Test compared to 33 % for non-CLIL students. In Spain, for both CLIL elementary students and secondary students' better language competency levels are achieved than for non-CLIL students, especially in written comprehension (Gallardo del Puerto, 2007).
On the other side, there is the shortage of materials to teach CLIL. Publishing houses fail to come up with such materials as they need to be personalized for each country and each subject according to their national curricula and culture. Therefore teachers have to create their own materials, and it is time-consuming and laborious process. The materials need to be personalized to suit their learners' needs so as to enable them to develop their skills until they are working at

high levels of cognitive and linguistic challenge. Each country or school has a clear objective when defining a language teaching programme. According to Baetens-Beardsmore (1997), no one version of CLIL is "exportable". Each country has its own needs, deals with its own reality and will establish its own way of implementing CLIL as a methodology. So, CLIL can be applied taking into account the local reality and particular school context.

In order to design a science and English integrated learning programme, the following had to be answered:

- How the programme for teaching science in schools of Latvia corresponds with the existing textbooks for teaching science in the children's native language and what the peculiarities are in presenting material for native English speakers in the textbook 'Success from the Start'.
- How the integrated science and English programme for Grade 1 students corresponds with the aim of teaching science in Latvia.

Theoretical standpoints on Content and Language Integrated Learning

Foreign language educators have promoted the benefits of content-based instruction, stating that such instruction fosters academic growth while also developing language proficiency. According to Curtain and Pesola (1994) ". . . in content-related instruction, the foreign language teacher uses concepts from the regular curriculum to enrich the program with academic content . . . The curriculum content is chosen to provide a vehicle for language learning and to reinforce the academic skills needed by the students" (Curtain and Pesola 1994: 35). Content-based instruction is intended to foster the integration of language and content, viewing "language as a medium for learning content and content as a resource for learning and improving language" (Stoller, 2004). In addition, content-based instruction is beneficial because classroom tasks provide a context for language learning, is more cognitively demanding, and reinforces the existing school curriculum.

The linguist Stephen Krashen's theories made a great influence on foreign language teaching. According to Krashen (1989) while learning is a conscious process of studying and paying attention to the language, its rules and forms, acquisition on the other hand happens through the exposure to the language. This approach is very close to the first language acquisition. Krashen (1989) emphasizes that acquisition is a more natural language development process. Lightbown and Spada (2013) also put far more importance on the acquisition as a way of learning a second language because it produces fluency while learning the rules of

a language does nothing to develop fluency. Krashen (1989: 12) states that the successful language learning "can be acquired through comprehensive input". Moreover, the level of the input must be just beyond the learners' competence level in the language, and then both understanding and language acquisition will take place (Lightbown and Spada 2013: 58).

Content based learning corresponds to Krashen's theory because it is based on interaction, conversation and using a foreign language for a particular purpose. The main goal of the content learning in a foreign language is to learn about other things through the language.

Content-based instruction (CBI) and Content and Language Integrated Learning (CLIL) are terms used for a variety of different approaches that have the commonality of integrating language and content and have both language and content-learning objectives (Stoller, 2004). CBI is the term more commonly used in the U.S., while CLIL is commonly used in Europe according to the Eurodice European Unit (2006). Content-based instruction or Content and Language Integrated Learning are broad terms describing many forms of bilingual education where a second or foreign language is used to teach subjects in the curriculum other than the language lessons themselves. In this Paper the term Content and Language Integrated Learning or CLIL will be used.

The term *Content and Language Integrated Learning* (CLIL) was coined by David Marsh, in 1994: "CLIL refers to situations where subjects, or parts of subjects, are taught through a foreign language with dual-focused aims, namely the learning of content and the simultaneous learning of a foreign language" (Marsh 1994: 3). It is important, that the word "content" stands in Marsh's definition as the first word. One of the essential features of CLIL involves the principle of being based on an integrated approach, where language learning is included in content classes. The English language is used to facilitate the understanding of the content of subject, students at the same time are developing their knowledge of English. This is because the content learning leads to language learning. According to Wolff (2007: 15-16), CLIL differs from the other content-based approaches as "classroom content is not so much taken from everyday life or the general content of the target language culture but rather from content subjects, from scientific disciplines".

Another different point of view, is given by Master (1997: 8), "Content is the point of departure or organizing principle of the course."

The framework of CLIL lies on four 'building blocks' (Coyle 2006: 9), which is commonly known as the 4Cs Framework:

Content – forms the basis of programme. It defines the subject, topic and main concepts of the programme. It provides the opportunity to study the subject through different perspectives, which can lead to achieving deeper understanding of the content.

Communication – the language to create and communicate about the content. To establish a successful learning Coyle (2006) points out that communication in this sense goes beyond the grammar system. There is the difference between the language learning with the learning of grammar and the using of language with the purpose of communication.

Cognition – reflects the development of learning and thinking in the subject content during the lesson, linking new knowledge and skills to existing understanding.

Culture – developing intercultural understanding and global citizenship. CLIL can help develop intercultural communication skills.

Through the 4Cs, content, cognition, communication and culture, students construct their own knowledge and skills (see Figure 1).

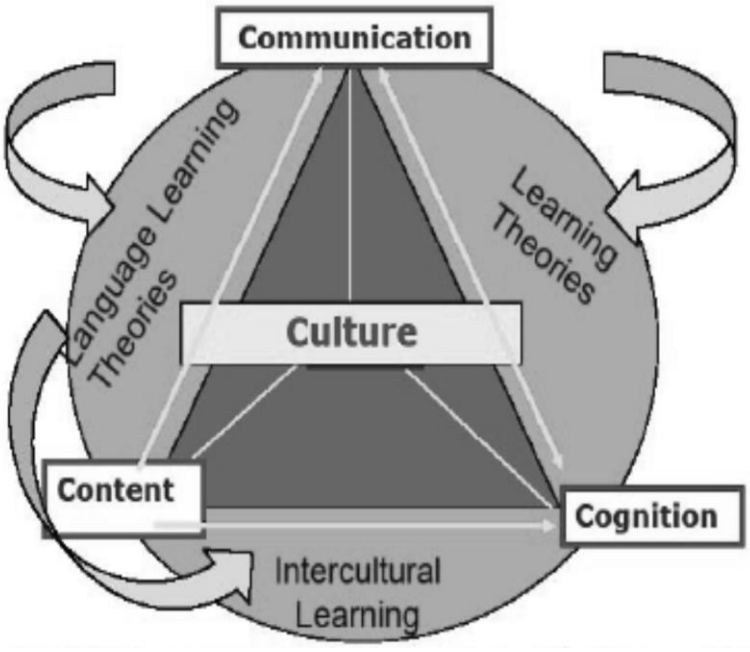

Figure 1. The 4 Cs Conceptual Framework (Coyle 2011:4)

According to the *CLIL-Compedium* (Marsh and Mehisto, 2009) the language goals have been placed among the other kinds of goals as cognitive and content goals. The cognition and content serves a basis for building communicative skills. An extract of the list of goals formulated in the *CLIL-Compedium* demonstrates developing intercultural communication skills, prepares for internationalization, provides

opportunities to study content through different perspectives, develops oral communicative skills, and increases learners' motivation.

Rampone (2010) proposes the following basis of CLIL:

- content subjects are taught and learnt in a language which is not the mother tongue of the learners;
- thinking and cognitive skills are developed together with language skills;
- language is functional and dictated by the context of the subject;
- language is approached lexically rather than grammatically;
- learning is improved through increased motivation;
- CLIL is based on language acquisition rather than enforced learning;
- language is seen in real life situations in which students can acquire the language;
- fluency is more important than accuracy and errors are a natural part of language learning;
- the learners develop fluency in English by using the language to communicate for variety of purposes.

Summing up the content of subject is given the priority in integrated content and language learning. The process of acquiring the content gives the students the opportunity to develop the English language skills. The content and English integrated learning does not only improve the language competence of the students, but also enriches their cognitive development and cultural growth.

Content and Language Integrated Learning in Latvia

The political and social situation in Latvia determined the need for the Latvian language learning as a meaningful aspect for sustainable development of the country. The low level of Latvian language skills of the part of the country's citizens was notified after the status of the Latvian language was enshrined in 1998. The national Programme for Latvian Language Training was established in 1995 and it claimed for the implementation of new methods and political decisions for stimulating the learning of the Latvian language. Content and language integrated learning has been known in Latvia for more than 10 years and is mostly applied in minority schools, where subjects according to curriculum are learnt bilingually. The development of content and language integrated learning methodology was set as the aim of Latvian language development (Programma 2006). Bilingual education was introduced in schools of Latvia starting with the primary school and continuing for 12 years through the

secondary school. The course books for bilingual education were published.

On the other side, Latvia is a small country and the foreign language learning is one of the most important directions of the country. Content and language integrated learning is one of the ways to develop the foreign language proficiency for students. As Lapinska (2015: 67) points out "CLIL approach is an important tool for increasing students' motivation and the development the students' cognitive skills".

Vaivade (2015) emphasizes that the aspects of integration, globalization and socialization are topical for students, and education should satisfy the needs of students. Using the CLIL approach (see Figure 2.) the students can not only learn languages, but also reach different aims, as integrating in the European society for further studying and working, using different sources of information in foreign languages for further self-realization or developing the ability to learn.

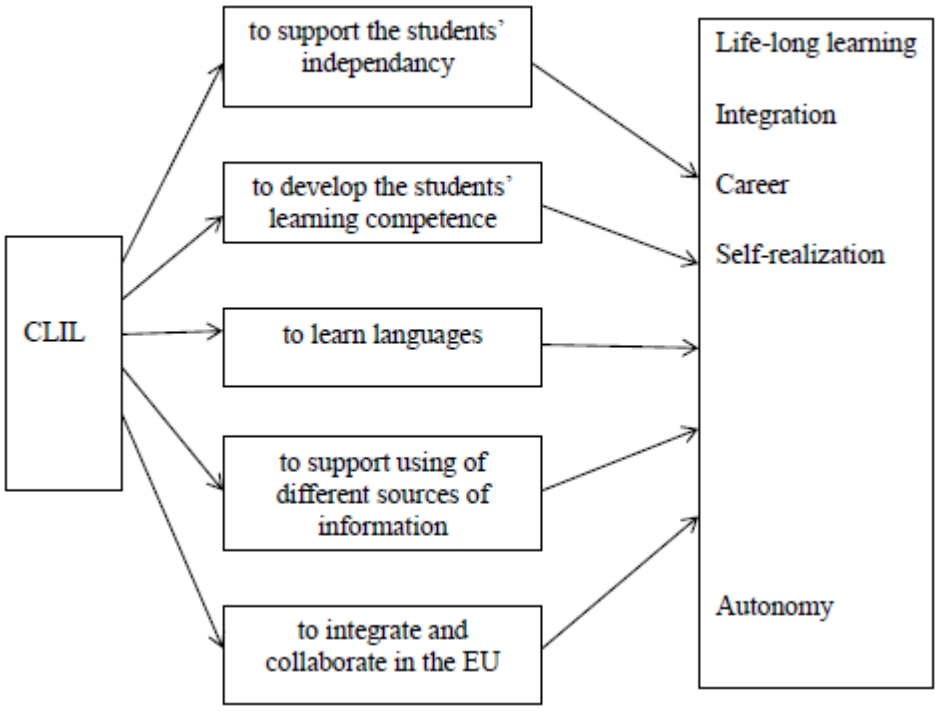

Figure 2. The short-term and strategic aims using CLIL approach (Vaivade 2015: 93)

Latvia is looking forward to multilingual society, to learning not only Latvian, English, but also other languages as German, Russian and French, which are taught in schools of Latvia. The aim of the multicultural education is to prepare for a life in a multicultural society. It includes different forms of education and strengthens educational opportunities and involvement of students in social life of the country.

The Principles of Cross Curricula Approach to Programme Design

As Coyle (2009) stated planning the curriculum for CLIL needs a concernment of teachers to focus on the development of active skills and deepen the learning of language and subject area content. In CLIL the sequence of content learning determines the language that will be needed. Coyle (2009: 20) emphasizes "one of the central challenges for CLIL teachers is to develop activities and select resources which provide sufficient challenge linguistically and cognitively". The difference between CLIL and traditional methods of language learning and teaching is that during CLIL lessons the new ideas on content, concepts of the content and language are presented at the same time.

According to Kerry (2010) there are three levels of effective curriculum planning:

- long term planning aims the setting out learning for between one or two years;
- medium term planning aims the setting out the learning for a term or half term;
- short term planning aims the setting out the learning for a unit of work, normally between one or four weeks duration. In addition the short term refers to planning for a specific lesson or sessions.

The long term planning for the school, where the integrated programme was applied, meant the setting out learning for three years – Grade 1, Grade 2 and Grade 3. The medium term planning meant the development of programme for one school year and in the case of this action research – for Grade 1 students. The short term planning meant the planning and the development of topics and the lesson plans for the designed programme.

Common features of effective planning, as Fautley (2013) concludes, include:

- clear objectives, related to the stationary curriculum;
- plans that focus on developing skills and concepts as well as knowledge;
- planning that takes into account children's prior learning;
- planning that involves children in the process;
- planning that is flexible;
- planning that makes the learning relevant to children;
- strategies for inclusion and differentiation;
- activities well matched to objectives;
- opportunities for first-hand or investigative learning;
- links made between subjects.

According to the set plan for designing the integrated science and English Programme (see Figure 3), the first step for

designing the programme was to formulate the purpose of the programme according to the needs and the interests of the target group. The next step was to specify the outcome of the programme and the objectives, taking into account the content and language, which was defined during the previous stage. Long term planning included planning the aims and setting out learning content in terms of the school year. Short term planning consisted of detailed planning of activities to acquire the content and reach language aims. The methods of teaching and the types of assessment were defined during this stage.

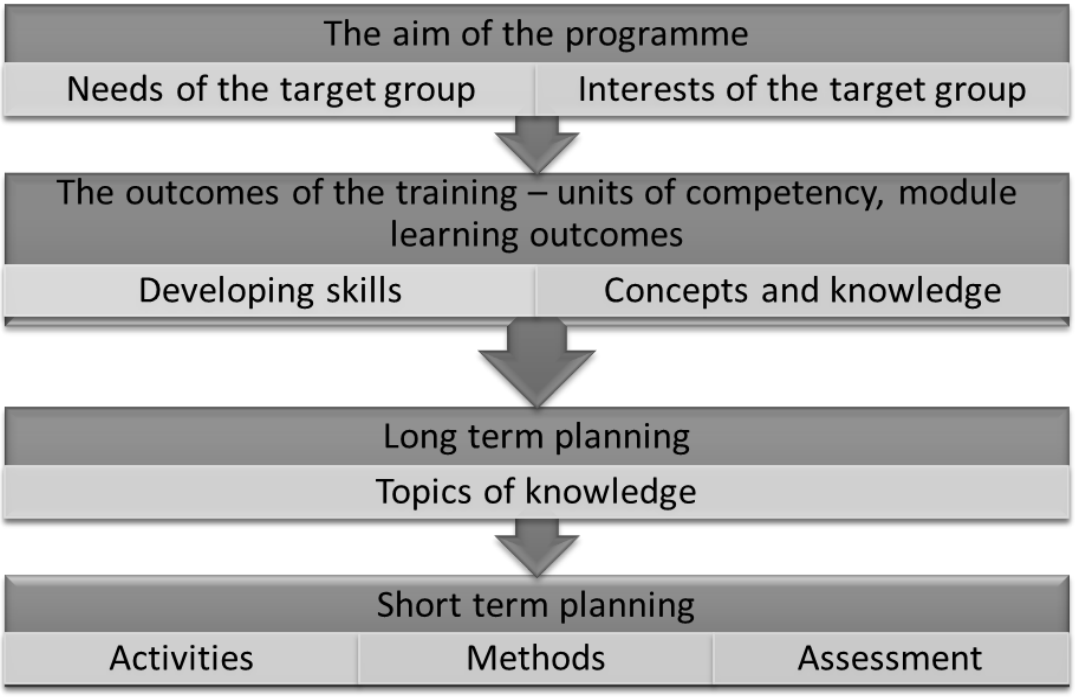

Figure 3. Steps for Designing and Developing a Learning Programme (Griņevska 2015: 15)

Action Research on Designing English and Science Integrated Learning Programme for Grade 1 Students

Riga Secondary School No. 34 with 1038 students and 92 teachers is a school specialised in teaching English. In 2011 the immersion programme, where science, maths and arts were taught in English by English language teachers was launched in primary school. The goal of this immersion programme is to develop primary school students' English language speaking skills. The action research has been chosen as it provides quantitative and qualitative data for adjusting content, language, instructions and activities to improve student learning. The aim of the research was to improve learning and engagement of Grade 1 students during their lessons of science in English. It was essential to see what improvements of teaching science and English needed to be introduced for the enhancement of the programme for teaching science and English

for Grade 1 students, as well as to eliminate the declines and drawbacks occurred in the process of teaching. Grade1 students learning science in English, the teachers teaching science in English, teachers teaching science according the curriculum, and the English language teachers participated in the research. The research took place in autumn, 2014, and spring, 2015, and lasted for one school year.

Data collection methods were questionnaires, teachers' interviews, classroom observation and field notes. The process of the research consisted of 3 phases and is depicted in Figure 4.

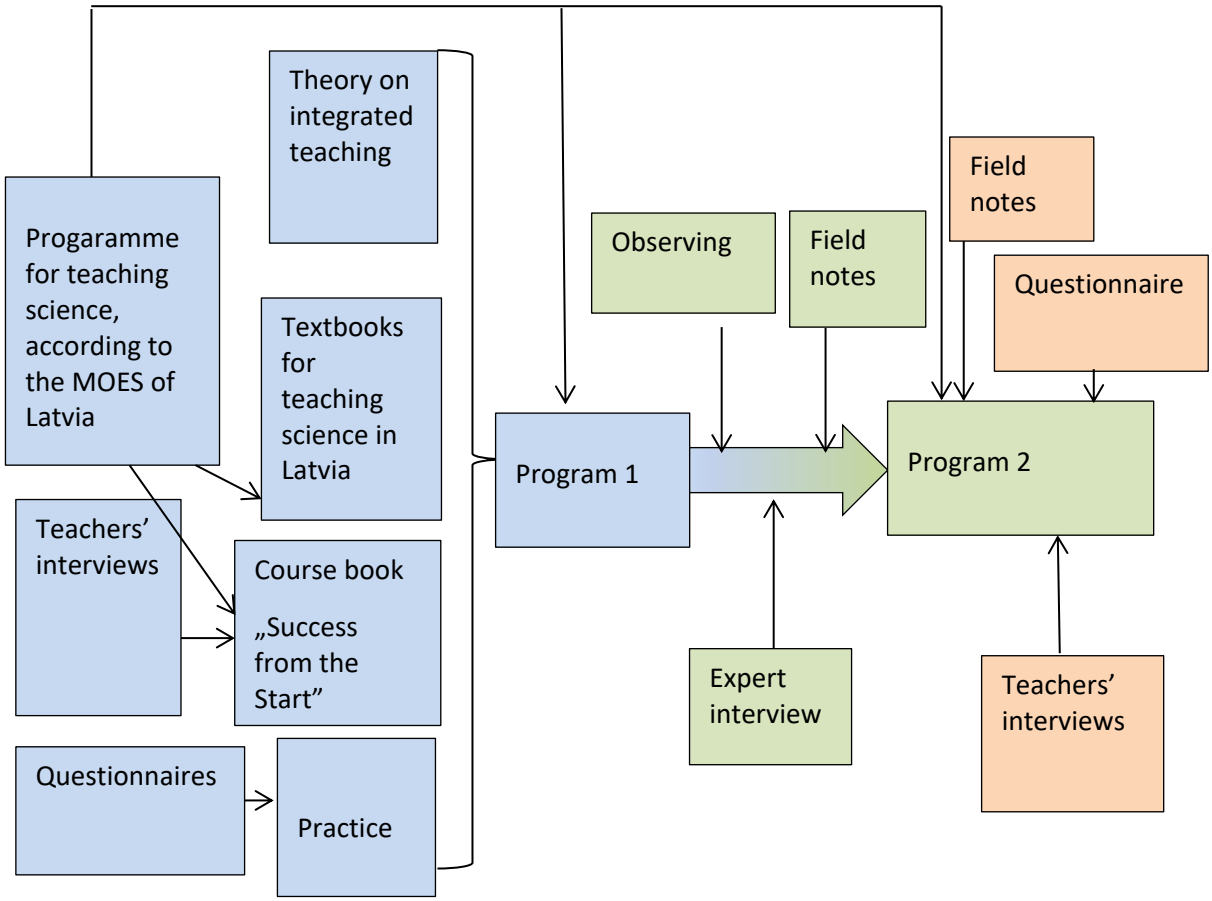

Figure 4. Process of the Research (Griņevska 2015: 21)

Phase 1. The action research started in spring 2014. In the process of practice the necessity of science and English integrated learning programme for Grade 1 students was defined. The Grade 1 students' preferences: the students' topics of interest in learning science as well as their preferred activities were clarified by a **questionnaire**. Analysing the data received from the questionnaires, the author of the Paper found out that the students preferred such topics, as animals and human body. The students of Grade 1 did not like

such topics as materials and plants. The reasons for the low level of "likes" could be the materials used during the lessons. Students' favourite activities during the learning process were handicrafts, doing experiments, matching, and colouring. These activities were planned to be applied for designing the materials for integrated programme.

During the first phase of the research, **textbooks for teaching science** in Latvia were analysed. 2 textbooks have been analysed: "Izzini pasauli/ Explore the World" by R. Arājs and "Dabaszinības bilingvāli/ Natural Sciences Bilingually" by Ņ. Lekse. The first course book "Izzini pasauli/ Explore the World" by R. Arājs includes the set of four books: Text Book, Activity Book, Tests and Teachers' Book. The target audience of the course book is Grade 1 students in schools in Latvia. The book is written in Latvian. Summing up the language of the course book, the book is worth using not only in schools of Latvia, where the language of learning is Latvian, but also in minority schools, where the language of learning is Russian because the language difficulty is appropriate for teaching science in Latvian. The number of new words, presented in each lesson, is appropriate not only for teaching content, but also for teaching language.

The second textbook "Dabaszinības bilingvāli/ Natural Sciences Bilingually" by Ņ. Lekse includes the set of two books as Text Book and Activity Book. The target audience of the course book is the Grade 1 students in minority (children whose native language is not Latvian, Latvian is learnt as the second language) schools in Latvia. The book is written bilingually in Russian and in Latvian. The content of the course book is compatible to the age of the learners. It is at appropriate comprehension level for the learners. The content of the course book includes not only science topics, but also many poems, proverbs, riddles and interesting facts. Some key words are presented in two languages, some texts are introduced in Latvian and some texts are in Russian. Some questions are asked in Latvian and some in Russian. There is also poetic language is presented in the course book. The texts in the Russian language are of the appropriate level of difficulty, but the texts in Latvian are difficult to understand to children whose native language is not Latvian. Both texts perform informative function, but texts in Latvian are more difficult to understand without additional explanation or translation. The materials in Russian are presented at an appropriate reading level, so as students can read the text independently. The materials in Latvian are difficult to read for Grade 1 students who have been learning Latvian for the first year and it is impossible to reach such proficiency in reading. The book corresponds to the needs of the learners, as the information is provided taking into

account the age of the target audience and their demands. The content evokes the students' interest in natural systems. The units are arranged logically and are student-centred.

The method of **course book analysis** and **interviews with the teachers** who taught science in English were applied to examine the course book "Success from the Start" and understand the peculiarities, advantages and drawbacks of the course book. The book is published in the UK for 5-7 year old students whose native language is English. The course book includes the set of two books as Text Book and Workbook. The course book "Success from the Start" does not correlate with the curricula in Latvia, as the aim of the book is to prepare the students in the UK for passing the national test KS1 where the demands differ from Latvian curriculum requirements. The course book "Success from the Start" was used for teaching science for Grade 1 students and it turned out to be rather difficult to use in Latvia for the students whose native language was not English, besides using authentic materials from the UK did not correspond with the aim of learning science in Latvia and did not give considerable outcome for leaning science and English for Grade 1 students. The course book did not present exercises for learning English, as language learning needed repetition and many exercises on the language. All the interviewees said that the course book was not intended for independent reading by students of Grade 1. The interviewees advised to add the topics on solar system, animals, plants, parts of a tree, vegetables, fruit, and mushrooms. At the same time the teachers emphasized that the course book helped to reach the main purpose of the immersion programme – communication. The interviewees stated that the course book did not include interesting and stimulating activities for learning science and English. Summing up the data, received from the interviews, the topics on solar system, animals, fruit, vegetables, and trees were included in the Programme 1 as they correspond with the programme for teaching science approved by the Ministry of Education and Science of Latvia.

As a result of the first phase of the research, the Programme 1 for science and English integrated learning for Grade 1 students was designed taking into account the theoretical background for designing the CLIL materials, the data from Grade 1 students' questionnaires, the data from teachers' interviews, the results from the course books analysis and the programme for teaching science approved by Ministry of Education and Science in Latvia.

Phase 2 started in autumn 2014 when the teachers started to use the designed programme. The designed Programme 1 and the designed materials were used for teaching science in English in autumn 2014. The

Programme 1 was piloted doing lesson observations, making field notes and organising expert interviews.

The following criteria were included in the observation checklist and analysing field notes:

- The compatibility of the content of the material to students' age;
- The compatibility of the content of the material to students' interest;
- The compatibility of the language of the material to students' age and the level of English language proficiency;
- The clarity of teacher's instructions;
- The stages of the lesson provided;
- The time planned for each activity;
- Students' interest in the activities;
- The signs of boredom, anxiety or lack of discipline;
- Something unexpected;
- The appropriateness and necessity of the topic;
- The necessity and clarity of visual aids;
- The necessity, clarity and applicability of video materials;
- The ability of students to use their previous knowledge and experience;
- The suitability of tasks for different language skills;
- The suitability of tasks for different learning styles;
- The use of adapted language that facilitates understanding;
- The use of group work to promote understanding.

The level of achievement was scaled as very well, satisfactory, attention needed. The hot reflection of the observer and the feedback of the teacher was added after each lesson. The field notes included the researcher's views on the lesson's activities. The field notes consisted of scratch notes and the preliminary conclusions, made after the lesson.

The following decisions were made to be introduced in Programme 2:

- the games for kinaesthetic activities should be added;
- the text for reading should be adapted for the level of reading for Grade 1 students;
- the number of new words should not exceed 8 words;
- it is better to present new information in pictures or schemes, not giving textual information;
- more games should be used for drilling the vocabulary;
- handicraft activities help students to use the English language in natural way;
- more songs should be added for practising language usage;
- total physical response activities should be used for Grade 1 students.

Science and English Integrated Programme for Grade 1 Students (Programme 2)

The aims:

to develop the students' interest in natural systems and exploring the natural processes,

to develop the understanding of the diversity and unity of nature in order to achieve a positive attitude towards environment and healthy living style,

to develop students' communicative and socio-cultural competences in using English.

The objectives of the programme are:

- to acquire the basic research activities on science;
- to explore the natural systems and processes in order to understand the diversity and unity of nature;
- to understand the importance of science achievements in people everyday lives and to be aware of taking care of environment and the necessity of healthy life;
- to communicate in oral and written English;
- to develop cognitive and metacognitive skills;
- to compare students' native language and the English language;
- to understand the role of language in studying science;
- to create positive attitude to others and the world;

The programme was designed for 91 lessons (3 lessons a week). The sequence of content acquisition is described in TABLE 1.

TABLE 1. The sequence of content acquisition in Programme 2

Topic	The number of lessons	Language
Introduction The world around us Plants Animals Humans Materials Physical processes	2 lessons	To name some plants (tree, flower), animals (cat, dog), humans (girl, boy), materials (metal, wood), physical processes (rainbow, smoke).
Alive or not alive	2 lessons	Features of alive and not alive creatures Categorising (plants, animals, materials, etc.)

Types of plants	2 lessons	To name the types of plants (tree, bush, grass, algae, etc.)
Parts of plants	3 lessons	To name the parts of a plant and the functions of the parts of a plant
Fruits, berries and nuts	2 lessons	To name the fruits, vegetables and nuts. Colours. I like … I don't like ...
Vegetables	2 lessons	To name the vegetables
Trees. Parts of a tree Types of trees	2 lessons	Name parts of a tree (roots, trunk, branch, twig, crown) Types of trees (oak, birch, fir tree, pine tree etc.)
Revising	1 lesson	Collaborative group projects. Plants in the neighbourhood.
Domestic and wild animals	2 lessons	To name the domestic and wild animals. Habitats.
Farm animals	1 lesson	To name the farm animals and the reason people grow them. Plural forms of nouns.
Pets	1 lesson	To name pets. To make a story about a pet. I have got …
Wild animals Wild animals in Latvia	2 lessons	To name the wild animals. Counting. How many...?
Animals and their babies	1 lesson	To name the animals and their babies (cat – kitten, a dog – puppy, a pig – a piglet, etc.)
Life cycles of animals	2 lessons	Life cycles of a dog, frog, butterfly, etc.
Parts of animals bodies (mammals, fish, insects, birds)	3 lessons	To name the parts of bodies (wings, legs. beak, tail, etc.) and to describe animals, using adjectives (big, small, long, short, etc.)
Classification of animals. What do animals eat?	3 lessons	Classification, using the keys (mammals, reptiles, insects, etc.). Venn diagram. (Carnivores, omnivores, herbivores)
Sounds of animals	1 lesson	
Revising	1 lesson	Collaborative group projects

		My favourite animal.
Humans and parts of human's body	1 lesson	To name the parts of human body.
5 senses	2 lessons	Speaking, according to a patern. (I use ... for ...)
Human's skeleton	2 lessons	To use the names of bones and their functions
Inner organs.	2 lesson	To name the inner organs and their functions (The heart pumps blood, lungs for breathing, stomach for digesting food, etc.)
Healthy living	2 lessons	Daily routine
Healthy eating	3 lessons	Food pyramid
Revising	1 lesson	Collaborative group project. How to grow healthy.
Materials in nature	2 lessons	To name the materials. Natural and materials made by people.
Materials (solid, liquid, gas) Water	2 lessons	Reversible changes (melting, freezing, evaporating and condensing)
Properties of materials	4 lessons	To speak about properties of materials (hard, soft, opaque, transparent, etc.) Floating and sinking. Irreversible changes (burning).
Using of materials	2 lessons	Glass is made from sand. T-shirt is made from cotton. … is made from …
Sorting waste.	2 lessons	
Revising	1 lesson	Collaborative group project. Using of materials.
Solar system	2 lessons	To name the planets. Ordinals numbers.
Day and night	2 lessons	Reason of changing day and night. Nocturnal animals.
Seasons	4 lessons	To speak about the activities in different seasons. Weather. Equator. Northern and Southern poles. Temperature.
The Earth	2 lessons	To name the oceans and seas.

Oceans and seas		Animals, living in water.
Continents	2 lessons	To name the continents. Superlatives.
Countries. Latvia. Countries in Europe	3 lessons	To speak about countries. Flag. Coat of arms. Currency.
Landforms. Landforms in Latvia	3 lessons	To speak about the neighbourhood and landforms in Latvia.
Revision	1 lesson	Collaborative group project. Countries.
Sound. Characteristics of sound	1 lesson	Loud and quiet.
Light Rainbow	2 lessons	To speak about the sources of light. Rainbow colours.
Electricity. Alternative and direct current	2 lessons	Sources of electricity.
Forces. Gravity. Friction	2 lessons	To speak about forces, as the causes of movements.
Inventions and inventors	2 lessons	To speak about inventions. Electricity, light bulb, airplanes, telephone, etc.
Revision	1 lesson	Collaborative group project. Inventions and inventors.

Phase 3 started in spring 2015. In the process of piloting Programme 2 **the field notes** of the integrated lessons were made. The same teachers that designed and improved the programme during Phase 2, were teaching science in English using Programme 2 and the materials. Afterwards face-to-face **structured interviews** were carried out in three groups: the interviews with the teachers, teaching science in English, the interviews with the English as foreign language teachers and interviews with science teachers in primary school. The questions for the teachers teaching science in English were about the content, the language and the activities of the Programme 2. The questions for the English as a foreign language teachers were about the language of the materials and the activities for learning English. The questions for the teachers teaching science were about the materials' correspondence with the Ministry of Education and Science approved programme, the content correspondence with the age, needs and the interests of the Grade 1 students, the accurateness of the information,

presented in the worksheets. The activities, arrangement of units, the size, format and print of the worksheets presented in the programme were discussed during the interviews.

To spot Grade 1 students' preference changes in science topics, **the questionnaires** for students were designed. The data were compared with the data received from Questionnaire 1. The data of questionnaire revealed that the most successful topics in the integrated programme were the topics on solar system and animals. The topics on human's body, the Earth and the light should be developed and improved. The topics on the materials on plants and materials should be revised, changed or developed further.

Conclusion

By completing the cycles of action research carried out to explore how to design the sequence of content acquisition of English and science integrated learning programme for teaching English and science to Grade1 students, several recommendations can be put forward:

1. The growth of students' interest to learning science in English has been observed in 2015 and it could be explained as a response to the science and English designed programme for Grade 1 students.
2. Content and materials should relate to the lives of the learners, correspond to the previous knowledge of the learners. Teachers need to organize materials in the following order: familiar language, familiar content, new content and finally new language (Mohan, 1986).
3. The activities should be sequenced according to Bloom's taxonomy from low cognitive to high cognitive thinking skills: remembering, understanding, applying, analysing, evaluating and creating and taking care of students' learning styles – "various sensory modalities (visual, auditory, tactile, etc.) as continuous sources of new information that must be integrated with prior knowledge to determine a course of action that is appropriate to a person's goals and motivations" (Wayne 2007: 45).
4. In the process of planning the lesson, the language of learning, the language for learning and the language through learning (Coyle et al., 2010), the intensity of cognitive load, the activities for collaborating and scaffolding instructions should be considered.

REFERENCES:

Baetens-Beardsmore, 1997 - Baetens-Beardsmore, H., *Manipulating the Variables in Bilingual Education in Buiteveld,* A. Report on the conference on European networks in bilingual education. The Hague: Dutch European Platform, 1997.

Coyle, 2006 - Coyle, D. (2006). *English Perspective for CLIL Research and Practice Matrix*. European Commission; 2006.

Coyle, 2009 - Coyle, D. (2009). *Towards an Integrated Curriculum – CLIL National Statement and Guidelines* Available in http://www.languagescompany.com/images/stories/docs/news/clil_ national_ statement_and_guidelines.pdf [Accessed 15 May 2015].

Coyle, 2011 - Coyle, D., *Teacher Education and CLIL Methods and Tools.* Seminar presented in Arisaig, Scotland; 2011.

Coyle, Hood, Marsh, 2010 - Coyle, D., Hood, P. & Marsh, D., *CLIL: Content and Language Integrated Learning.* Cambridge: Cambridge University Press; 2010.

Curtain, Pesola, 1994 - Curtain, H, and Pesola, C.A.B., *Languages and Children: Making the Match* New York: Longman; 1994.

Dalton-Puffer, 2007 - Dalton-Puffer, C., Outcomes and Processes in Content and Language Integrated Learning (CLIL) // In: Delanoy, W. & Volkmann, L. *Future Perspectives for English Language Teaching* (2007, S. 139-157).

DESI-Konsortium, 2008 - DESI-Konsortium (Hrsg.), *Unterricht und Kompetenzerwerb in Deutsch und Englisch*. Ergebnisse der DESI-Studie. Weinheim: Beltz. 2008.

Eurydice European Unit, 2006 - Eurydice European Unit. *Content and Language Integrated Learning – CLIL - at School and Europe*. http://www.indire.it/lucabas/lkmw_file/eurydice/CLIL_EN.pdf. 2006.

Fautley, 2013 - Fautley, M., *Lesson Planning for Effective Learning.* UK: Open University Press; 2013.

Gallardo del Puerto, 2007 - Gallardo del Puerto, F., On the Effectiveness of Early Foreign Language Instruction in School Contexts.// In: Elsner, D., Küster, L., & Viebrock, B. (Eds.), *Fremdsprachen-Kompetenzen für ein Wachsendes Europa [Foreign language competence for a growing Europe]* (2007, pp. 215–229). Amsterdam: John Benjamins.

Griņevska, 2015 - Griņevska, I., *Angļu valodas un dabaszinību integrētas programmas izstrāde 1. klases skolēniem/ English and Science Integrated Learning Programme for Grade 1 Students.* Maģistra darbs/ Master's Paper, 2015, Latvia: Riga.

Harlen, 2010 - Harlen, W., *Principles and Big Ideas of Science Education*. UK: College Lane. http://likumi.lv/doc.php?id=145143 [2010; Accessed 21.08.2014].

Kerry, 2010 - Kerry, T., *Cross-Curricular Teaching in the Primary School: Planning and Facilitating.* New York: Routledge; 2010.

Krashen, 1989 - Krashen, S. D., *Language Acquisition and Language Education: Extensions and Applications*. New York: Prentice Hall; 1989.

Lapinska, 2015 - Lapinska, I., CLIL Latvijas valodas agentūras darbības kontekstā.// In: Lazdiņa, S. (ed) *CLIL jeb mācību satura un valodas integrēta apguve: izglītības paradigmas maiņa* (2015). Latviešu valsts aģentūra.

Lasagabaster, 2008 - Lasagabaster, D., Foreign Language Competence in Content and Language Integrated Courses. *The Open Applied Linguistics Journal*, 1, 2008; 30–41.

Lightbown, Spada, 2013 - Lightbown, P. M. and Spada, N., *How Languages Are Learned 4th edition.* Oxford University Press, 2013.

Marsh, 1994 - Marsh, D., *Bilingual Education & Content and Language Integrated Learning.* Paris: International Association for Cross-cultural Communication, Language Teaching in the Member States of the European Union, University of Sorbonne; 1994.

Marsh, Mehisto, 2009 - Marsh, D. and Mehisto, P., *CLIL Practice: Perspectives from the Field*. Finland: CCN, University of Jyväskylä; 2009.

Master, 1997/8 - Master, P., *Content-based Instruction vs. ESP*. TESOL Matters, 6, 10; 1997/8.

Mohan, 1986 - Mohan, B. *Language and Content*. Reading. MA: Addison-Wesley. 1986.

Programma, 2010 - *Programma,* Valsts valodas politikas programma 2006.-2010. gadam. Latvijas Republikas Ministru kabineta noteikumi Nr. 770, 2010. 4. 10.

Rampone, 2010 - Rampone, S., *Strategies for CLIL*. Available in *https://www.google.lv /url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CDsQFjAC&url=http%3A%2F%2Fshare.dschola.it%2Fdd4pinerolo%2Fclimate%2FShared%2520Documents%2Fb.%2520CLIMATES_CLIL.doc&ei=V7CUU_LqHOuBywP3k4HACA&usg=AFQjCNEsLDFUlbFBBlYZMjQwAqmM9evinw&sig2=mMrTTFU_iLKT3uzLH8foGQ* [2010; Accessed 8 January 2015].

Snow, 1990 - Snow, M.A., Instructional Methodology in Immersion Foreign Language Education.// In: Fairchild, H. H., Padilla, A. M., & Valadez, C. M. (Eds.). (1990). *Foreign Language Education: Issues and Strategies.* Sage Publications.

Stoller, 2004 - Stoller, F. L., Content-based Instruction: Perspectives on Curriculum Planning. *Annual Review of Applied Linguistics*, Volume 24, 2004; 261-283. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=223408&fileId=S0267190504000108

Vaivade, 2015 - Vaivade, V., CLIL pieejas pedagoģiski aspekti: mēķi, uzdevumi un īstenošana. // In: Lazdiņa, S. (ed) *CLIL jeb mācību satura un valodas integrēta apguve: izglītības paradigmas maiņa*. (2015). Latviešu valsts aģentūra.

Wayne, 2007 - Wayne D. G., *Integrated Models of Cognitive Systems.* New York: Oxford University Press; 2007.

Wolff, 2007 - Wolff, D., CLIL: Bridging the Gap Between School and Working Life. 15-25. // In: Marsh, D., & Wolff, D. (2007). *Diverse Contexts-Converging Goals. CLIL in Europe.* Frankfurt: Peter Lang.