

**THE IMPACT OF CLIL AND TECHNO-CLIL IMPLEMENTATIONS ON TURKISH
STUDENTS' L2 READING PROFICIENCY AND VOCABULARY DEVELOPMENT**

Büşra ÜNSAL

AUGUST 2019

**THE IMPACT OF CLIL AND TECHNO-CLIL IMPLEMENTATIONS ON
TURKISH STUDENTS' L2 VOCABULARY PROFICIENCY AND READING
DEVELOPMENT**

**A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF EDUCATIONAL SCIENCES
OF
BAHÇEŞEHİR UNIVERSITY**

BY

Büşra ÜNSAL

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF ARTS
IN THE DEPARTMENT OF ENGLISH LANGUAGE TEACHING**

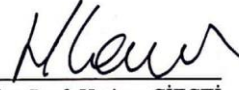
AUGUST 2019

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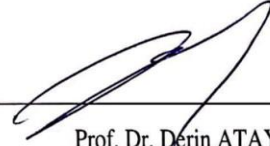
Assist. Prof. Enisa MEDE
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Arts.



Assist. Prof. Hatime ÇİFTİ
Coordinator

This is to certify that we have read this thesis and in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Arts.



Prof. Dr. Derin ATAY
Supervisor

Examining Committee Members

Assist. Prof. Enisa MEDE (BAU, ELT)

Prof. Dr. Derin ATAY (BAU, ELT)

Assist. Prof. Gökçe KURT TİFTİK (MU, ELT)



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Name, Last Name : Büşra ÜNSAL

Signature : 

ABSTRACT

THE IMPACT OF CLIL AND TECHNO-CLIL IMPLEMENTATIONS ON TURKISH STUDENTS' L2 VOCABULARY PROFICIENCY AND READING DEVELOPMENT

Ünsal, Büşra

Master's Thesis, Master's Program in English Language

Education Supervisor: Prof. Dr. Derin Atay

August 2019, 133 pages

This study investigated the impact of CLIL and Techno-CLIL lesson implementations on 6th grade students' L2 reading, and vocabulary development. It also aimed to analyze the perceptions of the students and the teachers toward CLIL and Techno-CLIL models. Two 6th grade intact classes were selected as control and experimental groups ($N=37$). The control group was exposed to traditional content and language integrated instruction while the experimental group received technology and content integrated language instruction. Quantitative data instruments included pre, post and delayed L2 reading proficiency test and Vocabulary Knowledge Scale, and the results showed a remarkable difference between pre and post-tests in both groups. Qualitative data instruments included teacher journals, student interviews, and stimulated recall and the results indicated that both teachers and students have developed positive attitudes towards Techno-CLIL and CLIL approaches in classrooms.

Key Words: Content and Language Integrated Learning, Techno-CLIL, L2 Vocabulary Development, L2 Reading Proficiency.

ÖZ

DİL VE İÇERİK BÜTÜNLEŞİK ÖĞRENME VE TEKNOLOJİ ENTEGRELİ DİL VE İÇERİK BÜTÜNLEŞİK ÖĞRENME UYGULAMALARININ TÜRK ÖĞRENCİLERİNİN İKİNCİ DİL KELİME VE OKUMA BECERİLERİNE ETKİLERİNİN İNCELENMESİ

Ünsal, Büşra

Yüksek Lisans Tezi, İngiliz Dili Eğitimi

Yüksek Lisans Programı

Tez Yöneticisi: Prof. Dr. Derin Atay

Ağustos 2019, 133 sayfa

Bu çalışma, içerik ve dil entegreli öğrenme ve teknoloji ile bütünleştirilmiş içerik ve dil entegreli öğrenme ders uygulamalarının 6. sınıf öğrencilerinin ikinci dil okuma ve kelime gelişimine etkilerini araştırmıştır. Ayrıca öğrencilerin ve öğretmenlerin teknoloji ile bütünleştirilmiş içerik ve dil entegreli öğrenme modeline yönelik algılarını analiz etmeyi amaçlamıştır. İki 6. sınıf bozulmamış sınıf kontrol ve deney grupları olarak seçilmiştir ($N= 37$). Kontrol grubu içerik tümleşik dil eğitimine maruz kalırken, deney grubu teknoloji ve içerik tümleşik dil eğitimi almıştır. Nicel veri araçları, okuma öncesi ve sonrası seviye belirleme testi ve Kelime Bilgisi Ölçeğini içermiştir ve sonuçlar iki grupta ön, son ve gecikmeli testler arasında dikkate değer bir fark göstermiştir. Nitel veri araçları öğretmen dergilerini, öğrenci görüşmelerini, ve öğretmenler arasında uyarılmış geri çağırma görüşmelerini içermekte ve sonuçlar hem öğretmenlerin hem de öğrencilerin derslerde içerik ve dil entegreli öğrenme ve teknoloji ile bütünleştirilmiş içerik ve dil entegreli öğrenme yaklaşımlarına yönelik olumlu tutumlar geliştirdiğini ortaya koymaktadır.

Anahtar Kelimeler: İerik ve Dil Entegreli ğrenme, Teknoloji ile Bütünleřtirilmiř İerik ve Dil Entegreli ğrenme, İkinci Dil Kelime Geliřimi, İkinci Dil Okuma Yeterlilięi.





To my grandpa in heaven

ACKNOWLEDGEMENTS

I would like to express my profound gratitude to my thesis advisor Prof. Dr. Derin Atay for always keeping her doors open whenever I ran into a trouble. Without her endless motivation, patience and deep knowledge this thesis would not have been achieveable.

I would also like to thank to my precious family and lovely friends who always provided continious support and encouragement with me throughout the process of researching and writing my thesis. Without their spiritual support it would not have been possible to conduct this study.

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LIST OF ABBREVIATIONS

BICS	Basic Interpersonal Communication Skills
CALL	Computer Assisted Language Learning
CALP	Cognitive Academic Language Proficiency
CLIL	Content and Language Integrated Learning
EFL	English as a Foreign Language
ELT	English Language Teaching
ESL	English as a Second Language
FL	Foreign Language
ICT	Information and Communication Technology
MALL	Mobile Assisted Language Learning
Techno-CLIL	Technology and Content and Language Integrated Learning

Chapter 1

Introduction

As a threshold matter, this chapter introduces an overview of the study which aims at experimenting Content and Language Integrated Learning models in foreign language learning environments. The chapter later gives a brief information about the importance of integration of technology with CLIL, namely Techno-CLIL. Consequently, the chapter describes the significance, the problem, and the purpose of the study, as well as the research questions of the study clearly. Ad finem, key terms related to the study have been clearly stated.

1.1 Theoretical Framework

CLIL has attracted a great deal of attention for the last few decades. Having started to be used to teach a school subject through a foreign or second language rather than the native language (Coyle, Hood & Marsh, 2010), CLIL has spreaded in school curricula since 1994. From that time, CLIL has been widely regarded as one of the best-fit approaches in language and content teaching through communication and interdisciplinary lesson practices across the world (Dalton-Puffer, 2007). Marsh (2000) defines CLIL as an approach which supports learners to develop the subject and foster language competences in a balanced way and constrains to take subject or language to forefront. By the guidance of the dual-focus education mission, CLIL targets to maximize fluency and accuracy in language and content (Munoz-Luna, 2014), by providing bilingual contexts where students switch from one language to another and communicate with each other upon o specific subject matter which is presented them in a culturally-enriched learning environment.

When it comes to appropriate materials which aim to serve to useful purposes in CLIL practice, as Malagon (2017) suggests, a CLIL teacher should always be prepared with a wide variety of authentic and back-up materials for an effective lesson because secondary CLIL courses need active material adaptations in order to promote profound learning (Simpson, 2005). He (ibid.), additionally claims that CLIL teachers should gently create a connection to digital tools in order to feed learners' electronic communicative competence. Further to that, ICT and CLIL

integration has so many advantages such as student motivation and interaction increase, as well as improving authentic and individual learning (Malagon, 2017). With a strong purpose of shedding light into how CLIL practice maximizes its' efficiency through technological devices, Cinganotto and Cuccurullo (2016) have carried out a europe-wide study where various communities regularly unite to develop virtual CLIL contexts which open a gate to CLIL learners to have an easy access to the digital learning contexts rather than merely electronic tools.

Within this framework, Cinganotto and Cuccurullo (2016) organised a teacher training program for nearly 5000 reflective CLIL teachers from Europe, mostly Italy. Agenda items were consisted of teacher perceptions towards ICT and CLIL integration, digital natives' attitudes on CLIL lessons practiced through technology, developing digital tools for Techno-CLIL lessons, and preparing lesson plans with these digital materials, accordingly. With the help of the Techno-CLIL project carried out by Cinganotto and Cuccurullo (2016), reflective CLIL teachers have discovered the favourable sides of Techno-CLIL and how it would help them and digital L2 learners. The study has clearly stated that Techno-CLIL lessons both help learners cover a distance in a short period of time and teachers develop a critical perspective in preparing and adapting contemporary lesson plans with the help of technological devices in digitally enriched contexts.

1.2 Statement of the Problem

More particularly in the last decade, most of the European countries have started to show an ultimate attention to foreign language teaching in their educational systems. According to the European Comission (2005) statistics, 56 percent of the citizens can communicate in a foreign language in a European country, 28 percent of them are multilingual at a high proficiency level regardless of their age, gender, or occupation. Alongside FL teaching, these countries pay strict attention to successful and efficient implementation of CLIL, as well.

When it comes to Turkish EFL setting, it is easily recognized that learners have difficulty in learning English at a satisfactory level which will serve to their purposes in their lives even after pretty long years of language education due to the inadequate learning environment. The number of the studies related to the CLIL in

Turkish EFL setting, particularly in secondary level, is quite limited although literature has coherently proven how L2 learners develop their language competences through CLIL contexts.

Furthermore, when the literature is sorted out, it can be seen that very few studies were conducted related to Techno-CLIL practice in secondary schools where learners were provided an opportunity to learn a subject matter and develop their language skills through digital tools. Consequently, the present study aims to discover the implementation of Techno-CLIL and its' effects on the learners' vocabulary and reading proficiency development within a comparative view of traditional practice of CLIL. By conducting this research, students will be provided with fruitful contexts where they can build up their vocabulary knowledge. Furthermore, it will be observed to what extent their general reading comprehension levels will show difference. It is expected to see that they will show a visible growth in their vocabulary knowledge and reading comprehension thanks to the great exposure to the rich content supplied by Techno-CLIL and CLIL practice.

1.3 Purpose of the Study

With a purpose of what has been claimed to be useful thus far, this study is to find out if CLIL and Techno-CLIL models have an impact on students' L2 vocabulary and L2 reading development in a private secondary school. As a succeeding purpose, the study aims to explore the learners' and teachers' perceptions towards CLIL and Techno-CLIL approaches. It is strongly believed that this study will shed light to a deeper understanding of Techno-CLIL and CLIL implementations in Turkish EFL settings.

1.4 Research Questions

The present study addresses the following research questions:

- 1- Will there be a difference between CLIL group and Techno-CLIL group students regarding their
 - a) L2 vocabulary achievement?
 - b) L2 reading proficiency?

- 2- What are the L2 students' perceptions regarding CLIL and Techno-CLIL instructions?
- 3- What are the L2 instructors' opinions regarding CLIL and Techno-CLIL instructions?

1.5 Significance of the Study

The majority of the CLIL studies has been experienced in primary and high school levels when Turkish EFL setting has been examined (Cinar, 2018). However, secondary level students are exposed to a huge amount of L2 vocabulary and content specific knowledge. Furthermore, various studies have suggested that adolescents best learn implicitly whereas they get older, they start to learn better in explicit ways (DeKeyser, 2000). Therefore, CLIL possesses the requisite qualifications in terms of providing secondary school learners a fruitful context where they can implicitly acquire L2 sub-skills and develop their content knowledge in a balanced manner.

For the most part, CLIL studies have aimed at observing motivational, linguistic and perceptual changes from the perspectives of learners and instructors. When it comes to technology and specific digital tools, CLIL has not been integrated with them in an experimental manner; therefore, there has been a lack of study which compares Techno-CLIL and traditional CLIL at an observable level. It has been implicated that CLIL and technology combination helps learners diversely; digital platforms that are applied even in daily life can assist to CLIL lessons to enrich the learning environment (Bozgodan, 2015). Digital natives of the era who are apt to feel more comfortable in learning in artificial environments rather than classroom setting feel themselves encouraged and motivated in learning another language and deeper understanding of the subject matter through Techno-CLIL lessons.

In the light of what has been said so far, it is considered that there is a need for the detailed practice and analysis of CLIL and technology integration. Beside the lack of study which focuses on the technological aspect of CLIL, there is also strong need for further study which meticulously reviews learners' vocabulary and other specific language skills development. When the literature is reviewed, it can be seen that the number of the studies exploring learners' vocabulary or language sub-skills

development through CLIL practice is quite limited (Altinkamis, 2009; Arribas, 2016; Nebioglugil, 2015). This study will not only try to practice Techno-CLIL but also reveal the advantageous implications of the model in terms of L2 vocabulary and L2 reading improvement.

With an intention of filling the gap recognized in literature, the researcher of this study has decided to create experimental and control groups and conduct regular CLIL and Techno-CLIL lessons with the participation of 37 (B1) pre-intermediate level 6th grade students in a private secondary school. It has been observed by the researcher that lack of L2 vocabulary is the leading reason that the learners cannot successfully or fully express their meaning when they are involved in an authentic conversation. Also, as they do not encounter purposive and meaningful content materials and they merely remain restricted with the language coursebooks, they practice to talk about the language; not the language itself.

Based on the significance of these problems, this study is decided to be quite significant in terms of moving learners many steps further with the companionship of CLIL and Techno-CLIL. Compounding traditional CLIL lessons with ICT resources and grounding each practice on theoretical background will help discover the unknown facts about the implementation of a brand new subject area, that is, Techno-CLIL. The results of the study may give some light to the following studies about how to integrate technological tools in CLIL classrooms. It is also expected to underline how to get the best results in Techno-CLIL practice.

1.6 Definitions

The basic terms which were frequently used in this study have been defined below.

CBI: Content-based Instruction. (Stryker & Leaver, 1997).

CLIL (Content and Language Integrated Learning): “refers to situations where subjects, or parts of subjects, are taught through a foreign language with dual-focussed aims, namely the learning of content, and the simultaneous learning of a foreign language” (Nation, 2009).

EFL: Abbreviation for English as a foreign language (Nation, 2009).

FL: Foreign Language (Gonen, 2015).

L2: Second language of an individual (Schwartz & Eubank, 1996).

ICT: Information and Communication Technologies (Semerci & Aydin, 2018).

Techno-CLIL: The combination of CLIL teaching strategies and teaching tools, a community who targets to gather every year and share their practices about technology-enhanced CLIL (Cinganotto, Cuccurullo, 2016).

TELL: Technology Enhanced Language Learning (Chau & Lee, 2014).

Chapter 2

Literature Review

The literature review is formed in a dual focus on theoretical background and empirical data about CLIL and Techno-CLIL models. The first section presents various definitions of CLIL and proceeds with theoretical background of the approach and underpinning philosophies behind it. The second section introduces Techno-CLIL approach in comparison with CLIL model. The last section concordantly reveals the existing studies related to the research questions that aim at exploring the the impact of CLIL and Techno-CLIL models on learners' L2 vocabulary and reading proficiency development.

2.1 Definition of Content and Language Integrated Learning (CLIL)

CLIL, the acronym for Content and Language Integrated Learning, is a dual-focused educational approach encompassing both an additional language and content with a purpose of promoting target language and content competency to pre-defined levels. Marsh (2002) refers to CLIL as a dual-focused approach where there are two aims in a lesson simultaneously. Similarly, Mehisto (2002) says that CLIL lessons use language as a medium in order to learn another language and content matter at the same time. Further, it is stated by scholars that CLIL is not a breath of fresh air for language or subject education; rather, it is a progressive way for teaching both. (Coyle, Hood & Marsh, 2010). A CLIL lesson expressly has two aims and outcomes so that language and subject are integrated into each other in a way. This very frank relation between subject and language leads that CLIL is mostly called as “dual-focused education” and it contributes to learners' foreign language and content development in a balanced way (Marsh, 2000). Additionally, Marsh (2000) clearly states that CLIL is an approach which constrains to take subject or language to forefront and supports learners to develop their academic and language development equally. For this reason, soft and hard versions of CLIL, the amount of new content and new language piece given, are seen as a continuum which can be adjusted by analysing students' needs for academic and language development. To support this, Munoz-Luna (2014) highlights that CLIL is an approach which can easily maximize

fluency in a foreign language and accuracy in content with well-designed activities and materials.

Mehisto and Marsh (2008) also stress that CLIL is a natural learning environment where subject matter and language feed each other in such a way that all the language skills are responsively integrated and they serve to a meaningful purpose which is sharing new information. This definition indicates that CLIL provides learners with authentic contexts where the learners implicitly use the pieces of language in order to express their meaning to the other party. Accordingly, Widdowson (2010) points out that CLIL is the medium for enhancing motivation of L2 learners through which they face with an authentic context where they can freely speak and enjoy. Through CLIL practice, learners undoubtedly feel themselves confident and eager to speak in L2 about a specific content area.

According to Coyle (2010), CLIL is essential to be practiced as it makes learners literate in a foreign language. She bases her definition to a multi-component 4Cs framework with a prior statement (1999); CLIL is distinctive because it supplies learners with a contextualized setting where they can *communicate* with each other upon a specific *content* matter and learners are presented a *culturally*-enriched learning process which helps promoting their *cognitive* development. Tidblom (2005) supports this combination of multifactorial elements in CLIL by pointing out the importance of changing the place of language and content from time to time. She explains that the language may be the focus in a CLIL lesson whilst another day the language may be the medium in order to understand the topic of the day. Correspondingly, Ruiz de Zarobe and Catalan (2009) stand up for Tidblom's idea by stating the fact that CLIL has so many objectives that there should be smooth transitions between each other. Naves (2009) also sets a number of parameters for adequate CLIL efficiency which also points out this transition; as long as target language is contextualized a CLIL teacher can practice linguistic studies absorbed in a content. The other parameters that Naves mentions are about the importance of CLIL teachers' being proficient both in target language and new content, the significance of parents' being informed and in contact with teachers about CLIL practice, the respect to be shown for learners' L1 and culture to base learning on a

safe ground, and pre-defining materials and assessment tools. Naves categorizes these parameters as pre-while-post CLIL practice necessities which can be easily yet carefully followed by CLIL teachers during implementation.

The abovementioned definitions regarding CLIL have touched on different aspects of the approach which shows the reader that CLIL serves important purposes in teaching a language and content with the help of its' multi-functional nature. The following section will dive into the history of CLIL approach by concentrating on the underlying philosophies that consist of the nature of CLIL.

2.2 Theoretical Background of CLIL

“Classrooms in the world over are full of people who, for different reasons, are learning additional languages and/or are studying through languages that are not their first” (Dalton-Puffer, Llinares, Lorenzo & Nikula 2014, p. 213).

In today's modern world, individuals go through a multi-factor process in order to choose a foreign language to learn. Some of these factors are the time set aside to learn this specific language, the needs and interests of the learner, input and intake, the current age, and the geographical position (Edelenbos, Johnstone & Kubanek, 2006). They commence a language learning process with all these contributing elements. Across the globe, individuals face with different language teaching techniques and methods and accustom their learning accordingly.

Considered as a an innovative and interdisciplinary teaching strategy by many scholars and teachers around the world, CLIL is one of the best-fit approaches in language and content teaching through target language communication and content development across the world (Dalton-Puffer, 2007). Despite the fact that CLIL has started to be increasingly used in the last few decades, the term takes its roots from 1960s. With the arrival of a change in formalisation in language policy of Canada, dual language programs, namely French imersion programs, were started to be practiced in order to preserve the key differences but generate mutual goals in multilingual territories (Genesee, 2007). French immersion programs were called as bilingual education systems where the children who did not speak French as their mother tongue could voluntarily participate in and receive content education in

French language. The implementation of this program leveled primary and secondary schools in Canada through teaching content specific knowledge in the existing curriculum through French language. Cammarata (2009) states that the primary goal of the immersion was to educate students in a way that they could both master at French language and content in a balanced way. By studying a curricular subject through a target language, both English and French-speaking Canadians were expected to show a mutual respect to each other as they became familiar with each others' culture (Baker, 1993).

After a few decades, when 'immersion', 'CBI (content-based instruction)', 'bilingualism', 'target language as a medium of instruction, 'dual focus programs' approaches were grounded and unconsciously used as a technique from primary to high schools without a specific umbrella term, CLIL, was originally defined and named in 1994 with an academic definition to teach a school subject through a foreign or second language rather than the native language (Coyle, Hood & Marsh, 2010). 2 years later, UNICOM, University of Jyväskylä, and the European Platform for Dutch Education emphasised on the main point of the term which is simultaneous learning of content and language (Darn, 2006).

When the terms related to content and language education in a simultaneous way seemed closer and they were practiced more frequently in several European countries such as Austria, Finland, Hungary, and Spain in 1990s, CLIL attracted the attention of Europeans. Marsh (2002) claims that this attraction stems from both political and educational reasons. The political reason was that there was a stability in mobility between European countries, henceforth European Parliament found it necessary to increase L2 competence of European citizens through CLIL. As for the educational reason, it was seen essential to raise the number of the multilingual students who could serve their countries better. When CLIL was reported by European Union, the following lines of the report have clearly shown the promising and purposive sides of the approach:

This method (CLIL) can contribute to individual and collective prosperity and it can strengthen social cohesion. The method thus presents a practical tool for promoting European citizenship while increasing student and worker mobility at the

same time. A necessity for the promoters that are contributing to the introduction, development, coordination and extension of CLIL has been recognized, as well as the special training of teachers. Council of the European Union in their press release notes (2005) states that ‘the exchange of scientific data and good practices should also be encouraged at the European level’ (as cited in Ioannou & Pavlou, 2011 p. 22).

A year later when Eurydice Reports were released in 2006, the reports included 30 European CLIL teachers’ reflections on their implementation processes to discover their hidden perceptions towards CLIL. The reports have carried a huge importance in terms of defining the philosophies of CLIL one more time in a more clear way. It has been markedly underlined once more that CLIL does not cover language lessons yet it covers all types of content teaching procedure through a foreign language.

As for the last decade, there has been a massive increase in the number of research in CLIL field. However, these studies have more focused on soft version of CLIL where linguistic objectives surpass the non-linguistic objectives (Marsh, 2012). Nevertheless, it has started to be proven to be more important to focus on the studies which compare the correlation between CLIL and whole-student development with the help of the projects for professional development of CLIL teachers and studies which were carried out to point on the rich variety of CLIL in terms of providing learners not only with linguistic but also with non-linguistic, topical development.

The CLIL Teachers’ Competence Grid document published by Bertaux, Coonan, Martin and Mehisto (2010) and the European Framework for CLIL Teacher originated by Frigols (2011) are regarded as the most important guidelines of the last decade, as stated in Hanesova’s meta-analysis CLIL study (2015), for the professional development of future CLIL teachers. The point often overlooked in both documents is that a CLIL teacher should adapt CLIL technique to local context successfully including influential course development and translating plans into action properly. While enumerating CLIL policies, it has been highly repeated that a common framework should be followed for pre-definition of objectives and

implementations to reach these goals. In particular, Coyle's 4Cs framework has been emphasized in order to include all needs of the learners. The following part will define the basic principles of 4Cs framework which composes tenets of CLIL approach, as well.

2.2.1 The 4Cs framework for CLIL. Coyle (1999) developed a frame including the most significant four C's for the successful implementation of CLIL. These elements, namely content, communication, cognition, and culture compose the underlying philosophies of both language and content teaching course development and implementation. In the light of placing a special emphasis on, this study aims at taking the 4Cs into account while lesson plans are designed during the experimental process. The framework's nature, designed by Coyle (1999, 2005) is volute as the components are integratively connected to each other. Meyer (2010) supports the framework by calling attention to the CLIL teachers and textbook writers to create CLIL activities and materials which follow four of the elements at the same time. Content, the curricular topic should be presented learner in defiance of the thinking level of the learner, who could feel himself motivated to communicate to gain an intercultural awareness in his own context.

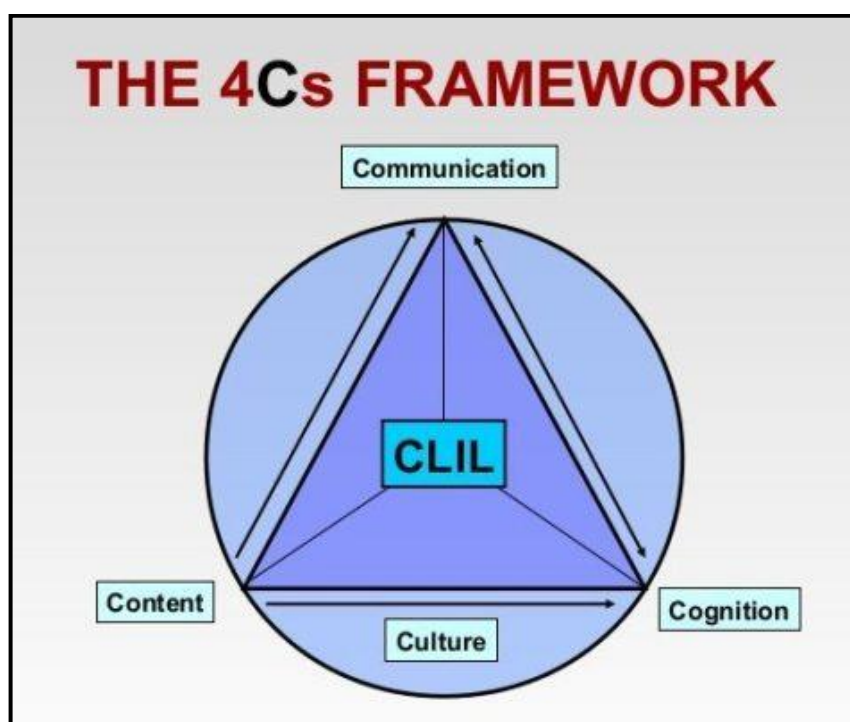


Figure 1. The 4Cs framework of CLIL (Coyle, 2005)

In order to combine these four elements during CLIL implementation, the content area and objectives should be pre-defined, the communication tools should be clearly provided with the learners in a healthy environment, the cognitive demands should be determined at an optimum level to the learner and the cultural texture should be closer and understandable from the learner side. The following sections will define the four components of the framework in detail.

2.2.1.1 Content in CLIL. Content refers to the progression in knowledge. Lorenzo (2007) remarks that CLIL's earliest form was content-based instruction. Having evolved from CBI to CLIL decades later, CLIL should always take the content into consideration. According to Coyle (2005), content should be the first thing that a CLIL teacher should consider: "What am I going to teach?". The question should be thought meticulously so that learning objectives and outcomes could be pre-defined. She also adds up the importance of contextualization through content. Klimova (2012) supports that it is difficult to turn a grammar point into a contextualized form but CLIL's nature is always suitable for diving into a meaningful context with the help of the content area. By complementing general knowledge of the learner, CLIL also enables learners with a wider vision of their own living context (Mcdougald, 2016).

There are numerous contents which could be integrated in CLIL practice such as history, geography, science, maths, art, environmental issues, health, etc. As CLIL is an interdisciplinary approach through which learners deepen their knowledge upon a specific content by using another language as a medium to communicate and exchange information, and Palmer and Littlewood (1981) claim that information transfer is an active process where students, with the guidance of teachers, are involved in reorganizing a piece of a language into a diagram, maps, charts, tables, drawings in receptive or productive modes of language, CLIL learners actively move information about a particular subject from one source to another (Bentley, 2010). The increase in content knowledge and language use can be easily observed in a learning process where the learners unconsciously use the language in order to negotiate their meaning. As Darn (2006) suggests, this increase in content knowledge through a foreign language from the early ages will help learners reach high quality life standards in their personal and bussiness life, as well.

2.2.1.2 Communication in CLIL. Communication refers to maintaining interaction, using another language rather than the native language to communicate. Coyle (2005) strongly defends the opinion that language is beyond the grammatical points and words. Language, as in real-life, is an unconsciously used medium which is naturally spoken to state an opinion, idea, or a belief. Language should be taught in a context, (Krashen, 1985; Swain, 2000) embedded in a subject matter in a way that it is used with a motivation to reconstruct the knowledge. Coyle (2005) reminds that it should be pre-defined that what kind of language and vocabulary learners will use through CLIL practice. She also adds that it is quite important not to create a language barrier for the learners that they can voluntarily participate in the lesson. CLIL teachers should navigate learners to acquire new language pieces and teachers, in this case, should use certain SLA knowledge such as strategies for enhancing oral production such as echoing, repeating, modelling, or they should create a mutual classroom culture where learners know when to work as a whole and when to work as individually (Bertaux, et al., 2010). They also state in their CLIL grid that learners code-switch to L2, use their mother tongue, or even apply translanguaging during communication as long as the teacher knows when and how to consult them. It is important to constitute a communication setting for the learner where he never feels demotivated to show his ability of self-expression.

As another advantageous side of CLIL, its' nature provides learners with an opportunity of bilingual education. Students in a CLIL lesson remarkably code-switch their language in order to be fully engaged in the content and keep up with the topic. Switching the target language for the sake of a meaningful purpose has been proven to be quite beneficial especially if it is made in early ages (Shatz & Wilkinson, 2013). CLIL provides learners with a meaningful purpose to communicate; learners are instinctively motivated to express themselves in a communicative environment through socializing. Nikula (2016) has also stated that bilingual education and communication in another language with the help of CLIL prompt learners to develop their life-long learning skills and their minds like a dual-core processor. This suggests that CLIL helps learners to discuss over a subject matter in another language unconsciously as their mind gains tendency and practice in processing both new information and language piece at the same time.

2.2.1.3 Cognition in CLIL. Cognition refers to constructing one's own understanding through activating thinking skills. Coyle (2005) stresses out the importance of analyzing learners cognitive levels in depth before learning phase starts. She says that a CLIL teacher should find out the activities that trigger higher order thinking skills. Bloom (1984) also claims that acquiring a subject knowledge or learning another language is strongly related to the student's thinking system – cognition. As suggested by him, cognitive performance is a hierarchial continuum which goes from simple to difficult. Bloom's taxonomy of learning domains is as presented in Figure 2.

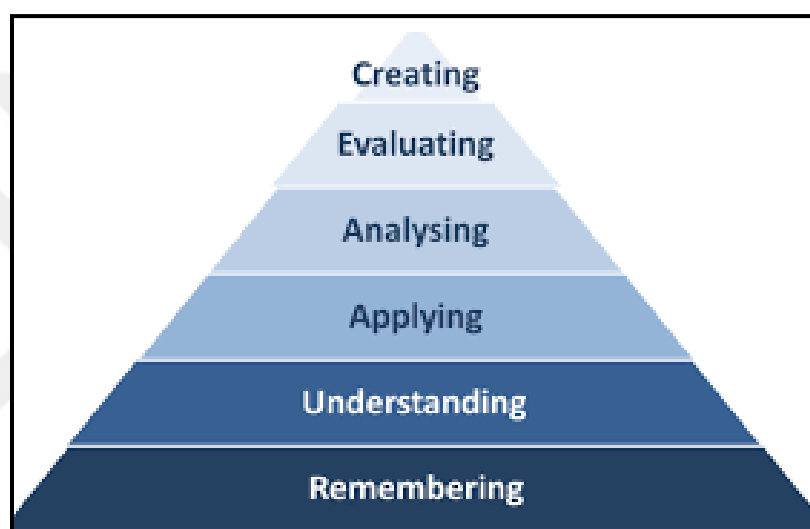


Figure 2. Bloom's taxonomy of learning domains (Bloom, 1984)

The first level refers to remembering which demands learners to recall facts or specific information by defining, listing, or stating. The second level, which is understanding, refers to comprehending and constructing meaning by interpreting and summarizing the knowledge. A learner can explain a fact or compare two knowledge in this level. The third level, namely applying, demands learner to use a conceptual knowledge in a new situation. In teaching, this level often refers to the fact that learners apply a concept that they learn in classroom outside the classroom. The fourth level, that is analysing, requires learners to break down knowledge into components by classifying or categorizing. Analysing helps learners to separate facts into parts so that they can make distinguishments. The fifth level, which is evaluating, is being able to state personal judgements about the value of information,

concepts, or ideas. Through evaluation, learners defend, support, and criticize ideas, decide on the concepts by relating them to certain facts. The last level, creating, refers to combination of the parts to make a whole. At this point, learners creatively work on their design, generate their ideas accordingly and relate their pattern to a base for a coherent and meaningful creation.

It has been seen in many studies that the activities which follow this hierarchical ordered thinking skills and feed learner accordingly lead to growth in learner's cognition. Hanesova (2014) has found out in her research that from primary to higher educational schools in Slovakia, critical thinking skills through CLIL implementation have been invested upon and various activities such as De Bono's six thinking hats, lotus blossom technique, and mind-mapping were prepared according to the taxonomy developed by Bloom. Qualitative data results have also shown that both younger and older learner groups were positively affected by CLIL practice including activities designed according to learner's thinking process, namely cognition. Bloom (1984) finds it important to analyze the thinking procedure of the learner in order to create effective tasks and promote learning. He adds that all the stages in the taxonomy are related to each other. A learner must remember a concept before he can get a deeper understanding of it, or he must finalize evaluating a structure before creating a new one. Consequently, it is important to form ladders of CLIL tasks which promote learners' cognitive development.

Defined as a dual-focused teaching approach (Coyle, Hood & Marsh, 2010), CLIL requires some demands on the learners both linguistically and cognitively. Cummins (2000) has designed a quadrant where there are pies involving different demands from learners. Coyle (2005) adapted Cummin's quadrant under the title of 'The CLIL Matrix' in order for CLIL teachers to redress the balance between cognitive and linguistic demands.

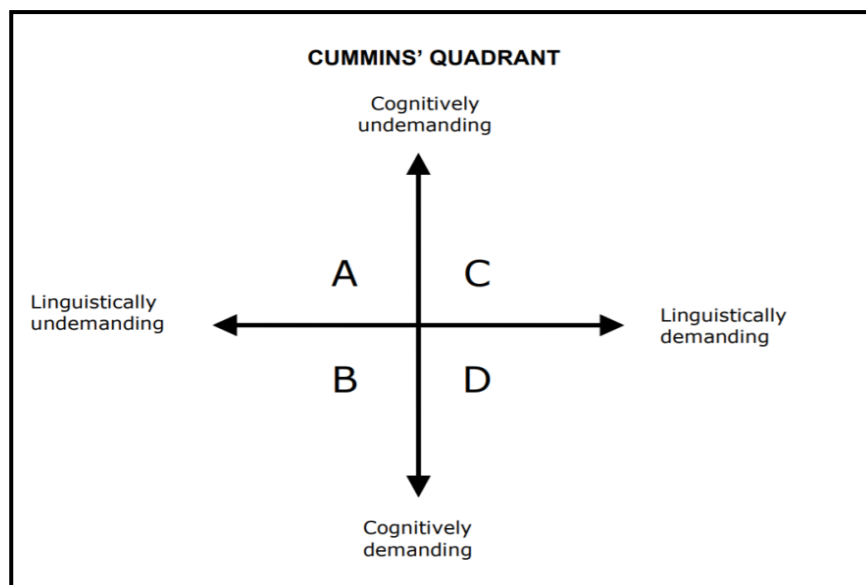


Figure 3. Cummins' Quadrant about Language and Cognitive Demands in CLIL (2000)

Cummins' Quadrant helps CLIL teachers categorize input, CLIL activities and materials according to their demands and difficulties (Barbero & Damascelli & Vittoz, 2013). According to these researchers, 4 Quadrants can be clarified in CLIL context as follows:

1. Quadrant A means that both language of the input and the input itself is undemanding – quite understandable for the learner with an easy context and guidance such as a visual, or a listening track, etc.
2. Quadrant B indicates that the language of the input is understandable with a clear context provided to learner; however, the input (content) is demanding which requires cognitive effort.
3. Quadrant C accounts to the difficult language such as content-specific or technical words (CALP) or demanding instructions; however, input is not demanding much cognitive effort from the learner.
4. Quadrant D is perceived as the most challenging part of the Quadrants since there is little contextual or linguistic support for the learner. The input and the language used as means of communication are kept at an abstract level and learners are required to make a cognitive and linguistic effort to keep up with the CLIL lesson.

As another point to be made about cognitive requirements of CLIL, learners are expected to use content specific vocabulary in target language during CLIL practice. For this reason, vocabulary is seen as the key for a comprehensible communication. Arribas (2016) closely relates the vocabulary development in CLIL contexts to the great amount of exposure to new vocabulary items and their continuous repetitive cycle. When this cycle is considered as a part of language development, it was divided into two main parts by Cummins (2000) as BICS (Basic Interpersonal Communicative Skills) and CALP (Cognitive Academic Language Proficiency). CLIL students are not only required to negotiate what they want to say through everyday language which is based on BICS; they are also required to use and internalize certain content specific words as a part of academic language.

In order to maximize these two aspects to as high level as possible for a learner, CLIL meets its' learners with different kinds of vocabulary stages through a specific content. Bentley (2010) has brought 4 different types of vocabulary into the CLIL academic field so that CLIL teachers and learners can easily notice what type of a word that they currently and specifically work on. These four stages are as follows:

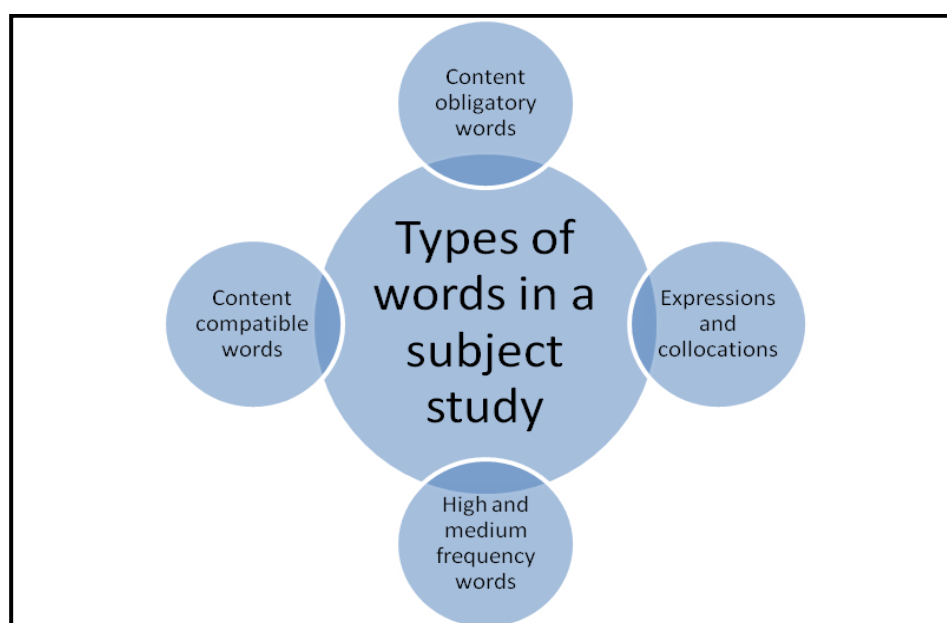


Figure 4. Bentley's categorization of words in subject study through a second language (2010)

Content obligatory words stand for the words that are specific to a content which must be known by a learner in order to understand that content. Content compatible words mean the words that might be passed in another content, as well. A word might be specific to two subject areas such as *centre*. High and medium frequency words are the words that belong to both BICS (everyday language) and CALP (academic language). Consequently, expressions and collocations indicate the words that are used both in BICS and CALP in specific contexts.

Content obligatory and content compatible words are two foci for the vocabulary development in CLIL lessons (Bentley, 2010). It has been strongly keynoted that the content words can easily be taught within an authentic context and this does not require a definite competence in that subject area (Snow, Met, & Genesee, 1989). Cummins (2000) supports this thought by stating the fact that it takes learners at least five years to attain a level of English suitable for academic school study. It can be deduced from this statement that CLIL at primary level should indeed provide learners with opportunities to use the language and vocabulary needed to understand and communicate knowledge of curricular subjects (CALP), through a variety of writing and speaking tasks.

2.2.1.4 Culture in CLIL. Culture in CLIL refers to fostering international understanding through self and other awareness. It has been assumed that intercultural awareness and learning is essential in CLIL (Byram, Nichols & Stevens, 2001). Language and culture are seen as so tightly coupled that when they are separated, one of them will undoubtedly decrease in terms of performance (Brown, 2002). For this reason, it is essential not to separate culture from the language that is spoken over a content area. Coyle (2005) highlights the importance of culture with the collaborative tasks and group activities where learners work as a whole and show each other mutual respect. Fontecha and Alonso (2013) note that the most important feature of CLIL is its' dynamic and moving condition as a group learning rather than merely being parts or members of a team. Unlike individual learning, which can be competitive in nature, students learning cooperatively in CLIL lessons can benefit from one another's knowledge and skills, evaluating each other's ideas, monitoring their group works. During this process, they learn from

each other's culture by being a member of the community, as well (Marsh, 2002).

Beyond the classroom borders, it is important to note that CLIL provides learners with a context where they go outside the classroom and try to understand the others in the world. Coyle (2005) suggests that there should be the development of sympathy with the people whose language the learners use as a medium to communicate in CLIL practice. If there is a drought in that country, learners should be asked what they could do in order to come over the problems, or she offers to build a contact between two countries or people from different nationalities in real life. A recent study conducted by Papadopoulos and Griva (2014) has revealed that building sympathy and carrying out intercultural activities through CLIL lessons both increase language and content achievement of the learners. 30 Albanian immigrant students who lived in Greece were taken into an experimental study where they studied on the Greek traces and learned their cultures accordingly. The results have shown that they showed a great performance in internalizing the knowledge and getting familiar to target culture at the same time. The study shows that building synergy and mutual understanding across the cultures become quite easier in CLIL practice.

Taking everything into account, 4Cs framework carries a huge importance in CLIL implementation and it is strongly suggested to be taken into account in creating lesson materials, activities, and plans by the researchers and scholars.

2.3 Technology Integrated CLIL Implementation (Techno-CLIL)

Lakhana (2012, p.12) states a thought-provoking idea: "Our tools can both limit and liberate our next thought." By means of technological tools, digitally competent learners of the twenty-first century generation are provided with fast, reliable and communicative learning platforms. As the learners' needs, interests, and values are reshaped through technology, educators find new ways of language teaching strategies. Zengin (2007) emphasizes that there can be seen a huge difference between 20th and 21st century classes with the arrival of technological innovations. Throughout time, technology has enabled more motivation and source of an achievement for both teachers and learners of foreign language. Integrating technological tools into EFL lessons has helped them set up explicit objectives for

learning (Wiebe & Kabata, 2010). Technophobia among the teachers, defined by Lam (2000), was once the fear of integrating technology into classrooms. Today, "...though it initially faced some resistance from teachers, teacher trainings helped them gain the awareness, confidence and necessary" (Bozdogan, 2015, p.164).

As the recognition of ICT use' positive impacts on classroom has risen, there have arisen various digital contexts where actual learning has started to take place. Malagon (2017) states that CLIL and technology integration helps whole learner involvement and increase in the learner interest as the rich variety of technological tools appeal them to learn more and more. By the help of digital platforms, students have been observed to be more willing towards a new language, more confident in monitoring their learning, and more motivated as they feel closer to the digital learning environment. As a commonly used ICT resource, e-books are quite loyal guides in language learning process. "The effects of using e-books are considered beneficial in extensive reading programs in many first- or second-language classrooms" (Chou, 2016, p.1). It is seen that e-books are the head assistants of the learners in developing their literacies both in their mother tongue and second or foreign language. Alongside the e-books, other ICT materials not only help learners gain confidence and motivation towards L2, they also help them develop their language skills. All in all, ICT resources play an important role in language learning as long as they are manipulated purposively by the competent teachers and digital natives.

Recently, teaching a specific content and a foreign language through computers or other technological devices is in high demand. European Commission (2014) has announced that CLIL and ICT integration has so many positive aspects in terms of quality of the education and learner's whole involvement in this educational setting. It helps learners to discover their potential in an authentic context where they communicate for real-life reasons with the help of technology. Since they feel themselves closer to digital contexts rather than classroom environment, they feel eager to follow what goes on around them in a CLIL lesson. Vesela (2012) has also clearly demonstrated in her meta-analysis study that CA-CLIL, namely computer-assisted CLIL, is considerably successful in satisfying the needs of the third millenium foreign language learners and learning environments. Judging from the

previous studies carried out related to computer-assisted CLIL, Vesela (2012, p.59) also lists the principles of integration of CLIL and computers as follows:

- i) Constructivism and connectivism as background philosophies
- ii) Learner-centeredness and learner's autonomy
- iii) Interactivity
- iv) Task-basedness
- v) Cooperative and collaborative learning

CLIL and computer integration helps learners construct their own understanding throughout language and content learning. In addition to individual construction of knowledge, learners also have a chance to connect people from all around the world with the help of technological tools as the yield of digital age. Learners not only understand the other cultures and how their lives go on but also gain opportunities to build networks with people across the globe. As every learner has a computer to work on they discover their own learning strategies but it does not deter them from keeping in touch and being involved in an interactive communication where they can even talk through the speakers, keyboards, or Skype. Moreover, computer-assisted CLIL lessons frequently promote task-based learning hence group and pair works. Through this fruitful integration, learners build their own understanding within groups where they interactively learn language and content interrelatedly.

The term Techno-CLIL was first used by two Spanish scholars, Cinganotto and Cuccurullo (2016) for a European community project which is gathered annually with the participation of more than 5000 foreign language teachers from all around the world and which gives an opportunity them to share what they do to integrate ICT with CLIL and how it can be implemented better in different contexts. Meanwhile, they re-discuss over the theoretical background of CLIL, how to prepare and adapt materials and plans for Techno-CLIL, how to assess learners and raise awareness in their minds. The project arouses curiosity each year more and more with the online sessions so that everybody can have an access and actively join to see different Techno-CLIL implementations across the world. The teacher training lasts for 5 weeks and they are expected to explicitly show how they practice a lesson. They prepare their lesson plans including all the procedure with the web links, and

they reflect on how their students have felt on each stage. They share their journals with the other reflective practitioners in a cycling way.



TECHNO-CLIL FOR EVO 2016
Moderators: Letizia Cinganotto & Daniela Cuccurullo
Mentor: Nellie Deutsch

My experience in Techno-CLIL

Name and surname	Nicoletta Ferri
Country and city	Italy - Piacenza
School level	Primary School
Subject/s taught	I teach Italian and English in class 1
CLIL previous experience (if any)	I had never attended a CLIL course before but I've been teaching English for years and I did some topics in English, especially in class 4 and 5, about healthy food, daily routine, animal... I helped the children to develop a project about their hometown with historical hints, pictures and explanations.
The best two webinars for you. Why?	20th Jan - Webinar with Kent Andersen I liked it because it focused on CLIL resources you can find on the web and because I could experience how to share the tasks between teachers in a CLIL team. 26 Jan - Webinar with Donatella Nucci and Max D'Innocenzo I liked it because it was about eTwinning.
The best learning material/s. Why?	All material suggested was really interesting but I liked Learning Designer very much because it allowed me to develop a few lessons in details focusing on the single steps and giving a visual scheme easy to read and understand.
Your best digital product/s within Techno-CLIL (brief description and link)	Lesson plan about road signs. The children will learn how to behave along the road, to recognize the road signs, to become aware of the rules of the road and respect them to be safe when they walk to school or when they cycle alone. http://v.gd/cpCSRl
The best two activities in the platform. Why?	I think the best activities were building a learning diary and using Learning Designer. Building a diary was a good experience because it allowed me to learn a new tool, which I found very nice, and to realize my progress during the course. Learning Designer was a useful tool to use to build lessons.

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Figure 5. A Reflection Paper from a Techno-CLIL Teacher in Italy (2016)

With the recognition and awareness raised among foreign language teachers, the studies have started to focus more on Techno-CLIL studies with ICT competent foreign language teachers who can practice any kind of digital tool or platform in their classes without any concern or demotivation to apply. Pellegrino, et al. (2013) have created a virtual CLIL environment which offers Erasmus learners study Linguistics through Italian language in University of Naples. After receiving 75 hours of CLIL education in the e-platform of the university which is CILA MoUVE, the results have indicated that online video lessons have helped Erasmus students to progress in morphological, syntactical and semantic fields in Linguistics. Binterova and Kominkova (2013) have also focused on upper-secondary school level in Czechia and conducted a study about teaching Mathematics in foreign language through computers with enjoyable group work activities such as crafts in Aritmetics and coloring games; results have shown that even learners who have problems with Mathematics have started to build positive attitudes towards it. As another effective tool, interactive whiteboards have proven to be a motivation booster in Techno-CLIL lessons, as well. Duran and Cruz (2013) have made an experimental study about CA-CLIL which targets to teach a foreign language through stories to 2nd and 6th grade level bilingual students in Spain. This study is relatively perceived as the soft version of CLIL; the stories were chosen according to the levels and interests of the learners and the results have indicated that both groups were highly motivated and involved in the stories when they encountered colored web-sites and moving images inside the online story sites.

When CLIL and ICT meets on a commonground, educators and instructional designers have started to develop well-designed digital learning contexts where learners feel energized and activated to learn the content matter through a foreign language by putting their native langauge aside. During Techno-CLIL project (2016) carried out by Cinganotto and Cuccurullo, various platforms were shared as the most favourite ones in terms of getting efficicency from the learner and learning process. Most of the teachers have stated that Padlet is one of the best platforms that they use everyday instead of boards. “Padlet (www.padlet.com) provides a free, multimediafriendly wall which can be used to encourage real-time, wholeclass participation and assessment” (Fuchs, 2014, p.7). Padlet is an online board where students can write, edit and shape according to their wishes.

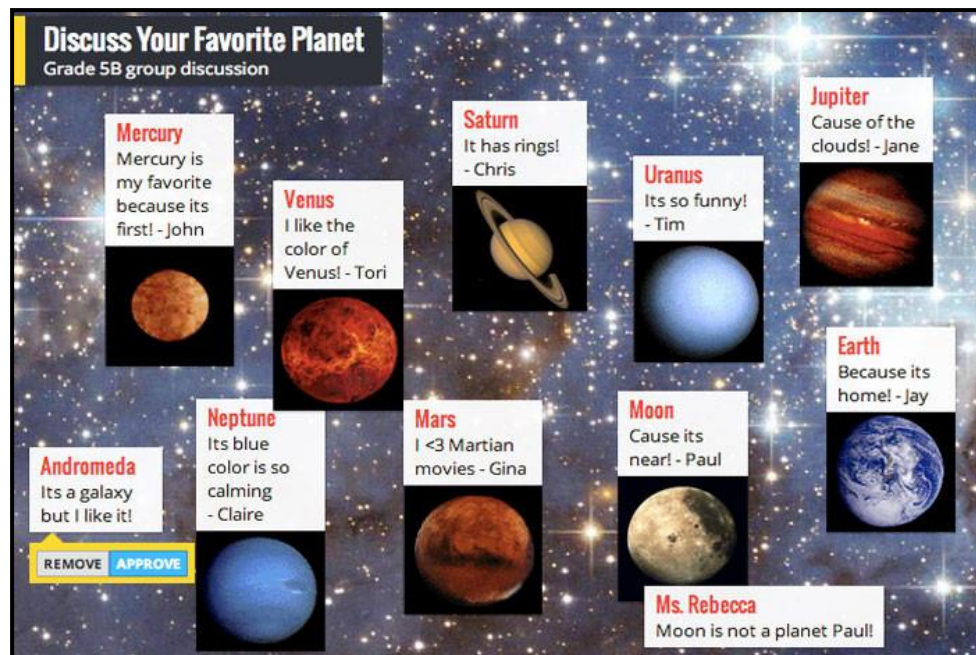


Figure 6. A Techno-CLIL lesson based on Padlet

Teachers from all around the world have also claimed in Techno-CLIL training project that word cloud generators are quite useful in brainstorming. Bubbl.us, Popplet, Wordle are decided to be the best websites in order to create a mindmap.

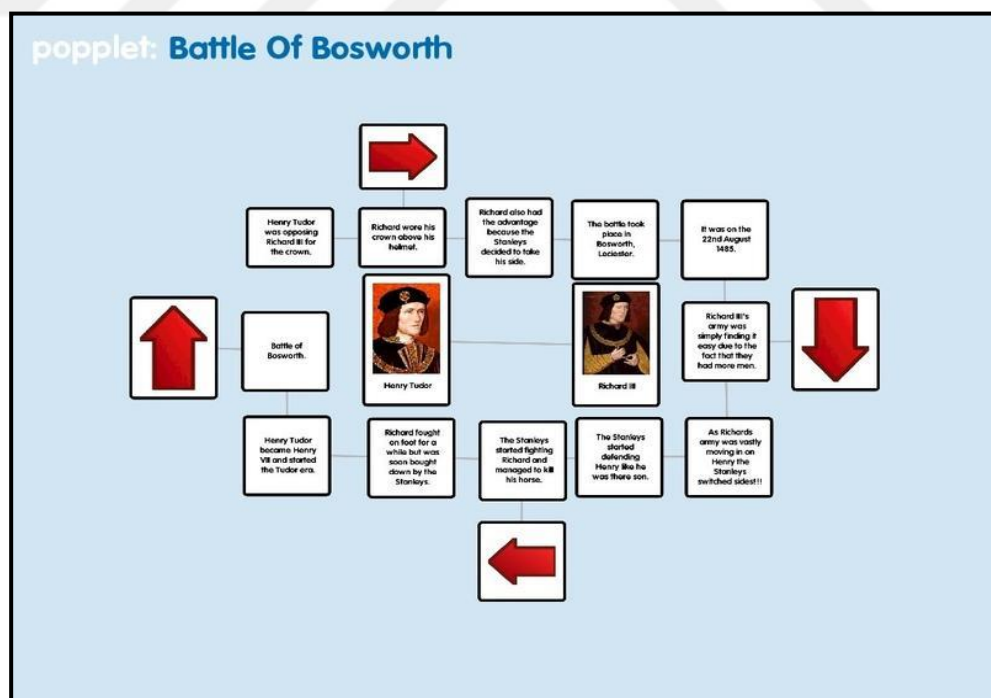


Figure 7. A Techno-CLIL (History) Lesson on Popplet

2.4 Studies on CLIL

Over the last decade, CLIL has been the focus of many studies regarding foreign language teaching, learning strategies, motivational factors, or other non-linguistic fields (Wolff, 2005). While a great major of study was conducted to see the relation between CLIL implementation and linguistic achievement, a good amount of research has focused on the motivational gainings of CLIL and professional development in CLIL. This section aims at presenting the previous studies related to the formerly mentioned fields.

2.4.1 L2 linguistic achievement and CLIL. Studies have shown that the relation between CLIL lessons and student's linguistic achievement is quite positive. To start with, as a large scale country policy, Germany gives bilingual education in French and English as France and Germany have *The Treaty of Friendship* for almost 60 years. German students who start to study secondary school start to take CLIL classes as well. A study which explored the differences between German students who took CLIL classes and who did not take them have revealed that CLIL students outperformed the non-CLIL students in terms of confidence in language use and overall linguistic achievement (Rumlich, 2014). It has been observed that CLIL students are more motivated to participate in the lesson and have a word in a foreign language because they are already accustomed to speak over a subject area in another language. Also, it has been seen that CLIL learners' receptive skills are relatively better than the non-CLIL learners as they are given regular follow-up tasks or homeworks which include writing, producing, and presenting. Oral and written production have been highly invested in CLIL implementations whereas the language pieces are studied separately in non-CLIL classes in Germany.

As another example, Lasagabaster (2010) carried out an experimental study with 191 secondary school students in Spain in order to observe the linguistic development from a closer perspective. It was revealed in the study that CLIL learners in all language sub-skills showed a growth whereas non-CLIL learners remained stable. Particularly, the growth in speaking performance attracts so much attention that it is highly connected to the motivational development of the learners. As the CLIL learners are involved in contexts which require fluent oral production,

they seem to practice language as a means of communication relatively more than the non-CLIL learners. However, Seikkula-Leino (2007) has shown in her study that students should be provided with enough language concept in order to make healthy oral production. In the study, 217 Finnish students from 5th and 6th grades were observed while using their mother and second language during CLIL instruction. It was seen that L1 was not negatively influenced by CLIL; but students felt lack as they had low foreign language concept in their minds inspite of having high motivation to be involved in CLIL lessons.

With a purpose of providing learners with enough foreign language concept to take part in CLIL instruction, learners should be provided with the necessary vocabulary of the content area. Apart from the oral production, it has been also observed that CLIL is a fruitful setting for vocabulary investment (Bonnet & Dalton-Puffer, 2013). Arribas (2015) used VLT in order to explore the lexical growth in Spanish learners through CLIL instruction. 403 secondary school students have shown a remarkable growth in their vocabulary knowledge after CLIL training which is related to the contextualized education by the researcher. As the learners encounter so many content specific words and actively use them in an authentic manner; it is seen that this exposure leads learners to develop positive attitudes towards language and prompt themselves to learn the lexicon of that language in order to speak or comment.

A recent study carried out by Moghadam and Fatemipour (2014) has aimed to develop secondary school learners' vocabulary knowledge through CLIL lessons and compare the results with the non-CLIL classes from two different cities in Iran. Results have revealed that 40 CLIL learners show better retainment in newly learnt words in Maths lesson than the other 40 non-CLIL learners. The main evidence is shown as the rich context and purposive communication through Maths provided to learners through well-designed materials in the lessons.

Similar with the context of the present study, Alonso (2013) found in his study that 79 6th grade CLIL students show a better performance in their vocabulary knowledge change than the non-CLIL students. The growth in this performance is related to the exposure to foreign language for a short period of time as it is observed

that CLIL and non-CLIL students have shown a similar growth in their vocabulary size according to VLTs. It can be concluded from Alonso's study that a longer period of instruction time and more exposure to vocabulary in CLIL classes are essential in order to analyze the difference of the CLIL and EFL setting's impact on vocabulary growth.

Another approach to CLIL and vocabulary learning comes from Sylvén (2006). She conducts an experimental study between 7th grade students in Sweden and observes their vocabulary use in CLIL and non-CLIL classes. She claims that CLIL students surpass the other students in terms of vocabulary knowledge; however, she claims that CLIL students are more self-confident and they have self-assessment ability. Apart from that, CLIL students are slightly and culturally more exposed to English through films, musics, TV programmes, books, etc. Therefore, they are detected to be more competent in vocabulary knowledge; not for the reason that there is a great amount of exposure in language in CLIL classes.

Apart from vocabulary knowledge, CLIL is useful for developing receptive skills such as reading. Diezmas (2015) has carried out a research in Spain with 4th grades aged between 9 and 10 years old. He closely observed the reading development of the learners and nearly 250 hours of intensive CLIL programme later, he implicated in his study that CLIL learners outperform non-CLIL learners in reading comprehension. He relates this increase in post-test to the fact that reading is meaningfully integrated into the other skills of the language in CLIL lessons.

Another study which explored the vocabulary development through CLIL lessons was conducted in the north part of Spain. Martinez and Zarobe (2017) chose two different schools and six intact classes including 145 students. One of the schools applied CLIL methodology with a purpose of increading metacognitive reading strategies of the students while the other school followed EFL lessons and invested on the same strategies. The results after 8 weeks of treatment have revealed that the students in CLIL and EFL classes showed better results from the metacognitive reading tests than the students in control groups. It can be concluded from here that CLIL classes provide learners with autonomous and strategic learning.

A similar study which was carried out last year by Canado (2018) has shown that students are better at obtaining receptive skills through CLIL than the other skills. The study was large scale including 1000 students from different schools (private, public, or charter) in different regions of Spain. Although the study investigated the overall linguistic achievement among CLIL students, the receptive skills including reading and listening have proven to reach a higher developmental stage than the other language sub-skills.

2.4.2 Motivation and CLIL. As two clear examples from Turkish CLIL and EFL settings, Altinkamis (2009) and Nebioglugil (2015) have carried out different studies which observed motivational changes in primary level CLIL students in public schools. The studies were carried out in Adana, Turkey. The results have shown that CLIL learners are highly motivated thus showing a growth in sub-skills of language such as vocabulary, as well. Both studies relate the successful implementation to the careful analysis of the learner interests and needs. Adapting the lessons to local context is seen as the key factor in successful CLIL practice. Similarly, Bozdogan and Karlidag (2013) made a study to explore 15 students' attitudes towards CLIL technique in a state university in Turkey. The semi-structured interview results including 11 detailed questions about CLIL practice have shown that students have started to develop a self-confidence through CLIL although they state that they feel no improvement linguistically.

Pablo and Jimenez (2017) have carried out a similar research with a larger community including 194 students from primary school and 158 students from secondary schools from Spain. The purpose of the study was to carefully examine the linguistic and motivational growth of CLIL learners. It was seen that CLIL plays a key role in enhancing the encouragement, confidence, and active participation of the learners. As suggested by the other scholars (Seikkula-Leino, 2007; Lagasabaster, 2011; Pfenninger, 2016) the increase in motivation and language use mutually and positively feed each other. When the learner notices that he can use the language, he is intrinsically motivated to learn. Vice versa, when the learner motivates himself during a CLIL practice, he is naturally apt to learn and internalize more about the language and content at the same time.

Another study carried out by Bower (2017) included secondary school students in England who speak French over six hours per week. Their motivational growth has been examined and the results have shown that secondary school learners feel much more concentrated when they come across real-life objects and contexts and more eager to speak thanks to the enjoyable activities carried out during CLIL practice. According to the study, the increase in motivation in this age group will sooner or later affect the linguistic performance as the teen learners have tendency to act according to their current performance.

Apart from the studies related to linguistic growth and CLIL, Sylven has also been interested in the motivational aspect of CLIL on young learners. In her study (2015), she observed the motivational variations among the high school CLIL and non-CLIL students in Sweden. She collected data from 180 students through various instruments and stated that CLIL students were much more motivated during lessons than non-CLIL students. They were also found to be less anxious about communicating in English and overcoming language barriers. On the other hand, CLIL students were observed to have the feeling of losing L1. The fear of not being understood hence staying in the safe zone results in less motivation and active participation in CLIL students.

2.4.3 Professional development and CLIL. CLIL is a teaching approach which is used for many decades yet it still requires enlightenment about the theoretical background and philosophies behind the approach, and how to implement CLIL successfully in a specific teaching context. Therefore, there are several studies which focused on in-service teachers' perceptions towards CLIL practice (Lasagabaster, Zarobe, 2010; Hillyard, 2011; Banegas, 2012; Aguilar, Rodriguez, 2012). The former studies dating back to the beginning of 21st century have shown that teachers had affective barriers and anxieties towards CLIL (Novotna, Moussova & Hofmannova, 2001). The researchers reckon that these barriers stem from the lack of knowledge of the brand new topic and it can be overcome through integrating CLIL into curriculum. When CLIL becomes a part of the curriculum, it will start to be recognized as a traditional way of teaching just as the others.

With a purpose of shedding light into professional development in CLIL field, Lagasabaster and Zarobe (2010) have written a book over teacher training in Spain about CLIL implementation. They felt an urge and need to underline the most significant points that CLIL teachers should have in different levels of teaching from kindergarden to higher level institutions as there is an increasing interest in using CLIL in the curriculum and teachers should be aware of how to implement successful lessons through material design, adaptation, and testing and evaluation. According to them, each teacher should consciously evaluate his own teaching context and learner profile so that he can easily recognize what works and does not work in his class. They also state that there should be a smooth transition to L2 and new content which will keep learners feel safe and motivated to discover more during CLIL lessons. Another thing they strongly suggest that a CLIL teacher should have a well-designed lesson plan and pocket activities in case the learners have difficulty in understanding new language piece or topic. It is stated in the book that CLIL requires more cognitive demand from the language and content side; that is why a learner might easily have a problem in keeping up with the pace of the lesson. At this point, a successful CLIL teacher should scaffold the learner by providing a suitable activity.

Madrid and Canado (2012) state in their in-service CLIL teacher training book that a CLIL teacher might have lack of content or language knowledge; however, a CLIL lesson does not require for a teacher full proficiency in a subject matter; a CLIL teacher should know how much he should give from the content and to what extent he should present a new piece of language. Knowing the moderation will be the guidance of a CLIL teacher. Lange (2005) strongly supports the idea of training CLIL teachers more around the world as it will become the future method of the schools. He suggests in his study that Italian CLIL teachers can easily understand the main points of the approach with the help of a web-based programme even in a limited time.

2.5 Studies on Techno-CLIL

There has been an increasing interest in the research dedicated to CLIL; more specifically technology integration with CLIL for the past few years. While a clear majority of the studies looked at the motivational contribution of Techno-CLIL and material development in this area through teacher professional development; a good amount of the research also attempted to explore the impact of Techno-CLIL strategies on students' linguistic achievement. This section targets at presenting a discussion of the previous studies related to the formerly mentioned areas.

2.5.1 Student motivation and Techno-CLIL. Various studies have shown that as the facts of the modern world, ICT resources accompany with CLIL practice in quite a positive way. Wojtovicz, Stansfield, Connolly, and Hainey (2011) have made a worldwide study where 250 teachers from 32 countries stated their thoughts about Techno-CLIL and how it would potentially help learners. 76% of the respondent teachers advocate the view that learners are highly motivated when ICT and CLIL meet in a lesson. The study strongly suggests the integration of ICT in language and content learning rather than traditional methods of CLIL. However, it also states the lack of materials that will provide motivation to learners may lead a problem in material adaptation of Techno-CLIL teachers.

Another study, conducted by Angel (2015), was special for the chemical engineers who had problems in finding a virtual environment to practice what they newly learnt. The researcher observed the motivational changes in Spanish engineer candidates through real and virtual laboratory sessions where each engineer could connect to an international virtual laboratory session through WebQuest. The questionnaire results have shown that 40 engineer candidates stated that they felt more motivated in virtual sessions in specializing their content area through English language.

Through web-learning, learners encounter well-prepared materials and feel eager to participate in language learning (Stepp-Greany, 2002). The study was conducted in Florida State University where the learners took Spanish classes with the help of interactive CD-ROMs, online dictionaries, electronic pen pals, and authentic Internet activities. The results have shown that learners were interested in

the digital platforms with an enjoyment. As their nature requires, Z generation feels himself closer to technological tools rather than the traditional materials. When their learning is enriched with online platforms and activities, they feel more comfortable, unhesitant to succeed, and confident in L2 (Zengin, 2007). As a recent research, Cinar (2018) attempted to see the motivational and linguistic changes in preparatory school learners in a private university by benefiting from the content-specific videos on YouTube. After 8 weeks of intervention where the practitioner used various websites and video links to enhance the quality of her lessons, she stressed on the obvious increase in the motivation of students. She explored that learners could brainstorm on what they thought about a certain topic when they watched different videos about it. Student participants also said that they started to feel much more confident in speaking on a content area after going through Techno-CLIL procedure. All in all, it can be inferred from the studies mentioned above that Techno-CLIL is a student-friendly method which maximizes learner motivation while minimizing affective barriers with the help of technological devices.

Another study conducted by Verdugo (2012) in 3 different primary bilingual schools in Spain has indicated that young learners started to develop positive attitudes towards Techno-CLIL and foreign language when they actively participated in digital stories and follow-up games such as riddles and puzzles. Qualitative data results have shown that learners find digital games enjoyable. Researcher proposed that young learners would have much more fun while learning a specific content knowledge in another language through interactive and online resources. He also adds that assessing learners in digital platforms such as Edmodo will persist the efficiency of Techno-CLIL lessons. The lessons can be extended to homes through digital tools with a matter of a click which persists individualized learning.

2.5.2 Material development and teacher training and Techno-CLIL. As the number of the studies related to CLIL which is enriched by technological tools is pretty limited, studies that include ICT and CLIL mostly concentrate upon how to develop fruitful materials; as a further concern, how to educate Techno-CLIL teachers on designing these effective Techno-CLIL materials. As Cinganotto and Cuccurullo (2016) clearly indicated in their study, there have arisen various communities which try to develop virtual Techno-CLIL contexts opening a gate to

the learners to have an easy access to the digital learning contexts rather than merely electronic tools. Some of these communities are as follows:

1. *E-CLIL*: A European Union funded project which aims to gather designed general and specific Techno-CLIL resources for the Techno-CLIL teachers to practice in their classrooms.
2. *EVO*: Electronic Village Online is a worldwide community which gathers every year with the participation of the Techno-CLIL, subject and language teachers from all around the world. They share what they do with TELL (Technology Enhanced Language Learning) and CLIL in their own context. More and more, they share their online lessons, activities, materials and ideas with the other teachers and develop a critical perspective with the help of comparing and contrasting to the others.
3. *The Materials and Resources*: Since there is a huge need for developing online Techno-CLIL materials today, this community makes an effort to explore further digital platforms where Techno-CLIL lessons can be successfully practiced. This community not only focuses upon teaching English as a foreign language, it takes the minority languages specific to the needs and interests of the learners into the account, as well.

2.5.3 Student L2 linguistic achievement and Techno-CLIL. When the limited research related to student achievement and Techno-CLIL are reviewed, it is possible to see the advantages of CLIL and ICT mixture. What is meant by student achievement here are consisted of both academic and linguistic development from the learner side. To start with the linguistic success, most of the studies claim that learners boost in vocabulary, reading, and speaking skills with the help of Techno-CLIL. Van der Es, Dale, and Tanner made a well distinction between two ways of teaching vocabulary (2010, p. 79):

Table 1

Poor and Rich Vocabulary Tasks (van der Es, Dale, Tanner, 2010, p.79)

<i>Poor Vocabulary Learning Task using (LOTS) Remembering:</i>
Memorise these words about metamorphosis.
<i>Rich Vocabulary Learning Task using (HOTS) Applying:</i>
Use these words about metamorphosis to write a story about a butterfly in 50 words.

Rich vocabulary learning tasks tend to address learners' higher order thinking skills whereas poor vocabulary learning tasks require lower order thinking skills. In order to organise rich vocabulary learning tasks, there needs to be an interaction and context. This meaningful content can be provided by Techno-CLIL lessons. Techno-CLIL lessons serve vocabulary development incontrovertibly as the learners are exposed to a great amount of subject-based words and use them in a context to express themselves (Tragant, Marsol, Serrano & Llanes, 2016). They took 22 primary school students as a target group who is aged 8 and studies Science through English in Spain. The results of the study have shown that the second grade students have internalized specific terminology for Science such as weather conditions quickly and used these words in semantically appropriate sentences with the help of various digital tools that were involved in the teaching process such as smartboards.

As a different study, Duman and Gedik (2015) conducted a meta-analysis study which overviews the previous 69 research made on m-learning between the years 2000 and 2012 and the comprehensible overview results have revealed that learners' vocabulary knowledge has shown an invisible improvement through m-learning. Tragant, et al., (2015) also made a study about YouTube and PowerPoint in Spain including 22 primary school students. Vocabulary learning practice which was prepared by the teacher on these two platforms became a routine for the learners and they were observed to internalize the words that they practiced online regularly.

Moreover, Angel (2015) also conducted an online laboratory lessons in a Spanish state university engineering department and it was noticed in student writings that there has become a growth and change in the words that they used to

write their reports. It can be concluded from the studies that Techno-CLIL positively affects vocabulary development as the learners see the vocabulary of target language in different immediate contexts and this diversity leads to permanence in learning the new word. In order to learn a vocabulary permanently, Morgan and Rinvogluciri (2004) recommend that there should be a meaningful and interactive context so that they can be all related to each other in a unity. When the needs and interests of the learners are taken into consideration, technology aspect of the CLIL swiftly comes on stage.

As another example, Vocabulary Notebook is a digital tool designed for Techno-CLIL purposes and used by more than 17,000 people (Bazo, Rodriguez & Fimero, 2016). It has been clearly observed in the study that this application helps people develop their content specific vocabulary. By the same token, Carloni (2012) has drawn attention to the importance of corpus and web based digital tools and their positive impact on the vocabulary development of Spanish Techno-CLIL learners at university level. According to the study, online CLIL lessons have catered to autonomous vocabulary learning, as well. Additively, Dourda, Bratitsis and Griva (2014) have revealed that online Techno-CLIL games have a positive impact on the vocabulary acquisition of the primary school students who is aged between 11 and 12. At the end of the study, it has been clerly observed by the researchers that the young learner participants showed a development in their vocabulary competence hence speaking ability. As the digital citizens of the future society, it is inferred in the study that educators should proceed in uniting Techno-CLIL with vocabulary acquisition from as early age as possible. Cummins (2000) supports this thought by stating the fact that it takes learners at least five years to attain a level of English suitable for academic school study. It can be deduced from here that Techno-CLIL at primary level should indeed provide learners with opportunities to use the language and vocabulary needed to understand and communicate knowledge of curricular subjects (CALP), through a variety of writing and speaking tasks. All in all, Techno-CLIL and vocabulary development have proven to be in the same boat.

When a Techno-CLIL learner encounters a subject-specific text, he is abundantly exposed to new content and language pieces such as grammatical form or content-specific vocabulary. In that way, he naturally feels engaged in the lesson and

reading becomes a pleasurable activity (Abbate, 2018). However, as an open issue in literature, when it is reviewed, the studies made related to Techno-CLIL and digital literacy integration is quite limited. On the other hand, it has been thought that Techno-CLIL significantly feeds reading skill (Diab, Abdel-Hak & Aly, 2018). Researchers in this study followed an experimental approach and attended to develop learners' reading skills through an intervention process which included a variety of digital readings enriched by illustrations, charts, tables, and other diagrams. Researchers worked with 38 third grade students who studied at Benha University, Egypt in ELT program. They explored that the internet resources which include authentic readings helped the learners develop their receptive skills noticeably.

Garcia (2015) has also pointed out that being a digital literate individual through Techno-CLIL lessons is highly possible and easy as receptive skills are apt to be developed implicitly in Techno-CLIL implementations. In order to access information, a Techno-CLIL learner scans the text quickly and language becomes a medium for information exchange. De Graff, Koopman, Anikina and Westhoff (2007) also suggest that reading skill can be developed in Techno-CLIL lessons with the facilitation of teachers through online reading. A techno-geek learner should feel himself adapted to online reading through Techno-CLIL lessons. In a similar way, Kiriakova, Okamoto, Zubarev and Gross (2010) point out that learners can carry a world in their hands without getting tired and mobile learners deserve mobile platforms. Moreover, Lam and McNaught (2010) also emphasize that e-books privilege its' learners by offering them access at any place, any time. Through online reading in Techno-CLIL lessons, digital literacy growth can be increased at higher levels.

2.6 Conclusion

Due to the limited number of studies dedicated to the relation between Techno-CLIL and vocabulary knowledge and reading proficiency both in European and Turkish EFL context, further research needs to be carried out in order to shed light into the future. For this specific reason, the present study aims to examine the relation between CLIL and Techno-CLIL lessons and secondary school learners

vocabulary and reading proficiency development. In this way, the effects of technology upon CLIL education may be seen more clearly and a deeper insight might be gained in Turkish EFL and CLIL context.



Chapter 3

Methodology

This chapter aims to dive into the methodology of the study by defining the steps of the research design, setting, participants, implementation along with data collection instruments, procedures and limitations of the study which targets at exploring the impact of CLIL and Techno-CLIL on learners' L2 reading and vocabulary achievement and perceptions towards these approaches, as well as teacher perceptions.

In conjunction with the aims listed above, the following research questions can be formulated in the study:

- 1) Will there be a difference between CLIL group and Techno-CLIL group students regarding their
 - a) L2 vocabulary achievement?
 - b) L2 reading proficiency?
- 2) What are the L2 students' perceptions regarding CLIL and Techno-CLIL instructions?
- 3) What are the L2 teachers' perceptions regarding CLIL and Techno-CLIL instructions?

3.1 Research Design

As a research design, this study followed a quasi-experimental design by designating one class as a control and one class as an experimental group rather than assigning them with a random selection. The random selection could not be applied as the participants of the study were already set in the intact groups as two 6th grade classes. A pre- and post-test design within the quasi-experimental design is applied in the study in order to meticulously analyze the starting and final point of the learners. CLIL and Techno-CLIL implementations that will be put into practice on these two groups will demonstrate how the participants in two different educational

settings will show growth in their specific language skills which are reading and vocabulary.

In this study, both qualitative and quantitative research methods were followed. Mixed method was used in order to support the quantitative data results with the qualitative and inductive explanations. Pre- and post- Vocabulary Knowledge Scale test and L2 reading comprehension tests regarding for the observation of reading proficiency are parts of the quantitative data. On the other hand, student interviews that were made at the end of the study, reflective journals which were regularly kept by the researcher teacher and stimulated recalls of the two teachers are the qualitative data of the study. Figure 8 is the outline of the distribution of quantitative and qualitative data collected in the present study.

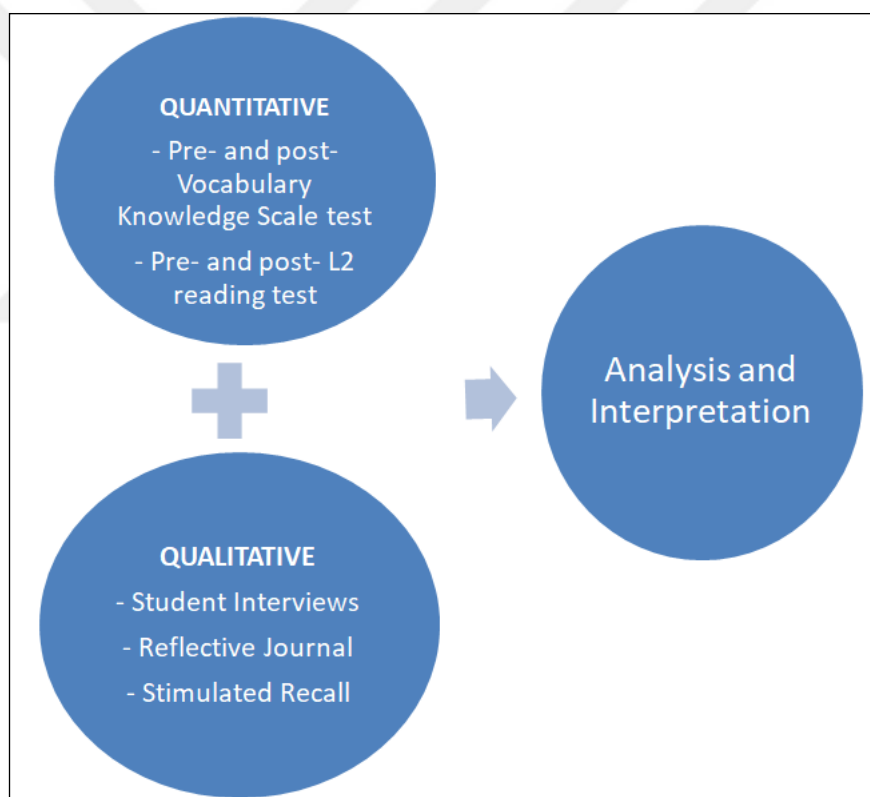


Figure 8. Distribution of Qualitative and Quantitative Data

Additionally, Table 2 summarizes the design of the research study:

Table 2

Research Design of the Study

	CLIL Group	Techno-CLIL Group	CLIL and Techno-CLIL Teachers
Vocabulary Knowledge Scale test (pre-post-delayed)	X	X	
L2 reading test (pre-post-delayed)	X	X	
Treatment	X	X	
Student Interviews	X	X	
Stimulated Recall			X
Reflective Journals			X

3.2 Setting and Target Population

The study was carried out in a private secondary school based in İstanbul, Turkey. Apart from the primary and high schools which are stated in the same campus, the secondary school delivers education to 250 students aged between 10-14. The maximum number of students in a classroom is 20. The vast majority of the population is Turkish in spite of homing to some foreign students from Middle Eastern countries, as well. The school owns a CLIL room and two computer laboratories where interactive CLIL lessons, Robotics and STEM clubs take place.

At the time of the study, there were three 6th grade classes in the school. Two of these classes were selected as control (CLIL) group and experimental (Techno-CLIL) group randomly. All 6th grades received 9 hours of English education using

Cambridge Superminds Level 6 (B1) book written by Melanie Williams, Herbert Puchta, Günter Gerngross, and Peter Lewis-Jones. The book includes 8 units and each unit includes a section (2 pages) of CLIL which aim at developing students' general and specific subject knowledge. Both control and experimental groups received 7 hours of English language education with sub-skills of language such as reading, listening, speaking, writing, grammar, and vocabulary. The other 2 hours were saved for CLIL (control group) and Techno-CLIL (experimental group) lessons which were designed according to the CLIL sections in *Superminds* textbook.

To briefly state classroom size of the control and experimental groups, experimental group (Techno-CLIL class) includes 21 EFL learners who are 11 years old. The purpose of choosing these students as the experimental class was the fact that most of the learners were members of Turkey Technology Stars – namely techno-geeks. They were believed to show a better performance in understanding and conducting the steps of digital tasks carried within digital contexts. As for the control group (CLIL class), it consists of 16 students who will receive traditional CLIL instruction without the integration of technology. As further information, Table 3 shows the gender distribution in the study groups.

Table 3
Gender Distribution in Study Groups

<i>Group</i>	<i>Gender</i>	<i>N</i>	<i>%</i>
Experimental (Techno- CLIL)	Male	13	61.9
	Female	8	38.1
	Total	21	100.0
Control (CLIL)	Male	9	56.3
	Female	7	43.8
	Total	16	100.0

It can be seen in the table that the experimental group includes 62% of males and 38% of females while the control group has 56% of males and 44% of females.

Throughout 6 weeks long treatment process, experimental and control groups received 2 hours of CLIL and Techno-CLIL education with the facilitation and monitor of CLIL and Techno-CLIL instructors. These lessons were made in the last 2 hours of each Friday which were also English lesson times for both classes. Apart from 2 hours of CLIL and Techno-CLIL education, they also received 7 hours of English main course education when they specifically studied language through communicative activities and tasks. Meanwhile, the school provides learners with a reliable reading platform to develop students' L2 reading through e-books and follow-up quizzes. The students, therefore, were required to go online on Scholastic Online Reading platform and read what was assigned on their profile everyday after school. They regularly took lexile level test (reading comprehension level test) provided by Scholastic in order to see their reading comprehension and vocabulary growth in time.

To be more precise about the general teacher profile of the school, this private school currently homes to 10 EFL teachers 2 of whom are native and 8 of whom are non-native. The researcher of the study is the participant of the study as the instructor of the experimental group (Techno-CLIL class). She has been teaching English as a foreign language for 3 years to various groups of learners between the ages of 10 and 21 in Turkey. The researcher's interest area of research is primarily Techno-CLIL technique, material design and development, and ICT in language teaching. Considering Techno-CLIL model as the most essential solution for the current teaching context, she seeks to expertise in the field of different implementations of Techno-CLIL by trying out various self-prepared lesson procedures in compliance with different Techno-CLIL strategies. The researcher teacher intended to contribute to this field with this study in which she used some pre-assessment surveys, experimented some Techno-CLIL strategies, and took some theoretical principles into account in the design of Techno-CLIL lessons, which is given in depth in the following sections.

As for the CLIL instructor, she has been working in the same private school for 20 years and she has CELTA & DELTA certificates and master's degree in English language teaching with a deep theoretical and practical knowledge about how to teach a foreign language to teens and young learners. Throughout the study,

the CLIL instructor was responsible for teaching the control group (CLIL class). In 2018 April, both the Techno-CLIL and CLIL teachers were involved in a CLIL study and received a special online CLIL training programme which was provided by Norwich Language Teaching Academy in England for 8 months. Throughout 8 months, both teachers were trained about CLIL approach both theoretically and practically. During this in-service teacher training, the main subject matters were how to adapt and prepare successful CLIL materials, lesson plans, and assessment tools, how to evaluate CLIL learners, and how to integrate technology with traditional CLIL classes. At the end of the training, both teachers decided to prepare their own CLIL and Techno-CLIL materials and assessment tools enriched by technological devices for the sake of their learners' both language and content development in the following years. As for the collaboration throughout the study, both teachers collaborated with each other in material development and lesson planning. Apart from that, they also cooperated with Science and Art teachers in order to broaden their perspectives in subject teaching through another language.

3.3 Procedures

In this part of the study, sampling, data collection instruments, data collection procedures, data analysis procedures, and reliability and validity of the study were presented.

3.3.1 Sampling. Sampling methods are the strategies in a study which selects a group of people or items from a large population in order to make measurements (Creswell & Clark, 2007). Creswell (2013) also states that sampling differs from quantitative to qualitative research as both types of research serve to different purposes. For the selection of participants in the present study, convenience sampling was applied. Convenience sampling accounts for the type of non-probability sampling technique where the participants are selected in accordance with their accessibility and proximity to the researcher (Creswell, 2012). That is, the participants of this study were selected because of their availability for the necessary context and procedure.

3.3.2 Data collection instruments. In this study, both quantitative and qualitative data were collected. Quantitative data were collected through Vocabulary Knowledge Scale which was prepared based on the textbook's target vocabulary for both groups and L2 reading comprehension test which was provided by Scholastic Online Reading platform in order to determine the reading level of the participants. Qualitative data included student interviews, reflective journals which were regularly kept by the researcher teacher, and stimulated recall. Data collection and analysis lasted for ten weeks in total, while six weeks were carried out as an implementation process during the study. Prelusively, the students took Vocabulary Knowledge Scale test which measured their current vocabulary knowledge. Afterwards, they were asked to log in Scholastic reading platform and take the pre-test for reading comprehension in order to see their current lexile (reading ability) level in a numerical way. Throughout the 6 weeks of implementation, the researcher teacher kept regular journals to record what she noticed as advantageous or challenging in experimental group from the learner and teacher side. After each implementation week, both Techno-CLIL and CLIL teachers gathered and made reflective sessions to share their weekly comments. The researcher teacher kept notes on her journal about what struck the other teacher's attention in CLIL group. Meanwhile, one implementation lesson carried out in both experimental and control groups were videotaped and watched by the two teachers to make further comments on lesson progress.

After 6 weeks of intervention process, the students took post-test for Vocabulary Knowledge Scale and reading comprehension one more time, they were also required to take the same tests two weeks later in the form of delayed tests. Finally, 3 participants from two groups were interviewed about what they thought about CLIL and Techno-CLIL lessons in order to discover their opinions towards two different models and increase the reliability of the study with the help of qualitative data.

3.3.2.1 Vocabulary knowledge scale (VKS). The scale with 5-point self-report Likert design was taken directly from the original version developed by Wesche and Paribakht (1996) and was used as pre, post and delayed test to analyze learners' vocabulary knowledge. With the help of this scale, it was seen how much learners

knew the target vocabulary items and to what extent they were able to apply them while producing language pieces. Figure 9 indicates a sample scale which was used by including target vocabulary.

- 1: I don't remember having seen this word before.
- 2: I have seen this word before but I don't know what it means.
- 3: I have seen this word before and I think it means _____(synonym or translation).
- 4: I know this word. It means_____ (synonym or translation).
- 5: I can use this word in a sentence. e.g.: _____(if you do this section, please also do section 4).

Figure 9. The vocabulary knowledge scale (Wesche & Paribakht, 1996).

As can be seen in the Figure 10, level 1 in the scale shows that the participant does not know anything about the given word, while level 2 shows that the participant notices the lexical item but doesn't have any idea about meaning of it. Level 3 and 4 stands for the partially or fully notice of the word's meaning in through translation or synonym forms. Last, level 5 means that the participant can actively and freely use the word in a sentence rather than passive use (Gairn & Redman, 1986; Skehan, 1989; Tosuncuoglu, 2004) and he expresses that he has linguistic consciousness about the word.

Score	Category
1	The word is not familiar at all.
2	The word is familiar, but its meaning is not known.
3	A synonym or translation of the target word is correct.
4	The target word is used with semantic appropriateness in a sentence.
5	The use of the target word is both grammatically and semantically correct in a sentence.

Figure 10. Meaning of scores in vocabulary knowledge scale (Wesche and Paribakht, 1996).

As for the scoring of the scale, score 2 was assigned to categories III, IV and V for the wrong answers. As for correct synonyms, translations or meanings score 3 was given for categories III and IV. If a word was used in the accurate context yet in a grammatically wrong structure, score 4 was assigned. Finally, score 5 was given

only when the participant creates a sentence including the target word in grammatically and semantically accurate way. An example provided by Wesche and Paribakht (1993, p.16) clearly shows that minor mistakes are ignored if the semantic meaning of a word is known by the student as follows: ‘An example for the target word “chemicals” was: “Hydro Quebec produce some dangerous chemicals liquid with electricity”’. It can be deduced from the example that if the word’s referential meaning is accurately given other structural mistakes are ignored.

3.3.2.2 Scholastic L2 reading test. L2 reading test is a comprehension-based reading test which was offered by Scholastic reading platform provided within the structure of the school setting. The test was applied three times as pre, post, and delayed tests in the study to assess learners’ reading ability in numeric levels which are called as lexile levels. Lexile measures are grounded upon more than 30 years of research and they are commonly used for the accurate measurement of reading ability and text difficulty. A student starts the test on an average lexile and his/her end of year lexile growth is pre-defined by a scientifically measured lexile chart system, MetaMetrics. Figure 11 which is taken from www.metametricsinc.com shows how much a student can get from the test.



Figure 11. Lexile measures for reading (MetaMetrics Graphics, 2019)

During the test, if a student answers a question correct, he/she is given a more challenging question. If the student answers the question incorrect, a question at a lower lexile is posed. After approximately 20 questions, the student’s lexile level is

able to be determined in this L2 reading assessment process. The number of the questions changes from student to student; longer questions with more difficult words are generally addressed to the learners who can give correct answers to the easier ones. All the questions included in the test are multiple choice and have one correct answer which is generally one word defining a specific feeling or situation.

3.3.2.3 Student interviews. Interviews which are made with the participants in a specific study show the group's perceptions, attitudes, understanding, thoughts and reactions upon some experience or on a subject matter. This study thus made use of student interviews in order to reach the perceptions of the participants who experienced CLIL and Techno-CLIL lessons. After having gone through 6 weeks of treatment, 3 students from both groups were randomly chosen in order to gain a deeper understanding about their ideas towards CLIL and Techno-CLIL models.

3.3.2.4 Reflective journals. A reflective journal is written tangible data which provides teacher with self-reflection of a teaching process on which he can meet his needs by overcoming any kind of isolation (Webb, 1997). In the present study, this data instrument was applied to discover the learners' and instructors' opinions and deeper perceptions, and challenges throughout the practice of CLIL and Techno-CLIL, which provided a reliable data and deeper understanding for the last research question. Reflective journals were kept by the researcher teacher who taught Techno-CLIL class. However, researcher teacher and her colleague who taught CLIL class gathered every week to make oral reflection and take notes of the highlights of the week. Researcher teacher attentively contributed the comments of the practitioner teacher on the journal to have tangible data about CLIL implementation process, as well.

3.3.2.5 Stimulated recall. Stimulated recall is a data collection method which generally involves videotaping a lesson and replaying that lesson later on in order to stimulate a comment on teacher's actions and opinions that is specific for that lesson time (Calderhead, 1981). In order to observe and understand the nature of CLIL and Techno-CLIL models better in classroom environment, the researcher teacher decided to include this technique as a data collection instrument in the present study. In the fourth week of treatment, the unit on Moon was to be covered in both groups

for 2 hours. This lesson was videotaped in both classes. The reason why this lesson was specifically selected was that the activities and projects in the textbook was quite interesting and appealing to the students. Because the study group was highly interested in Science and planets, these lessons were seen worth to be videotaped. Moreover, as the lessons in both groups required the same level of group work, cognitive and linguistic demands, and research skills, it was believed to observe the difference in the groups better. With a camera set on a hidden place which did not spoil the natural classroom environment, two teachers videotaped each other in turns and then had a session over those lessons. Teachers asked each other questions about how and why they used certain activities, materials, or techniques specifically. They unhesitantly reflected on their movements in classroom environment, as well. Both experimental and control groups were videotaped in one of their intervention lessons.

3.3.3 Data collection procedures. In order to demonstrate the schedule of the data collection procedure clearly, this section presents a sketch for the procedural stages of the study involving quantitative and qualitative data collection instruments. Table 4 reveals the outline of the methodology of the study weekly in detail.

Table 4

Timetable of Data Collection Procedure

Week	Data Collection
Week 1	Pre-reading test
Week 2	Pre-VKS test
Week 3-8	Treatment, Reflective Journal
Week 9	Post-reading and post-VKS test
Week 10	Delayed post-reading test, Delayed post-VKS test, Student Interviews

Two weeks before starting the implementation process, students in the CLIL, and Techno-CLIL groups were deeply informed about the study. The CLIL and Techno-CLIL groups were particularly informed about pre- assessment tools and interventional teaching procedure. The importance of the study was highlighted

in the hope of ensuring maximum student participation. This week was also dedicated to the reading comprehension test as pre-test which was provided by Scholastic reading platform. Participants from both control and experimental groups were taken to the laboratory in different hours of a school day. A lesson time was given them to complete the online test attentively. Participants were not allowed to finish the test without seeing their current lexile level on their profile.

A week before starting the implementation process, the researcher teacher announced and administered the VKS as pre-test to measure learners' vocabulary knowledge in both groups. The test was administered to both groups at the second hour of a school day at the same time. The test took 60 minutes in total. Due to the level of the participants, teachers translated the descriptions of the scale for the control and experimental groups.

This study adopted an experimental research design as a result of which 16 students from the control (CLIL) group and 21 students from experimental (Techno-CLIL) group were involved in the study. The following sections briefly describe the design of CLIL and Techno-CLIL lessons through the principles that were followed and the procedure of the study on a weekly basis.

3.3.3.1 Design of CLIL and Techno-CLIL lessons. All the way through the planning and designing lessons for CLIL and Techno-CLIL implementations, several principles were followed. First, 4Cs framework was taken into consideration in both classes in order to increase content and cultural knowledge through communication and optimum level of cognitive demands. Throughout 6 weeks long implementation process, various subject matters were studied in English language to invest both on content and second language. Also, these lessons were designed with regard to the cognitive levels of the students in both groups. Vocabulary difficulty, amount of information and communication were determined by the readiness level of the learners. However, Techno-CLIL class had a distinctive dimension which was technology. Apart from 4Cs elements, technology was regarded as an important element of chain which should be integrated in Techno-CLIL class. In accordance with this purpose, videos, interactive games, digital platforms, and e-books were included in Techno-CLIL lessons to activate learners' digital knowledge and skills.

Second, both CLIL and Techno-CLIL classes aimed at investing on discovery of knowledge through authentic tasks and autonomous learning. While CLIL class prioritized hands-on activities where the learners were actively and personally involved in learning through touching and observing with the help of realia, Techno-CLIL class attached priority to digital learning enriched by educative e-sources and online games.

Third, both classes gave high importance to the principles of constructivism through which learners constructed their own meaning from what they have processed. Instead of giving new piece of information explicitly, learners were expected to search for it and discover individually or collaboratively. In order to activate learners' existing knowledge, CLIL class followed diagrams and eliciting questions while Techno-CLIL class used digital mind-maps and Padlets to share what they have constructed on their own.

Fourth, CLIL and Techno-CLIL classes gave primacy to experiential learning and real-world activities where the learners learned by doing such as observing the phases of moon. However, the methods of both class differed; while CLIL class observed the phases through realia, Techno-CLIL followed a different path such as interactive destination to moon on NASA's website. Although both classes contained the same principles in themselves, they took different tacks to arrive these principles. Following section describes the treatment procedure of the study on a weekly basis.

3.3.3.2 Week 1. This week was the first week of the treatment for both groups. The weekly objectives and outcomes were planned by the two teachers of the groups. While designating objectives for each group, lesson topics which were included in the last two pages of the each unit in the 6th grade main course books, Superminds Level 6, were taken into consideration. The book introduces ten topics from another areas of the primary school curriculum which are related to the overall unit topics. Therefore, Superminds Level 6 was followed in both classes with the necessary adaptations according to the needs and nature of both classes. CLIL and Techno-CLIL lessons are designed to encourage the students to learn about other subjects through English and then to demonstrate and apply that knowledge

in follow-up tasks including projects. Accordingly, researcher teacher chose the first six lesson topics for both groups which were suitable for the level and interest of the participant learners and included them in the intervention process. Accordingly, CLIL and Techno-CLIL lessons were designed by taking 4Cs framework of Coyle (2005). Both control and experimental group treatments have aimed at reaching beyond linguistic objectives by bringing language and content together in creative ways to develop fluency in both communication skills and imaginative expressions while the experimental group put technological devices and digital learning platforms in front and control group followed traditional CLIL lesson procedure with authentic materials. Table 5 shows the weekly topics during intervention.

Table 5
Timetable of Weekly Topics during Treatment

Week	Subjects in CLIL and Techno-CLIL
Week 1	Muscles
Week 2	Impressionism
Week 3	Levers
Week 4	Moon
Week 5	Glaciers
Week 6	Fossils

To have a vivid picture of what happened in both groups in this week, procedural steps in the control (CLIL) group and the experimental (Techno-CLIL) group are listed in the following table comparatively.

Table 6

Muscles / Biology

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Students are taken to science laboratory.	1. Students are taken to computer laboratory.
2. Students read a text on their textbooks to learn about muscles and their places in their body.	2. Students watch a video to learn about muscles and their places in their body. (https://www.youtube.com/watch?v=rMcg9YzNSEs)
3. Teacher introduces muscle objects such as biceps, triceps, gluteus maximus and asks students to stick them on the right place in the empty skeleton. Students fill the skeleton with the correct muscle objects in each space.	3. Students are asked to open www.anatomyarcade.com and play 'poke-a-muscle' game; they poke the right muscle such as biceps, triceps, gluteus maximus with their finger by using an x-ray scanner.
4. Students listen to a track about voluntary and involuntary muscles and teacher asks some questions to elicit the difference in between.	4. Students watch an interactive video to learn about the difference between voluntary and involuntary muscles. The video stops and teacher asks questions about these two muscles and students give immediate answers. (https://www.youtube.com/watch?v=C6u0u_59UDc)

Table 6 (cont.d)

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
5. Teacher hands out some action cards such as sneezing, sending an e-mail, blinking, breathing, drinking soda, etc. and asks each student to come to stage, pick a card and act the action. When the other students find out the action, they are asked if it requires voluntary or involuntary muscle work.	5. Teacher asks students to open www.kahoot.it and enter 'Muscles' test. Students start to answer 15 questions about muscles. Questions include some action pictures and there are two options to choose; voluntary or involuntary muscles. At the end of each question, students can see who give the correct and incorrect answer on the projection board in the lab.
6. Teacher hands out four different Biology books to students and asks them to scan them in groups of 4. They are to choose 3 muscles from the book and make a poster about their names, places in their body, and function. They are free to cut and stick the pictures on their poster. When it is over, they come to stage and present their findings to classroom.	6. Teacher asks students to choose 3 muscles from the Internet websites such as www.kidshealth.org , www.ducksters.com , and www.sciencekids.co.nz , and prepare a PowerPoint presentation about them. They are asked to include some information about their names, places, and function. They can add some videos and pictures of the muscles on their presentations as well. When it is over, they stand up and show their slides to their peers.

In both groups, content and language were integrated in a manner that provided learners with enough content knowledge and meaningful conversation around the content. In order to provide accurate content knowledge with students, CLIL and Techno-CLIL teachers received support from the 6th grades' science teacher. The teacher gave them authentic Biology books to use them in their

classes. She also provided muscle objects and skeleton by opening the doors of her laboratory. She supported the contental accurateness of the lesson plan and shared additional information with CLIL teachers.

In CLIL group, “What are Muscles?” reading passage and “Voluntary and Involuntary Muscles” listening track which were provided in the textbooks were involved in the plan. As for Techno-CLIL group, online videos were preferred as engaging and motivating ice-breakers. As Oddone (2018) claims, using videos in CLIL lessons as warm-up activities is quite useful as these audio-visual materials present authentic language use and real things as parts of the content. While CLIL group worked with realia such as skeletons and muscles, Techno-CLIL group played a game about the places of muscles and internalized correct positions by poking them through a digital platform. Towards the end of the lesson, both groups were given a presentation project; while the CLIL group had the books to search for information Techno-CLIL group had the Internet to go through and prepare a PowerPoint presentations. Both groups’ research skills were tried to be fed in different ways.

For the weekend homework, CLIL group was given a project homework to keep an exercise diary over the next week and form a table including day / type of exercise / muscles used / how long. As for Techno-CLIL group, they were assigned to read two books on Scholastic platform which were “I Like to Exercise” and “Energy in Motion” and take the quiz accordingly.

3.3.3.3 Week 2. In the second week of the treatment, the researcher teacher and her colleague discussed over the outcomes of the the first week and prepared the next week’s plan. Following table shows the details of the second week’s treatment process.

Table 7

Impressionism / Art

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Students are taken to CLIL room with their brushes, papers, and other necessary equipment. 2. Students read two texts about Impressionism and Realism on their textbooks and match the paintings with the correct painters. T then draws a Venn Diagram on the board and elicits the difference between two styles and writes students' answers on the diagram. 3. Teacher divides class in two groups; I for Impressionist and R for realist painters. Students are asked to draw their painting in a limited time and present the features of their paintings according to the style that they have chosen. Teacher scaffolds learners on necessary points.	1. Students are taken to computer laboratory. 2. Students watch a video about Realism and Impressionism and tell the difference in between. T opens www.bubbl.us.com and creates an online mind-map to write students' answers. Later, they discuss over the paintings on the video and check the painters of them on the Internet in groups. 3. Students are asked to open https://sketch.io/sketchpad/ and draw their online painting. Teacher stresses that students have to follow the features of a style that they brainstorm on the mindmap. When the students are done with online drawing, they write a short text near their drawing and teacher reflects all the drawings through projection board. Students present their drawing, style, and they sign under it.

Before implementing the art lesson, both teachers received help from the art teacher in the school. The art teacher provided them with the easels and watercolors which were pre-set in the CLIL room. She also helped teachers understand the difference between two art styles which was the focus point of the lesson. She also gave the examples of important painter names who contributed Realism and

Impressionism.

Both CLIL and Techno-CLIL groups have aimed at telling the difference between two art styles and giving examples to paintings and painters who belong to these art styles. However, activities which made students reach these goals were designed in a different way in both classes. CLIL group read ‘Impressionism and Realism’ text on their books and used real materials when they drew their paintings while Techno-CLIL group watched videos about art styles and brainstormed on these styles through an online mind-map. While one of the group presented their drawings created by real life materials such as paintbrushes, plastic cups, cardboards, wood glues, and plastic plates in CLIL room, the other group presented their digital drawings in the computer laboratory where they projected and showed their work of art with stylistic features to whole class.

For the weekend homework, Techno-CLIL group was assigned “I am the Artist” on Scholastic reading platform and take the quiz as a follow-up activity. Regarding CLIL group, they were asked to hang their work of art somewhere in their home, take a picture with them and post it on their social media account.

3.3.3.4 Week 3. In the third week of the intervention, the researcher teacher and her colleague reflected on the last week’s outcomes. Upcoming three plans show the details of the third of of the treatment in detail.

Table 8

Levers / Physics

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Teacher introduces levers to classroom by using classroom objects. Students are asked to tell what is called as force, load, and pivot in the levers.	1. Teacher takes students to computer laboratory and asks students to open https://phet.colorado.edu/en/simulation/balancing-act to understand the basic materials in levers and how they work.

Table 8 (cont.d)

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
Later, students read a text about levers on their textbooks and complete the blanks in the diagram with the correct words in order to internalize the basic materials in levers. 2. Teacher asks students to bring out a ruler and two rubbers and try out an experiment individually. They put the ruler on one of the rubbers and put the other rubber at one end of the ruler. Later, they hit the other end of the ruler. Teacher asks classroom what happens to the second rubber. She also asks what is the lever and what is the pivot. 3. Teacher brings out some objects such as nail clipper, wrench, stapler, tweezers, latch, bottle opener, pencilcase, candle, laptop, scissors and asks students which ones are levers and which ones are not. Students get in groups of 4 and pick up the levers from the other materials. They label the pivot in their lever and explain why it is called as a lever.	Students quickly go through the page and share where is the load, pivot, and the force in the lever simulations that the teacher shows on the website. 2. Teacher asks students to open https://www.propofs.com/games/lever. Students start to play a game about levers by dragging objects onto the lever in order to balance both sides' weight before the clock runs out of time. Students practice the basic materials such as pivot, force, and load in levers. 3. Teacher asks each student to search on the Internet for two more examples of levers which use pivots. They can get help from their textbooks and www.sciencing.com to find out more levers used in their everyday life. Following this, they are asked to stick the photo of the lever on www.padlet.com and attach some comments near it. Each class member creates his own digital page on Padlet and it is displayed on the board for everyone to see.

Both groups aimed at extending focus on Physics through English language. CLIL and Techno-CLIL teachers received additional support from 6th grades Science teacher once more in order to get a deeper understanding about the nature of levers and how they work. Also, because the teachers were not sure of the cognitive demands of the lesson and student capacity, Science teacher showed the path in terms of to what extent students should be challenged and provided content knowledge. In this way, basic materials of the levers such as load, pivot, and force were studied and the logic of the lever mechanism was taught in two classes. However, while CLIL group studied the content through realia, classroom objects such as ruler, rubber, and book, Techno-CLIL class played different online games and found out the machine's contrivance through different levels in the games. In the end, Techno-CLIL group was expected to search for the other lever mechanisms online and stick their findings on online board; "Padlet" website. In this way, each student had a chance to contribute each other's work in an interactional and spontaneous behavior. As this specific group of Techno-CLIL learners was quite familiar with Padlet from a pilot study conducted in the previous year, they were not challenged in using the digital platform; nevertheless, teacher introduced how to create a digital page and stick photograph on Padlet platform.

For the homework, CLIL group was asked to find some more common levers in their home and draw them by labeling the pivot. They were asked to search for these machines in their own living space. As for Techno-CLIL group, they were assigned a book "Simple Machines" on Scholastic and the follow-up quiz about levers.

3.3.3.5 Week 4. In the fourth week of the intervention, the researcher teacher and her colleague reflected on the last week's outcomes. Following table shows the lesson procedure for control and experimental groups. As stated in Table 5 before, the subject matter of the fourth week is Moon.

Table 9

Moon / Physics

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Students are taken to science laboratory. 2. Teacher asks students in which hemisphere they live. They are then asked to remember the shape of the moon that will be in two weeks' time. 3. After they figure it out, students are asked to stick a pencil into a foam ball. The ball is the moon. The curtains in the lab are closed and the lamp is turned on and put in the middle of the room at the same height as students' eyes. Students are asked to look at the lamp; the lamp is the sun and the students are Earth. Students are asked to hold the ball above their head, between them and the light. The side of the ball that is facing them will be dark. Teacher clarifies that this is the new moon.	1. Students are taken to computer laboratory. 2. Teacher opens a video about the moon tour by NASA and asks questions and facts about moon (https://www.youtube.com/watch?v=2iSZMv64wuU). 3. Teacher asks students to open Google's online moon on https://www.google.com/moon/ and NASA's interactional solar system on https://solarsystem.nasa.gov/ and go over the pages in detail. Teacher elicits the names of the other planets in the solar system and writes the answers on a wordcloud on https://www.wordclouds.com/. 4. Teacher opens an online blog page where a blogger has written about the phases of the moon. As they read the blog, they are asked to draw the phases of the moon on Paint. Students check their understanding after they complete their drawing. 5. Students are asked to get in groups of 4 and each group chooses a different planet that they brainstormed on the wordcloud.

Table 9 (cont.d)

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
Last, students are asked to turn round on the spot slowly, keeping the ball above their head. They are asked to look at how the light shines on the ball and they watch the phases of their own moon.	They are asked to do some research using the Internet and find out some facts about it. Groups organize their information on PowerPoint and present them in classroom. They may get help from their textbooks, as well.

It has been aimed at gaining awareness towards the moon and different planets on the solar system both in CLIL and Techno-CLIL groups. However, the groups followed different procedures during lesson by fulfilling the necessities of the nature of CLIL and Techno-CLIL. While CLIL group made a project and studied different phases of the moon by realia such as foam ball, pencil, and mobile lamp, Techno-CLIL group virtually travelled the moon and the solar system. They specialized in the moon's different phases through a blog site and online painting.

As the 6th grades currently studied moon in their Science lesson in this week as well, Science teacher specifically suggested to study the phases of the moon and the planets on the solar system in order to strengthen the existing knowledge about moon. After the lesson, CLIL class was asked to complete the activity on their Activity Book which required them to label the phases of the moon in the northern hemisphere. Techno-CLIL class was assigned 'Moon' on Scholastic reading platform and a follow-up quiz as homework.

3.3.3.6 Week 5. In the fifth week of the treatment, the researcher teacher and her colleague reflected on the last week's outcomes. Following table indicates this week's procedural design comparatively in detail.

Table 10

Glaciers / Environmental Studies

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Teacher asks students to read smart facts about glaciers on their textbooks and fill in the blanks in the facts with the correct word. Teacher writes the specific words about glaciers in jumbled order and asks students to unscramble them. They elicit unknown words' meaning. 2. Students listen to a listening track on their textbooks which mentions facts about glaciers. However, there are mistakes in the track which should be detected by the students. Each student carefully takes notes and shares their answers with class members. 3. Teacher shows a map to students. The blue areas in the map show how much of Earth was covered by glaciers 20.000 years ago, during the last ice age. Teacher asks the percentage of it and elicits the correct answer.	1. Students are taken to computer laboratory and asked to get into https://www.swisseduc.ch/glaciers/ and discover glaciers across the world. Teacher introduces new vocabulary through https://www.vocabulary.com/. She asks all the students to open this website and write the words on the book that they do not know. The site lists the definitions of the words quickly. 2. Students are shown 5 authentic texts about glaciers and written in mind-map format on www.popplet.com. Also, there are 5 questions on the top of page and each text answers a question. Students are asked to skim and scan the text and match the questions with the texts online. 3. Students are asked to get in groups of 4. Each group uses the Internet to choose one particular glacier and find out where it is, its' size and some facts about it.

Table 10 (cont.d)

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
Later, she hands out empty, black and white maps to students. She asks them to guess where glaciers are today and draw the areas where glaciers are stated today. When they are done, the maps are collected and compared to the real world map.	They are asked to organize information on PowerPoint by using pictures or diagrams. Groups are asked to take turns to present their talks about different glaciers. At the end of the presentations, teacher asks the classroom which glacier is the bigges and which continent each glacier belongs to.

In the fifth week of the treatment, both CLIL and Techno-CLIL groups focused on glaciers with an emphasis on subject-spezifc words. However, different procedures were preferred to follow; while the students in the CLIL group worked on the real maps, Techno-CLIL group used online web tools in order to get a deeper understanding about the places of glaciers on Earth. Both groups may target to reach the same goal but their paths were quite different than each other. The groups were assigned a book about glaciers on Scholastic reading platform and a follow-up quiz related to the topic as weekend homework.

3.3.3.7 Week 6. In the last week of treatment, teachers of the study gathered in order to reflect on previous week's practice and prepare the suitable plan by taking the needs, demands, and interests of both group into account. Following table demonstrates the details of the sixth week's intervention procedure.

Table 11

Fossils / Environmental Studies

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
1. Teacher asks students to read about fossils on their textbooks and discuss over the photos on the page. They decide on which one is fossil and which one is not a fossil. They also go over additional reading about how fossils are formed and what the scientists who look for fossils are called. When there is an unknown word in the texts, the other students and teacher help each other to figure out correct meaning from the context. 2. Teacher asks students to bring out their plasticine, the object they want to fossilize, and a thick plaster of paris. Students are asked to make a smooth flat circle with the plasticine about 2 cm thick. Then, they are asked to press the object into the plasticine until it is half buried. Later, they should take the object out carefully.	1. Teacher opens a video named ‘I’m a Paleontologist’ (https://www.youtube.com/watch?v=B7zo2zY1Zqg), and asks students what they know about fossils. Teacher asks students to go over the page https://www.amnh.org/explore/ology/paleontology and learn some facts about fossils through various informative games. Buried bones, drawing bones and layers of time are presented to students through colorful and enjoyable online design. 2. Students are asked to open ‘make your own stationery’ section on the same website and design their personalized text field with fossil pictures. They can choose fossils on the Internet and adjust the size of the paper and fill in the paper with some information about that fossil and what scientists think the animal look like.

Table 11 (cont.d)

<i>Control Group (CLIL)</i>	<i>Experimental Group (Techno-CLIL)</i>
It should be ensured by the students that the object should leave an imprint in the plasticine. They are asked to leave it until it is totally dry. In the end, they are to carefully remove the plaster from the plasticine and observe their fossil. Each student comes to stage and presents their fossils to their peers.	When they write their own texts online, they are asked to download their texts and stick it on www.padlet.com to share knowledge and see their friends' personalized fossil information paper. They read them aloud and ask whatever they wonder about them to each other.

Both CLIL and Techno-CLIL group concentrated on discovery of knowledge about fossils by doing various activities related to them. While CLIL group made their own fossil by touching the plasticine and plaster of paris, Techno-CLIL group worked on fossils through online web-sites which provided them with content knowledge through enjoyable activities. At the end of the lesson, both groups were assigned 'Fossils' book on Scholastic reading platform which included visualisation and interesting facts about the topic.

After the treatment weeks were over, students took L2 reading test and VKS test as the post-test. The tests were conducted at the same day with both groups. It was aimed at exploring the impact of treatment on learners' reading proficiency and vocabulary development.

2 weeks later, researcher teacher took L2 reading test and Vocabulary Knowledge Scale test as the delayed post-test. Online reading exam and the scale were taken at the same time by the students. Due to the level of the participants, translation of the description on the Vocabulary Knowledge Scale test was provided by the teachers both in control and the experimental groups. After completing the tests, 3 students from both groups were randomly selected for the interviews in order to explore the perceptions of the students towards CLIL and Techno-CLIL use

in their regular classrooms. The students were told to express their opinions in Turkish to remove any kind of language barrier and increase the reliability of the data.

3.3.4 Data analysis procedures. In order to analyze the obtained data, both quantitative and qualitative data analysis procedures were followed in the present study. Quantitative data were gathered through Vocabulary Knowledge Scale test and Scholastic L2 reading test while qualitative data were collected with the help of student interviews, reflective journals, and stimulated recall technique. For the analysis of the quantitative data, Statistical Package for the Social Sciences (SPSS) 22.0 was used. To begin with, the data were examined to check in terms of normality and outliers. The results have shown that there is not any outlier or missing score in the gathered data throughout the study.

Accordingly, Friedman Test was conducted to analyze the correlational relationship between pre post and delayed post tests both in vocabulary and reading skills of both groups separately. Means, standard deviations, minimum and maximum values, mean ranks, chi-square, and final p-values of both groups' reading and vocabulary test results were calculated. In this way, the developmental levels of both groups in different stages, pre, post, delayed post, were seen in detail. Immediately afterwards, Wilcoxon Test was applied to see whether there is a significant difference in control and experimental groups after the treatment. Pre-post, post-delayed, and pre-delayed relations were examined in both skills and results have been compared by using p-value (0.05) as base. The groups were

comparatively analyzed with the help of using Wilcoxon Test and it was detected which group showed better retainment in vocabulary and reading skills.

As for the analysis of the qualitative data, coding was applied, defined by Miles & Huberman as “tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study. Codes are usually attached to ‘chunks’ of varying size – words, phrases, sentences or whole paragraphs” (1994, p.56). Initially, the data were gained through qualitative methods such as student interviews, teacher journals, and notes emerged from stimulated recall.

Gained data were analyzed through pattern coding where the researcher teacher divided the data into theme-based categories and constructed tables to show the statements that were frequently made. Finally, the data were analyzed and interpreted by taking the research questions and objectives into account. Throughout the analysis of the student interviews, both Turkish and English language were used in order to increase the reliability of the study and overcome any kind of linguistic obstacle.

3.3.5 Reliability and validity. Reliability measures the stability and consistency of a test score whereas Buckley and Chiang (1976) define validity as the extent that a test truly measures what is intended or supposed to measure. According to them, validity requires reliability and they are interrelated.

In this study, the procedure of measurement of instruments (Vocabulary Knowledge Scale test and Scholastic L2 reading test) were followed by the researcher teacher who administered measuring process both in control and experimental groups by taking the possibility of errors into account carefully. Additionally, the procedure of scoring was ensured by the teacher that the answers of both tests were pre-defined long before the students took the tests. The questions involved in the tests had only one correct answer which aimed at increasing the reliability of the tests. Moreover, tests were long enough to meticulously measure the current vocabulary and reading levels of the participants. Also, both quantitative data collection instruments were taken as a post-test 6 weeks after the intervention, and as a delayed test 2 weeks later the post-test in order to observe the proximity of the change in these results and increase the construct validity of the study.

L2 reading comprehension test which is provided by Scholastic reading platform as 'lit-pro test' is a research-based and norm-referenced digital assessment that has been validated to demonstrate the reliability of its nature when measuring the L2 reading levels of the learners. The test uses MetaMetrics, which develops a scientifically measured lexile chart including scores related to the student's reading ability and text difficulty. As for the content validity, the reading test addresses questions about identifying details, making conclusions, recalling, and comparing that are essential sub-skills of reading comprehension.

Vocabulary Knowledge Scale test, developed by Wesche and Paribakht (1996) is regarded as a reliable and valid method for measuring the vocabulary knowledge of the learner. As stated by Zhang and Lin (2017, p.118), ‘Wesche and Paribakht reported test-retest correlations of over 0.80 for the VKS’. They also state that Stewart et al. (2012) pointed out the reliability of the VKS with a score of 0.90 measured among the L2 speakers of English. In this study, VKS consists of questions which are directly linked to the vocabulary related to the subjects in treatment process. Furthermore, with a purpose of increasing the construct validity of the study, the researcher teacher kept a journal during implementation process on which she reflected on with her colleague, videotaped some lessons to watch and observe the behaviors and teaching and learning steps carefully, and made student interviews to reach a deeper understanding about attitudes towards CLIL models. In order to maintain the external validity, control and experimental intact classes were chosen with similar levels of language and content knowledge. It was considered before sampling that the student distribution in each class would be close to each other.

3.4. Limitations. It can be asserted that the study has reached its goals and taken the answers for the research questions which are stated before the implementation process. Throughout an intense data collection process, it was realized by the researcher that a longitudinal research which could continue for a school year could be carried out in order to have more reliable and better results. Both tangible data with systematic and reliable data collection and hunch shed light to the researcher through ten weeks of data collection process; however, a larger period of time would give much deeper understanding to questions of the study.

In addition to these, the lesson time given to each implementation lesson per week was quite limited due to the heavy curricular schedule of the school. Therefore, the time set in this study was noticed as a limitation. As another factor that might affect the reliability of the study, the sample size ($N=37$) was quite small. It would be better to carry out a similar research with a larger group of participants in order to observe both linguistic development and behavioral changes towards CLIL and Techno-CLIL models.

Finally, the instructors of the groups were to be different educators so that each group could simultaneously follow the same implementation phase, which might influence the reliability of the study.



Chapter 4

Findings

4.1 Overview

This chapter presents the findings of the present study which takes the aim at exploring the difference in student L2 reading comprehension and vocabulary knowledge after the treatment (CLIL and Techno-CLIL), and cipher out the perceptions of learners and teachers about CLIL and Techno-CLIL. The upcoming two sections elaborate on the results of quantitative and qualitative data respectively.

4.2 Quantitative Data Analysis

The quantitative data were analyzed through a commonly preferred and reliable packaged software program for statistical analysis which is SPSS 22.0. The L2 reading and vocabulary score descriptors were indicated as mean (*M*), standard deviation (*SD*), minimum (*min*), maximum (*max*), mean rank, chi-square, degree of freedom (*df*) and p-value (*p*). The p-values (probability values) in the study which are less than 0.05, ($p < 0.05$) are regarded as statistically significant. During the study, Friedman Test was used to analyze the correlational relationship between pre, post, and delayed vocabulary and reading tests. Furthermore, Wilcoxon Test was applied to compare two groups and see whether there was a significance difference in control and experimental groups after the treatment was conducted.

4.2.1 Findings about L2 vocabulary achievement. The following section shows the statistical analysis of L2 vocabulary achievement of control and experimental groups.

Table 12

Comparison of Vocabulary Achievement with Friedman Test

Item	Experimental (N=21)								Control (N=16)							
	M	SD	Min	Max	Mean Rank	Chi-Square	df	p-value	M	SD	Min	Max	Mean Rank	Chi-Square	df	p-value
Pre-vocab	34.10	14.2	15	65	1.0				29.13	11.79	13	48	1.0			
Post-vocab	59.48	12.01	38	85	2.31	33.422	2	0.0	53.63	15.19	36	77	2.13	28.5	2	0.0
Delayed-vocab	61.24	13.01	34	87	2.69				56.19	15.03	38	80	2.88			

The Table 6 shows the vocabulary statistics of the pre, post, and delayed post-test scores of the control and experimental groups. In order to measure the difference among these tests, Friedman Test, which is used for non-parametric repeated measures was applied.

The experimental group's vocabulary scores of the VKS test are respectively 34.10, 59.48, and 61.24 which indicated that the experimental group showed around 80% increase from pre to delayed post-test, as shown in Table 6. It is, thus, concluded that Techno-CLIL treatment made a difference on the students' vocabulary achievement. The delayed post-test was implemented two weeks following the post-test, and the results showed no significant difference as compared to the post-test. Moreover, the p-value of the pre, post, and delayed post-tests of the experimental group is detected to be less than pre-defined p-value ($0.000 < 0.05$), which indicated that there is a significant difference between these tests in positive way.

The control group's vocabulary scores of the VKS test are respectively 29.13, 53.63, and 56.19 which demonstrated that the control group also showed increase around 93%, as shown in Table 6. Therefore, it is inferred that CLIL treatment made a difference on the students' vocabulary achievement, as well. Moreover, the p-value of the pre, post, and delayed post-tests of the control group is detected to be less than pre-defined p-value ($0.000 < 0.05$), which showed that there is a significant difference between these tests in positive way.

When the p-values are taken into consideration, it is concluded that both experimental and control groups have shown vocabulary development after the implementation process in a positive way. However, when the means results are compared, control group has shown the most increase with a narrow difference.

Table 13

Vocabulary Results with Wilcoxon Test

Group		Pre-vocab- Post-vocab	Post-vocab- Delayed-vocab	Pre-vocab- Delayed-vocab
Experimental	Z	-4.017 ^b	-2.396 ^c	-4.018 ^c
	Asymp, Sig, (2-trailed)	0.000	0.017	0.000
Control	Z	-3.518 ^b	-2.499 ^c	-3.519 ^c
	Asymp, Sig, (2-trailed)	0.000	0.012	0.000

a. Wilcoxon Signed Ranks Test.

b. Based on negative ranks.

c. Based on positive ranks.

As can be seen in the Table 7, it was targeted to analyze if there is a difference in the vocabulary knowledge of the students in the experimental group before and after the treatment. The table shows that there is a significant difference between pre, and post-test scores of the experimental group ($0.000 < 0.05$). In other words, Techno-CLIL treatment made a difference by leading to an increase. Similarly, the scores of the participants raised at a significant level from the post-test to the delayed post-test ($0.017 < 0.05$). Also, learners in the experimental group have shown development from pre-test to delayed post-test at a significant level ($0.000 < 0.05$).

As demonstrated in Table 7, there is a statistically significant difference between pre-test and post-test vocabulary scores for the control group ($0.000 < 0.05$). Moreover, regarding post- and delayed post-test there is a significant difference, as well ($0.012 < 0.05$). The scores of the participants statistically increased at a significant level from post-test to delayed post-test, which is also true for the difference between pre- and delayed post-tests ($0.000 < 0.05$).

When the significance values of both groups are statistically analyzed, it can be claimed that both experimental and control groups have shown the same results in pre- post-tests and pre- delayed post-test scores comparisons. However, with a

minor difference, control group has shown better retainment in vocabulary performance when the delayed post-tests are examined (0.012) than the experimental group (0.017).

4.2.2 Findings about L2 reading achievement. The following section reveals the statistical analysis of L2 reading achievement of control and experimental groups.

Table 14

Comparison of Reading Achievement with Friedman Test

Item	Experimental (N=21)								Control(N=16)							
	M	SD	Min	Max	Mean Rank	Chi-Square	df	p-value	M	SD	Min	Max	Mean Rank	Chi-Square	df	p-value
Pre-reading	134.81	153.48	5	550	1.33				159.13	104.96	4	345	1.34			
Post-reading	151.76	150.26	15	545	2.238	14.095	2	0.001	169.63	107.47	9	359	2.09	12.286	2	0.002
Delayed-reading	149.24	143.58	16	513	2.29				171.56	107.29	15	358	2.56			

The Table 8 demonstrates the reading statistics of the pre, post, and delayed post-test scores of the control and experimental groups. In order to measure the difference among these tests, Friedman Test was used.

The experimental group's pre, post, and delayed post-reading test scores are respectively 134.81, 151.76, and 149.24 which indicated that the experimental group showed around 11% increase from pre- to delayed post-test, as shown in Table 8. It is, thus, concluded that Techno-CLIL treatment made a difference on the students' reading comprehension and achievement. The delayed post-test was implemented two weeks following the post-test, and the results showed no significant difference as compared to the post-test. Moreover, the p-value of the pre, post, and delayed-tests of the experimental group is detected to be less than pre-defined p-value ($0.001 < 0.05$), which indicated that there is a significant difference between these tests in positive way.

The control group's reading scores taken from the test are respectively 159.13, 169.63, and 171.56 which indicated that the control group showed around 8% increase from pre- to delayed post-test, as shown in Table 8. Therefore, it is inferred that CLIL treatment made a difference on the students' reading achievement, as well. Furthermore, the p-value of the pre, post, and delayed-tests of the control group is detected to be less than pre-defined p-value ($0.002 < 0.05$), which showed that there is a significant difference between these tests in positive way.

Regarding to the results which show the most increase in reading achievement, experimental group which has received Techno-CLIL instruction is detected to be the forefront group. Pre, post, and delayed post-test results' means showed more increase when compared to the control group.

Table 15

Reading Results with Wilcoxon Test

Group		Pre-reading- Post-reading	Post-reading- Delayed-reading	Pre-reading- Delayed-reading
Experimental	Z	-3.200 ^b	-0.975 ^b	-2.573 ^b
	Asymp, Sig, (2-trailed)	0.001	0.330	0.010
Control	Z	-2.618 ^b	-1.244 ^c	-2.716 ^c
	Asymp, Sig, (2-trailed)	0.009	0.213	0.007

a. Wilcoxon Signed Ranks Test.

b. Based on negative ranks.

c. Based on positive ranks.

Wilcoxon Test has aimed at analyzing if there is a difference in the L2 reading comprehension achievement of the students in the experimental group before and after the technology-integrated CLIL treatment. The Table 9 shows that there is a significant difference between pre and post-test scores of the experimental group ($0.001 < 0.05$). Similarly, pre and delayed post- reading tests' p-value is detected as 0.010 which shows a significant difference, as well ($0.010 < 0.05$). However, when the p-value between the post-reading and delayed post- reading is analyzed it can be claimed that there is no significant difference between post- and delayed reading tests in the experimental group ($0.330 > 0.05$).

As demonstrated in Table 9, in the control group, there is a statistically significant difference between pre-test and post-test reading scores ($0.009 < 0.05$). The scores of the participants raised at a significant level from pre- to post-test. In other words, the traditional CLIL instruction made a significant difference by leading to an increase in the reading scores. A significant difference is also true between pre and delayed post-test ($0.007 < 0.05$). When it comes to the relation between the and the post and delayed post- reading test scores, it is seen that there is not a significant difference between them ($0.213 > 0.05$).

The significance values have shown that experimental group has shown the most development in reading achievement test scores with the smallest p-value (0.001).

Quantitative data results have clearly demonstrated that Techno-CLIL and CLIL implementation play almost an equal and crucial role on L2 vocabulary and reading development of the learners. Vocabulary test results of the learners have shown that control group has shown better retainment in learning vocabulary through CLIL treatment than the experimental group which has received Techno-CLIL instruction. Control group's delayed post-test results have sensitively demonstrated that the group has better internalized the target vocabulary than the experimental group.

When the reading test results are analyzed, it has been concluded that the experimental group with Techno-CLIL instruction has outperformed the control group with CLIL treatment with the lowest p-value. The following part will go into the depths of qualitative data analysis which consists of various data collection instruments.

4.3 Qualitative Data Analysis

This section includes three sub-sections: In the first sub-section, comparative findings that are drawn from student interviews which were made after the implementation in both groups, in the second sub-section the instructors' perceptions about the implementations of CLIL and Techno-CLIL models were analyzed based on the reflective journals the researcher teacher kept herself during

the implementation and reflection session made with the other teacher, and in the last sub-section the two instructors' opinions and comments on the lesson procedures based on stimulated recall technique were carefully interpreted.

4.3.1 Student interviews. After completing the CLIL and Techno-CLIL implementation processes successfully, three students from CLIL and Techno-CLIL classes (six students in total) were randomly selected and guided some questions to obtain their opinions regarding the six weeks long treatment. They were asked open-ended questions related to the models in their mother tongue with the purpose of breaking any kind of language barrier and inadequacy in self-expression during the interviews. When the students stopped, they were guided with questions to take more in-depth answers. As the nature of both groups were quite different and exhaustive information was tried to be obtained through interviews, questions that were addressed to the interviewees in CLIL and Techno-CLIL groups showed variations.

After the interviews were completed, the students' answers were carefully transcribed, translated into English, and thematically coded in different major themes that indicate their comparative perceptions towards CLIL and Techno-CLIL models. According to the data collected from the interviewees, three major titles, namely use of materials, learning outcomes, and challenges, were formed under which both groups' answers were separately analyzed and then compared.

4.3.1.1 Use of materials. Both CLIL and Techno-CLIL groups pointed out the importance of the way materials used during lesson procedure and its' positive impacts on their motivation and academic development. However, while CLIL group stressed out the benefits of using real-life objects in classroom, Techno-CLIL group emphasized the positive sides of using digital tools and platforms to learn language and content at the same time.

To start with, the students from CLIL group specifically noted that using authentic materials such as muscles, easels, paintbrushes, or plasticine was quite motivating and encouraging for them to participate and learn more about content area by using another language, as is evidenced in the following excerpts:

[...] Last week I created my world map and compared it to the real world map. I didn't know that there were less glaciers on Earth now than a few years ago. When I went back home, I opened my detailed world map once again to find out more about glaciers.

(S3 from CLIL group, personal communication)

[...] I like painting a lot. When we created our own painting, I brought my own easel and watercolors to CLIL room. It was so much fun to share them with my friends. We all the time spoke in English in the class but it was like Art class.

(S2 from CLIL group, personal communication)

[...] I thought I was in Science lesson when I saw the muscles in my teacher's hand. I go to a gym every weekend, so I listened to the places of the muscles carefully in order to work them out in the gym. We also played with the muscles and it was fun.

(S3 from CLIL group, personal communication)

[...] I learned the muscles in English, they are so similar to Turkish. For example, biceps and triceps. I learned their shapes, too.

(S3 from CLIL group, personal communication)

As is evident from the reported opinions of the participants, they evaluated CLIL as beneficial thanks to the real-life objects provided with them during the lesson. For this reason, it can be concluded that CLIL model succeeded in creating a difference in their motivation and content and linguistic development with the help of authentic materials.

As for the participants of Techno-CLIL group, they were analyzed to frequently point out the enjoyment of using digital learning tools such as online games, wordclouds, interactive videos, and presentations. The following excerpts indicate that students were highly motivated by technological materials specifically chosen for them:

[...] Wordclouds are so cool. I can see everything in my mind on the screen like a network.

(S5 from Techno-CLIL group, personal communication)

[...] At first, I did not know how to add sound on PowerPoint. Teacher taught me how and I used it in our presentation. The others in the class were very impressed of it.

(S6 from Techno-CLIL group, personal communication)

[...] I love games. I am a gamer. When the teacher told us to open a game about levers, I adored it. The game requires some Maths but anyway, I can play it for hours without a rest.

(S5 from Techno-CLIL group, personal communication)

[...] I learned so many interesting websites and games from the lessons to practice Science or Geography.

(S4 from Techno-CLIL group, personal communication)

[...] In the lessons, I used Google maps and some other websites to learn about glaciers. When I went back home, I searched more about them.

(S5 from Techno-CLIL group, personal communication)

It can be interpreted from the sentences of the participants that Techno-CLIL provided an untraditional opportunity for the learners that they had not come across previously. Choosing particular technological tools according to the needs and interests of the learners opened a road them to develop their academic skills through increased motivation and enjoyment.

When the reports of the participants in both groups are compared, it is inferred that CLIL group was increasingly motivated by the realia while Techno-CLIL group was positively influenced by the digital materials and technological platforms. CLIL group held the idea that working with real-life objects increased their motivation and academic achievement such as vocabulary knowledge whereas Techno-CLIL

group stated that learning a particular subject matter through digital platforms was engaging and informative for them. Both groups claimed to develop their language and content knowledge through different materials and procedures.

4.3.1.2 Learning outcomes. Both CLIL and Techno-CLIL group participants emphasized the importance of personal gains that the models provided with them. However, while the participants of CLIL group based their vocabulary and speaking development on CLIL model, the participants of Techno-CLIL group asserted that they increased their subject matter knowledge thanks to the model.

To start with, students from CLIL group notably stressed that they profoundly practiced target language structures during lessons by using English as the medium of communication. They also claimed to develop their vocabulary knowledge through the cycle of certain subject-specific vocabulary which were frequently used during lessons. Following excerpts display these claims in an evidential value:

[...] I learned so many words about paintings, levers, and muscles.

(S1 from CLIL group, personal communication)

[...] We all spoke in English during lessons but we did not study English. I was like in America, talking to other people.

(S3 from CLIL group, personal communication)

[...] Our teacher told us to speak in English to communicate and we did it. Teacher explained the meaning of the words that we did not know at the beginning of each lesson. The rest was easy for me.

(S3 from CLIL group, personal communication)

The statements of the participants indicated that they practiced L2 primary skills and sub-skills, particularly speaking and vocabulary, thanks to CLIL treatment that they had been exposed to for six weeks. Therefore, it was proven with the qualitative data that CLIL group students instinctively believed that they used the target vocabulary continuously and internalized them.

When the reports of the participants in Techno-CLIL group were analyzed, it was detected that the students highly believed to improve their subject-specific knowledge thanks to Techno-CLIL, as is indicated in the following excerpts below:

[...] Sometimes our teacher set us free to search for information on the Internet because we made so many presentations in the lessons. I love spending hours online and learning new things.

(S4 from Techno-CLIL group, personal communication)

[...] Especially the week when we worked on fossils was very good. I learned so many different fossils. I can never forget the game where we made our own dinosaur. I know all his organs now.

(S6 from Techno-CLIL group, personal communication)

[...] It was so intense. I liked Art lesson most, especially the videos, that lesson was informative and enjoyable.

(S5 from Techno-CLIL group, personal communication)

The above statements of the participants show that they developed their content knowledge through various online activities and presentations. It can be claimed from the reports that online presentations triggered students to search for and gather information from the Internet which was aimed by the researcher from the very beginning of the study. In order to develop learner autonomy and individualized learning, students went online and read authentic texts from various websites which proves the apparent increase in their reading ability, as well.

From a comparative perspective, it can be suggested that CLIL group students believed to develop their linguistic knowledge more such as speaking skill and vocabulary set while Techno-CLIL group students highlighted that they made progress in their subject-specific knowledge more through digital tools. Both groups claim to invest on their personal development but while the former focuses on linguistic development, the latter gains insight about topical development.

4.3.1.3 Challenges. Throughout six week long treatment process, CLIL and Techno-CLIL students were challenged in various points. While the participants of CLIL group stated that they had great difficulty in completing the weekly assigned homeworks before deadline, Techno-CLIL group participants expressed that they were mostly challenged in doing three things at the same time: learning another subject through English and technology.

To begin with, CLIL group students highlighted that they had difficulty in completing the weekly tasks such as keeping an exercise diary, lever projects, reading a book and doing follow-up quiz, as is shown in the following excerpts:

[...] Homeworks were long. The other teachers do not give that much homework. It was difficult for me.

(S2 from CLIL group, personal communication)

[...] I understood everything in the lesson but when I started to do the homework about levers, I had to get help and a little copy from the Internet.

(S1 from CLIL group, personal communication)

[...] I had to read much that is why I got help from the Internet. It was easy to find what the teacher wanted.

(S1 from CLIL group, personal communication)

As is obviously indicated in the reports of the participants, they had difficulty in finishing their homeworks according to what was expected from them. The reason for this might be the burden of the other lessons or lack of motivation in CLIL group students as for searching for new information through extensive reading.

As for the participants of Techno-CLIL group, they claimed to be mostly challenged in conducting three things at the same time which are processing new content information on digital platforms by using another language as a medium of communication. Following excerpts demonstrate that they hold this idea subconsciously:

[...] Sometimes I could not use my computer. Our teacher showed us how we should play the game for example, but I sometimes could not catch the links that she told us to open.

(S4 from Techno-CLIL group, personal communication)

[...] It was difficult to draw something online. My other friends easily did it. Personally, I was dealing with finding appropriate brush and colors for my painting.

(S6 from Techno-CLIL group, personal communication)

These comments of the Techno-CLIL students obviously reveal that they were challenged in processing content, language, and technology at the same time no matter how much they were scaffolded by their peers and teachers. Apparently, as an untraditional teaching method, Techno-CLIL should be practiced more by the students in order to be experienced in carrying out three things at the same time successfully.

From a comparative perspective, it can be claimed that both groups had difficulties in different fields throughout six weeks long treatment process. While CLIL group experienced a block against completing the weekly tasks in time, Techno-CLIL group had difficulty in processing multiple tasks simultaneously no matter how much they were guided and facilitated by their teachers.

4.3.2 Teacher journals. Another qualitative data collection resource were the teacher journals which were kept during the treatment by Techno-CLIL teacher. However, reflective sessions were made after each treatment in order to gather the ideas of CLIL teacher about the previous lesson and Techno-CLIL teacher took notes on the teacher journal. Having a detailed look and careful analysis of each journal guided the researcher to form a grouping including the advantages, disadvantages and challenges of the research process. Three major titles, namely challenges, appreciation for the nature of CLIL and Techno-CLIL models, and increasing literariness, will be discussed in the titles below.

4.3.2.1 Challenges. Both CLIL and Techno-CLIL teachers came up against some challenges not only in preparation but also in the implementation process. While CLIL and Techno-CLIL teacher met on the common ground and stated that they had difficulty in finding appropriate materials and managing time, the underlying reasons for these main problems are quite different.

4.3.2.1.1 Finding appropriate materials. During the six weeks long implementation process, both the researcher and the practitioner teacher prepared every steps in the module carefully by taking cognitive, cultural, content, and linguistic demands into account. However, as the nature of each group is different, they had to find appropriate materials for their students according to their needs and interests. CLIL teacher expressed that she was challenged in adapting the existing materials on the book and finding related activities in accordance with the nature of the lesson. Whilst, Techno-CLIL teacher highlighted that she needed to carefully work on choosing the suitable technological tools which are widely known by the students from previous years and easy to be used. As a mutual challenge, both teachers instinctively thought that they might lead themselves wrong as they were not subject teachers and domineer in content-area as much as them.

To start with, CLIL teacher stated that she had difficulty in finding interesting and suitable materials for the lesson procedure. Although the lessons were planned by the researcher teacher, it was reviewed and certain changes were made by the practitioner teacher, as well. No matter how challenging it was to plan creative lessons according to the curriculum, CLIL teacher held the idea that she benefited from the CLIL teacher training programme that she received last year, as indicated in the following excerpts:

[...] There are so many activities in the textbook related to the CLIL topics; however they finalize in the linguistic focus one way or another. I have to find real-life attached meaningful materials which appeal to my learners.
(CLIL Teacher, 04.03.2019)

[...] For this week's lesson procedure, I think I can benefit from the Art lesson plan that I prepared in teacher training programme. To be honest, I do not know anything about these two art styles, we have to apply the knowledge of subject teacher. As the book does not include a creative and cognitively demanding task, I need to make some adaptations on the activities. For instance, students can present their paintings to classroom in the end.

(CLIL Teacher, 25.02.2019)

When it comes to Techno-CLIL teacher, she highlighted that she was challenged in finding the appropriate technological tools and materials for Techno-CLIL lessons as it is a brand new teaching area where the teachers design their own materials according to the needs of their learners. This challenge leads teacher to consume more time than necessary and put much more burden on her shoulders and feed negative thoughts towards integrating technology into her lesson. No matter how experienced the researcher teacher was in using technology in her classes, preparing and adapting appropriate materials for Techno-CLIL which include learners with various needs and interests was a challenge for her.

[...] It has been almost a week and I still could not find an appropriate material for drawing an online painting including impressionism or realism. If I want them to bring their materials and draw it in CLIL room, it will not be a Techno-CLIL lesson any more. I have to find a way for digital drawing, but how?

(Techno-CLIL Teacher, 11.03.2019)

[...] I have so much difficulty in finding an online map which allows students to draw something on it. CLIL group may do the activity on printed maps, but Techno-CLIL group needs something online. I am a bit afraid. How can I create my own material for this specific purpose?

(Techno-CLIL Teacher, 01.04.2019)

[...] I do not have much ideas about fossil types that the book presents. It would be nice to ask for further information to Science teacher.

(Techno-CLIL Teacher, 06.04.2019)

When compared, CLIL teacher had difficulty in creating and adapting suitable materials for her learner group while Techno-CLIL teacher was challenged in finding the right digital tool such as a website, game, or video for her learner group. As the nature of CLIL and Techno-CLIL changes from learner to learner vividly, both teachers had to adapt existing materials according to their own specific learner group. Also, both teachers needed the support and guidance of subject teachers for deeper content knowledge in order to provide learners with accurate information.

4.3.2.1.2 Time constraints. The journals included numerous lines which stated the time constraints faced by both teachers during data collection procedure. While CLIL teacher stated that she could not manage her time in terms of homework checks during lessons, Techno-CLIL teacher stated that she had difficulty in preparing two plans for each week as well as the other requirements of the school. The following excerpts reveal the drawbacks of having limited time from CLIL teacher's side:

[...] It is difficult to check all the students' homeworks before getting started to the lesson. I wish we could have larger time instead of two hours a week so that we could give more time to these checks.

(CLIL Teacher, 25.03.2019)

[...] Some of my students made mistakes on their homeworks. I could not stop and correct the mistakes on the spot; rather, I collected the homeworks, checked them in my free time. This week I will give them back with some feedbacks on them.

(CLIL Teacher, 04.04.2019)

On the other hand, Techno-CLIL teacher stated that preparing lesson plans for CLIL and Techno-CLIL groups was quite time-consuming; almost unmanageable because of the other responsibilities such as the other classes that the researcher teacher has, exams, lesson plans, and the regular meetings. All in all, it can be asserted that planning and preparing CLIL and Techno-CLIL materials took so much time and the researcher teacher was challenged in managing time successfully, as indicated in the following excerpts:

[...] I have so limited time to keep up with the curriculum of the 6th grade and I need to balance even the time I do my questionnaire.

(Techno-CLIL Teacher, 26.02.2019)

[...] I spend so much time on CLIL and Techno-CLIL lesson plans of that I cannot give enough attention to my 7th grades' writing classes.

(Techno-CLIL Teacher, 11.04.2019)

[...] I could not have enough time to practice the presentation stage of this week's treatment lesson with Techno-CLIL group. I have to go on with it in the first lesson of Monday.

(Techno-CLIL Teacher, 12.04.2019)

While CLIL teacher had time management problems with homework checks, Techno-CLIL teacher was challenged in preparing lesson plans for both groups and completing her other works at the right time. It is obvious from the teacher reports that CLIL and Techno-CLIL lesson preparation requires attention and fruitful time for positive results on the learner and teacher side.

4.3.2.2 Appreciation for the nature of CLIL and Techno-CLIL models. Both CLIL and Techno-CLIL teachers appreciated the nature of CLIL and Techno-CLIL models; however they stressed out different points of two models. While CLIL teacher claimed that CLIL had an informative nature which provided students with opportunities to access information, Techno-CLIL teacher claimed that Techno-CLIL enabled learners with e-learning through which they can access information on digital platforms easily.

[...] Thanks to CLIL, learners can practice Science, Art, Environmental Issues, Physics, and many more. They use language just as a way to negotiate their meaning. If the subject knowledge is given in an interesting way, they certainly concentrate on and grasp it.

(CLIL Teacher, 25.03.2019)

[...] This week was very beneficial in terms of teaching the content area. I could understand from my students' eyes that they wanted to learn more about our topic, and one of them even whatsapped me for further information when they got home.

(CLIL Teacher, 11.03.2019)

CLIL teacher obviously believed that her lessons were as informative as the other subject lessons. It, therefore, shows that informative nature of the lesson motivated both students and teacher in a positive manner to make sure that they are on the right path.

On the other hand, Techno-CLIL teacher impressed on that Techno-CLIL enabled students with e-learning environments where they can easily access any kind of information they need, as indicated in the following excerpts:

[...] There are thousands of websites which I can use for educative purposes to teach my students a specific subject. Although it makes my job a bit harder, it is good to have a wide variety of options to provide information with my students.

(Techno-CLIL Teacher, 15.03.2019)

[...] It was like a magic that my students went into depths in their computers and discovered their own learning. They used English unconsciously in order to share their ideas. Although I taught them how to play the game and discover information on the same website, it felt me like they did not need my teaching at all because they are all digital natives who are already technologically literate.

(Techno-CLIL Teacher, 29.03.2019)

If needed to make a comparison between two teachers' thoughts about CLIL and Techno-CLIL's nature, CLIL teacher strongly believes that CLIL is a good chance to teach another subject fruitfully. Meantime, Techno-CLIL teacher holds the idea that e-learning and digital platforms are the key to access content knowledge as long as stayed in the borders of the teacher, such as using the links that she shares or using the Internet purposively.

4.3.2.3 Increasing literariness. Another beneficial side of CLIL and Techno-CLIL from which students highly gain favour is the increase in literariness. Both teachers closely observed that the students developed their literacy with the help of CLIL and Techno-CLIL models through extensive readings, consistent and continuous research, mutual communication to understand each other, and sharing. However, CLIL teacher pointed out the increase in students' traditional literacy while Techno-CLIL teacher mainly focused on digital literacy.

[...] They read a lot even though they do not like it. If they were more intrinsically motivated to read, I cannot imagine what could happen. Anyway, they like scanning. Whatever I give them during lessons, they quickly read it.

(CLIL Teacher, 18.03.2019)

[...] One of my students wanted a book from me about our topic. She said she wanted to read further to learn more about involuntary muscles.

(CLIL Teacher, 25.02.2019)

CLIL teacher observed that her students liked to scan the books that were given them during lesson although they did not like reading much. It can be understood from here that students do extensive readings about a specific context through CLIL lessons which increases their literariness in foreign language.

On the other hand, Techno-CLIL teacher stated that Techno-CLIL provides students with so many digital reading platforms which increase their digital literacy, as indicated in the following excerpts:

[...] They read an authentic blog entry on the Internet and they even scanned the related blog entries on the same page. They like to read more on the Internet than textbooks.

(Techno-CLIL Teacher, 26.02.2019)

[...] Techno-CLIL students like to read on Scholastic reading platform very much. When I check their reading reports, I see that most of them spend so much time on the platform to read books and get a certificate. They are so motivated.

(Techno-CLIL Teacher, 21.03.2019)

[...] Getting a higher level certificate on Scholastic is so important for the learners. That is why they intensely read e-books and the lexile level test results show that they obviously improved their reading comprehension.

(Techno-CLIL Teacher, 15.04.2019)

When compared, CLIL teacher believes that the students increase their literacy in L2 thanks to the interesting topics provided through CLIL lessons. She states that they desire further reading about what they have done in lesstime. On the other hand, Techno-CLIL teacher holds the idea that students develop their digital reading skills through e-books at an observable level. She also believes that having an online access to authentic reading texts motivates them to read further and discover more about the subject-matter. Both methods help students increase their literariness level; but either traditionally or digitally.

4.3.3 Stimulated recall. In order to observe and make reflections on the lesson procedure, a lesson from CLIL and Techno-CLIL classes were videotaped and watched by the two teachers. The lessons were videotaped in the fourth week of treatment when both CLIL and Techno-CLIL teachers taught Moon subject through English. This week of treatment was purposefully selected as the activities in both groups were quite appealing and they required similar cognitive demands from the students. The results drawn from the reflections of the teachers were divided into two different major categories, namely fostering thinking skills through CLIL and various opportunities for interaction and cooperation through Techno-CLIL.

4.3.3.1 Fostering thinking skills through CLIL. When CLIL lesson was watched by the teachers, both of them pinned down that CLIL lessons fostered higher order thinking skills with successful integration of language and content. The following excerpts from the reflections reveal that teachers build positive attitudes towards CLIL model:

[...] I suppose the students feel challenged at an optimum level of difficulty when they are asked some content knowledge questions at the beginning of the lessons.

(CLIL Teacher, 17.03.2019)

[...] Preparing the activities as ladders of tasks and asking them to create their own project at the end of the lesson was cognitively demanding for them.

(CLIL Teacher, 17.03.2019)

[...] Students speak English so actively that I do not suppose that they are aware that they use another language to communicate. They look so involved. Using language for learning content specific information seems demanding; however, they seem quite used to it.

(CLIL Teacher, 17.03.2019)

The comments that were made during the reflection process have shown that CLIL teacher stressed that CLIL was useful in enabling active thinking during and after the lesson.

It has also been revealed in the reflection phase that carrying out simple investigations, thinking on the answer of a critical question, drawing conclusions, applying knowledge, or comparing and contrasting are the basic objectives of CLIL tasks. The significant point here is to encourage learner to carry out these tasks and foster their thinking skills through autonomous learning and self-motivation.

4.3.3.2 Various opportunities for interaction & cooperation through Techno-CLIL. It has been highlighted in the reflections that Techno-CLIL model provides learners with various opportunities for interacting and cooperating with each other. Through group and pair works, learners develop social skills where they build on their intercultural competence as well. The following excerpts display the thoughts of Techno-CLIL teacher about the interactivity and cooperativity of Techno-CLIL:

[...] In the lesson time, when I asked them to get in groups they directly found their group mates and distributed the roles which would be mostly on computers such as searching, preparing the presentation, providing photos, etc. They were so happy to be involved in the digital activity together.
(Techno-CLIL Teacher, 17.03.2019)

[...] When you asked if they wanted to work in pairs or groups, all of them went for group work. Working in team, helping each other and building cooperation scaffold them, not the teachers. They also feed each other when they have problems with technology as they are all digital natives, they can easily grasp how to use technological tools.
(CLIL Teacher, 17.03.2019)

[...] They learn from each other in a way that they can come over any cognitive challenge or language demand. Anybody did not ask the meaning of any word to me in this lesson as their friends helped them during group work. Some of them also open digital dictionary to quickly find out the meaning of an unknown word.
(Techno-CLIL Teacher, 17.03.2019)

According to the reports of Techno-CLIL teacher, it can be inferred that tasks that involve group work and cooperation help learners to break difficult tasks into parts and improve stronger communication skills. It is also claimed in the recall that, students in Techno-CLIL group were highly motivated in the lesson to learn something further and activate their critical thinking skills. However, the teachers of the study have also claimed that it should be noted by the teachers that the objectives of a group work and distribution of the roles should be pre-defined by them. If there is not a duty distribution or if the students do not fully understand what they are supposed to do, group work will not go beyond a group conversation. Moreover, students' inquiry and problem-solving skills have shown development as stated by the researcher of the study. It has been observed that, in each week's treatment when the teacher asked learners to get in groups and search for a specific content, they sensitively worked on their job and became faster in time.

When the two videos from both groups were carefully watched by the teachers, two different topics which were specific to those two lessons were emerged and discussed. While CLIL was decided to foster thinking skills by activating creative and critical thinking among learners, Techno-CLIL was detected to provide learners with various opportunities for interaction and cooperation through group works. If CLIL tasks are created as ladders in terms of difficulty and if the students get used to using language as a medium to specialize in content, CLIL will undoubtedly invest on learners' thinking skills. In the meantime, Techno-CLIL lessons include computers; however, it should not be seen as a handicap for group works; rather, duties should be shared among the students in order to work on their computers effectively.

Chapter 5

Discussion and Conclusions

5.1 Discussion of Findings for Research Questions

The primary purpose of the present study was to investigate the impact of CLIL and Techno-CLIL models on students' L2 reading comprehension and L2 vocabulary knowledge. Together with, the study also targeted at exploring the impact of these two models on students' perceptions, and the perceptions of the researcher teacher and practitioner teacher about planning and implementing CLIL and Techno-CLIL models in a secondary school setting. With a purpose of realizing the goals of the study and finding the answers to the research questions, data were collected through quantitative and qualitative data tools which included VKS, Scholastic L2 reading comprehension test, student interviews, reflective journals, and stimulated recall technique. The following section displays the discussion of the findings with respect to the pre-determined research questions.

5.1.1 Discussion of the findings of RQ1a: Will there be a difference between CLIL group and Techno-CLIL group students regarding their L2 vocabulary achievement? This research question aimed to determine if there was a significant difference in students' L2 vocabulary achievement on the pre and post-VKS testing. The statistical results have indicated that CLIL and Techno-CLIL groups showed a great vocabulary development after the treatment which suggested that both traditional CLIL teaching and Techno-CLIL teaching influenced learners' vocabulary development in a positive way. However, concerning comparative results, it was analyzed that control group which has taken traditional CLIL instruction has shown better retainment in their vocabulary development than the experimental group, Techno-CLIL class.

To start with, the reason why the student vocabulary knowledge has shown growth in both CLIL and Techno-CLIL groups might be the fact that the students in both groups were not merely taught the target vocabulary through linguistic games,

activities; instead, the students were involved in contextualized lessons where they unconsciously used the target vocabulary. For instance, CLIL students used real-life objects such as levers, pivot, painting materials, plasticine, or digital tools such as interactive games, videos, PowerPoint, and educative websites in order to maintain the permanence of learning the meaning of a word. The findings of this study are closely aligned with the findings of Arribas (2015) whose study also aimed to find the effectiveness of CLIL approach on the L2 vocabulary achievement. His study has similarly revealed that secondary school learners are apt to learn L2 vocabulary more through contextualized lessons. Furthermore, this study has reached the common conclusion with Moghadam and Fatemipour's (2014) study as they have also proved the development of L2 vocabulary of secondary school students' through CLIL implementation. As Bonnet and Dalton-Puffer suggested (2013), CLIL is an effective setting for L2 vocabulary development, which has been clearly proven in the current study, as well.

Moreover, the results of this study are similar with Alonso's (2013) study which was also conducted in the 6th grades. Alonso's study has analogically shown that CLIL students have shown more vocabulary development than the non-CLIL students but the growth in both groups was quite similar in his study. The researcher related this similarity to the exposure to language for a limited time just as in this study. With an attempt to see the developmental difference between these two groups better, the treatment process should be longer. As for this study, CLIL group has shown better growth than Techno-CLIL group in terms of vocabulary knowledge with a minor difference; however, it is needed to lengthen the treatment process to access healthier results.

As for the relation between Techno-CLIL and vocabulary development, the results of this study are aligned with the findings of Dourda, et al. (2014) as both studies used interactive games in order to increase the L2 vocabulary knowledge of the learners. The results of their study have shown that students have developed their L2 vocabulary with the help of these games; similarly, the present study used games during treatment process in Techno-CLIL group which was strongly believed to affect vocabulary development of the learners in a positive manner. Similar study results which proved the effectiveness of Techno-CLIL on L2 vocabulary of learners

(Bazo, Rodriguez & Fimero, 2016; Carloni, 2012; Angel, 2015) strongly suggested that digital tools could help learners develop their autonomous vocabulary learning with the help of easy access to information online.

However, pre and post-test results between the CLIL and Techno-CLIL groups have shown that the vocabulary growth in the both groups are similar. The reason of this might lie in the fact that both groups put equal effort in learning content and language and they were equally motivated during the lessons. As Sylven (2006) suggested in her study, CLIL students are highly exposed to L2 vocabulary outside classroom which naturally increases their self-confidence and self-assessment ability. A similar result can be drawn for the current study as well since the students in CLIL and Techno-CLIL classes were slightly interested in watching documentaries, listening and reading in L2, in other words, incorporating English with their lives.

In conclusion, it can be clearly suggested that CLIL group has outperformed Techno-CLIL group in terms of vocabulary knowledge growth with a minor difference. However, Techno-CLIL group was also influential in terms of L2 vocabulary achievement. Above all, there should be a large scale study including more students from various educational levels and different Techno-CLIL teaching techniques to generalize the impact of Techno-CLIL on students' L2 vocabulary achievement.

5.1.2 Discussion of the findings of RQ1b: Will there be a difference between CLIL group and Techno-CLIL group students regarding their L2 reading proficiency? This research question aimed to explore the impacts of CLIL and Techno-CLIL models on the L2 reading comprehension levels of the secondary school students. With an attempt to analyze the levels through highly reliable Scholastic measurement test, pre and post-reading comprehension test results have revealed that both control and experimental groups have shown development in their reading achievement. It can be deduced from here that traditional CLIL instruction and Techno-CLIL instruction gave rise to an increase in students' reading achievement. However, when a detailed test was carried out to analyze the reading test scores, it was detected that CLIL group could not reach as much success as the

students in Techno-CLIL group could. The main reason might be that the students in CLIL group were not as interested in reading extensive reading activities as the students in Techno-CLIL group. Statistically, Techno-CLIL group has surpassed CLIL group in terms of reading development with a little difference; that is to say, CLIL group has also shown high results in pre and post- tests.

The findings of the study are consonant with the study of Canado (2018) who has similarly found out that CLIL has positive impacts on L2 reading development of the secondary school students in Spain. As Canado relates this success to a large amount of exposure to L2 reading in CLIL classes, this study also regards extensive reading which accounts for the increase in reading achievement. As noted in methodology section clearly, CLIL and Techno-CLIL students were assigned various books related to the topic of the week which also included follow-up quizzes. It is impossible to deny the impact of these take home lessons. Furthermore, Diezmas (2015) has shown in his study that CLIL students integrate reading texts into the lessons so meaningfully that reading skill becomes a purpose for them, they read to discover knowledge, to deconstruct on the existing knowledge and apply it in their own production; hence increasing their L2 reading unconsciously. Moreover, Martinez and Zarobe (2017) have stressed on the importance of enabling learners with metacognitive reading strategies through CLIL implementation. Similarly, this study also invested on learners' own discovery process of their reading ability through digital and traditional reading.

On the other hand, it should be noted that Techno-CLIL students have outperformed CLIL students in terms of vocabulary achievement. Similar findings in Diab, Abdel-Hak and Aly's (2018) study have shown that using internet resources and authentic readings that were taken from real-life websites rather than the educative ones helped their Techno-CLIL learners show development in their reading skills. This study was in line with their study in terms of providing learners with authentic reading materials. For instance, during Techno-CLIL implementation, when the learners were curious about a topic, they had a look at the newspaper of the day. This easy access to authentic information and quick reading with the purpose of self satisfaction might have influenced the L2 development of Techno-CLIL learners. Similar claims which can be related to the present study

(Garcia, 2015; De Graff, et al. 2007; Zubarev and Gross, 2010; McNaught, 2010) have pointed out that digital readers feel themselves confident and free in reaching any kind of reading text online. Digital reading coheres with digital natives who can quickly access information through e-reading and develop their digital literacy.

To sum up, both control and experimental groups in the study have shown increase in L2 reading test scores as both classes studied on different sub-skills of reading such as reading for gist, specific information, drawing conclusions, or reading for enthusiasm; therefore it involuntarily affected the change in their reading ability in a different way. However, Techno-CLIL group, have shown more reading growth as shown in pre- and post- reading test analysis in detail. Since there is dearth of data proving the reading achievement difference between CLIL and Techno-CLIL, it is difficult to relate the study to the previous studies; consequently, further research needs to be conducted to compare two models of teaching.

5.1.3 Discussion of the findings of RQ2: What are the L2 students' perceptions regarding CLIL and Techno-CLIL instructions? This research question targeted at exploring the impact of CLIL and Techno-CLIL models on students' perceptions, as interpreted from qualitative data obtained from student interviews. Having examined what each interviewee stated carefully, it can be claimed that both groups of students in CLIL and Techno-CLIL classes maintain positive attitudes towards two models. Apart from many other personal opinions, CLIL students think that learning through real-life objects are motivating for them. They also believe that they practice language structures and vocabulary thanks to CLIL. Finally, they suggest that they are challenged in completing homeworks appropriately before deadline.

One evident that indicated their belief on the motivating side of the realia comes from S3 from CLIL group: '... I brought my own easel and watercolors to CLIL room. It was so much fun to share them with my friends. We all the time spoke in English in the class but it was like Art class.' It can be concluded from the reports of the S3 that when they bring the materials that they use in their daily life into classroom environment and share with their friends, they feel highly motivated to learn subject-specific information through another language. The findings of this

study is highly related to the study of Bower (2017) who conducted CLIL on secondary school students. In his study, he figured out that students were motivated to be involved in the lesson and engaged to learn more thanks to the real-life objects that they came across during treatment.

It was also clearly understood from the interviews that CLIL learners felt believed that they developed their L2 sub-skills such as speaking and vocabulary. S3 from CLIL group states that: 'I learned the muscles in English, they are so similar to Turkish. I learned their shapes, too.' It can be understood that learners have developed their lexical knowledge through realia and contextualized learning. The findings related to this question is in close line with the findings of Arribas (2015) who has suggested that repeating certain words during CLIL lessons and creating a cycle of vocabulary motivate learners to learn more about those words and use them in context unconsciously. Similarly, it can be understood from the reports of the CLIL students that they use English as a medium to communicate therefore they believe that there is a growth in their speaking, as well.

As for Techno-CLIL groups, the students stated that they enjoyed while using digital platforms as educative tools. They also claimed to develop their subject-specific knowledge thanks to online access to information. Finally, they revealed that they were challenged in processing language, content, and technology at the same time.

The finding of this study is related with the findings of Connolly and Hainey (2011) who have found out that students were increasingly motivated by the digital tools provided with them during Techno-CLIL lessons. Similarly, the participants of the present research have claimed to have so much fun while using digital tools during lessons to access information. They also maintain positive attitudes towards building high level of content knowledge thanks to Techno-CLIL. Similarly, Garcia (2015) suggests that Techno-CLIL learners scan the reading texts quickly over the pages online in order to find information. She then adds that digital natives find it easy to wander around the webpages and satisfy their need, learn about any content area that they are curious about or teacher assigns them. Comparably, the students involved in this research have searched for whatever they needed to find out about

content information during treatment weeks. It is believed to be the key reason why they believed that they developed their subject-specific knowledge.

5.1.4 Discussion of the findings of RQ3: What are the L2 instructors' opinions regarding CLIL and Techno-CLIL instructions? The purpose of the final research question was to carefully examine the two teachers' opinions regarding two different techniques that they used in their classes. With a purpose of finding an answer to this crucial question, teachers kept regular journals where they made comments on their implementation, thoughts and feelings about the models. The results have thematically indicated that the teachers were challenged in adapting materials, managing time and school requirements. They also videotaped each other's lesson on which they stimulated a comment for drawing conclusions and reaching the better practices in the following treatment weeks. Thematic categorization from this reflection phase has shown that the teachers strongly believe that CLIL fosters higher order thinking skills while Techno-CLIL provides learners with an opportunity to cooperate and interact through group works and digital searching.

The findings of the qualitative data have shown that both teachers bounded positive relations with CLIL and Techno-CLIL through time. No matter how afraid the researcher teacher was at the beginning of the study because of the possible problems that might stem from technology integration, as indicated as a reason in Lam's study (2000) why teachers had difficulty in using technology in their classroom, reading and practicing helped her overcome her fears. The findings related to this question are aligned with Cinganotto and Cuccurullo's teacher training project study (2016) which have revealed that the teacher is motivated by Techno-CLIL because three components of teaching; content, language, and technology are interrelated.

As another significant point to mention, both teachers felt hesitant before starting to teach CLIL and Techno-CLIL models in classroom because they had a hunch that they might fail because of the lack of content knowledge. As stated in the study of Novotna, Moussova and Hofmannova (2001), this fear could only be overcome by integrating CLIL into curriculum so that every language teacher can

see that they can teach another content through a second language. The findings of this study supports the study in terms of realizing that the fears were overcome right after the teachers started to teach content and language integratively through technological tools.

Adapting materials, on the other hand, was an obstacle for the teachers as they could not find to-the-point and effective materials for their lesson objectives in CLIL and Techno-CLIL; rather they had to adapt the existing materials. The scholars who shared the similar problems during implementation (Perez & Malagon, 2017; Angel 2015; Cinar, 2018, Verdugo 2012) stated that it was not easy to find and adapt the suitable material in a shape that would be appropriate for the specific learner context with various needs and interests. Verdugo (2012) specifically underlines the lack of Techno-CLIL materials that will motivate learners to learn more but put burden on the shoulder of Techno-CLIL teacher.

Time constraints also negatively affected the teachers as they did not have a chance to make changes in syllabus or time. Cinar (2018) stated that she had to give priority to her school requirements such as exams and quizzes in order to keep up with the curriculum. Similarly, this study also encountered similar problems where the teachers had to manage the time so carefully and meticulously.

Apart from these, teachers strongly support that CLIL has a nature that fosters learners' thinking skills and Techno-CLIL provides learners with opportunities for cooperation and interaction. Various studies which supported these two advantages of CLIL and Techno-CLIL (Hanesova, 2014; Griva, 2014; Verdugo 2012; Binterova & Kominkova, 2013) have revealed that thanks to CLIL and Techno-CLIL models and enriched materials involved in these model of lessons not only promote higher order thinking skills but also teach them build social skills thanks to CLIL and Techno-CLIL's interactive and cooperative nature.

5.2 Conclusions

The main point of the present study was to explore whether CLIL and Techno-CLIL made a significant difference in L2 reading and vocabulary achievement in a Turkish secondary school setting. Subsequently, the study takes the aim of finding

and discovering the perceptions of students about CLIL and Techno-CLIL, as stated through the student interviews and to analyze the perceptions of teachers about planning and implementing CLIL, and Techno-CLIL lessons as revealed in the reflective journals kept by the researcher teacher and the stimulated recall on which it was reflected by the teachers.

To make a conclusion, the findings of quantitative data displayed that CLIL and Techno-CLIL have made a difference in L2 vocabulary achievement of Turkish secondary school student as tested by Vocabulary Knowledge Scale test. However, CLIL instruction displayed better vocabulary retainment in learners' academic success than Techno-CLIL instruction. When it comes to L2 reading proficiency, it was reported that there is a significant difference that Techno-CLIL model made in Turkish secondary school students. Techno-CLIL students have proven to show better reading achievement than CLIL group. With regard to the qualitative data results, it was concluded that students developed good relations with CLIL and Techno-CLIL models. In a similar way, conclusions that were drawn from teacher journals and stimulated recall also revealed that they developed positive relations with CLIL and Techno-CLIL models. The results of the qualitative data put essential ideas and perceptions together in CLIL and Techno-CLIL world.

5.3 Recommendations

The study has found out several recommendations for future research in the field of CLIL and Techno-CLIL. The recommendations will be listed in the following paragraphs.

First of all, it should be noted down by anybody who is going to practice CLIL or Techno-CLIL that these models are not language teaching approaches. Content and language are integratively and intensively used during lesson time so that teachers should not merely study language pieces or content knowledge. It is also important to pin down that smooth transitions between language and content focus should be pre-defined by the teachers if they are going to apply.

Second, it is suggested to the teachers, who has an intention to practice Techno-CLIL, especially in large classes, to make observations about how their

learners best learn, and what their needs and interests are. When the teacher knows the needs and interests of the digital learners, it will be quite easy to find appropriate online materials because digital world serves innumerable materials that teachers can use. However, it is important to select the ones who appeal to that local learner context and their readiness level. Apart from their affective situations, their academic levels should also be pre-defined so that they will not have difficulty in understanding the language or topic in a Techno-CLIL lesson, as their nature suggests. Therefore, it is important to select or adapt the materials right according to the level of the learner. When a digital learner meets the right material, it will be no longer difficult to learn a subject matter through a second language as they feel themselves free in online world rather than traditional settings.

Third, CLIL teachers should definitely be an expert in content knowledge and language use so that learners will not face any problems in information transfer. If a language teacher is not competent in the content, he or she should learn more about it through subject teachers' support so that a successful implementation can happen. Moreover, Techno-CLIL teachers should be technologically literate and technology-friendly as the learners, especially young age groups, can easily manipulate Techno-CLIL lessons. A Techno-CLIL teacher should feel free to dive into the depths of the Internet in order to find the most suitable materials and practice them before carrying them to classroom environment. When the suitable digital materials are chosen, they need to be practiced by the teacher in class first in order to show students how it works and it should be made sure by Techno-CLIL teacher that learners fully understand how they will use a specific digital tool during lesson.

Fourth, CLIL and Techno-CLIL lesson planning takes so much time, so it is suggested to the teachers who would like to use these models to take professional in-service teacher training in the field of CLIL. Most CLIL programs offer a special section named "ICT Integration with CLIL" which sheds more light to Techno-CLIL as practiced in this study. As long as deeper understanding is gained towards this integration, it will not be difficult for a CLIL teacher to become a Techno-CLIL teacher, as well.

Finally, the school institution homing to CLIL or Techno-CLIL practice should be open to collaboration. It should be noted that laboratories should always be accessible to CLIL or Techno-CLIL teachers. Computer laboratory, specifically, should always be open and computers should be supported with brand new softwares in order to access online games, interactive websites, and quizzes.

Furthermore, there should be a CLIL room in each school in order students to go out of classroom borders and feel themselves free. Also, the school should provide teachers with real-life materials which will be used during lessons. The school should also have a garden where experiential learning environment can be created by the teachers and students. Besides, the curriculum of the school institution should give a place to CLIL or Techno-CLIL models so that teachers can make their lessons without time constraints. As it is difficult and time consuming for the teacher to find the appropriate material for the specific learner group, the school should provide teachers with a wide variety of materials and activities which they can use in their classes.

Apart from the recommendations for the future researchers, it should be noted down that more and wide scale of research is needed in this field to generalize the findings and results of this study. Moreover, a longer research needs to be carried out in order to observe long-term effects of the models on learners' development and motivational growth and reach more reliable data results. Furthermore, besides the 6th grade secondary school students, young learners or high school levels with higher language levels are recommended to be studied with the aim of increasing the external validity of the data.

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APPENDICES

A. Vocabulary Knowledge Scale

Wesche, M., & Paribakht, T. S. (1996). Assessing Second Language Vocabulary Knowledge: Depth Versus Breadth. *Canadian Modern Language Review*, 53(1), 13-40.

Dear student,

This questionnaire was prepared to measure your knowledge of listed words. Your answers will only be used for research purposes and will be kept confidential. Your sincere responses are highly appreciated as it is of high importance for the reliability of the study. Thank you very much for taking your time to help me.

- 1: I don't remember having seen this word before.

2: I have seen this word before, but I don't know what it means.

3: I have seen this word before and I think it means _____
(synonym or translation).

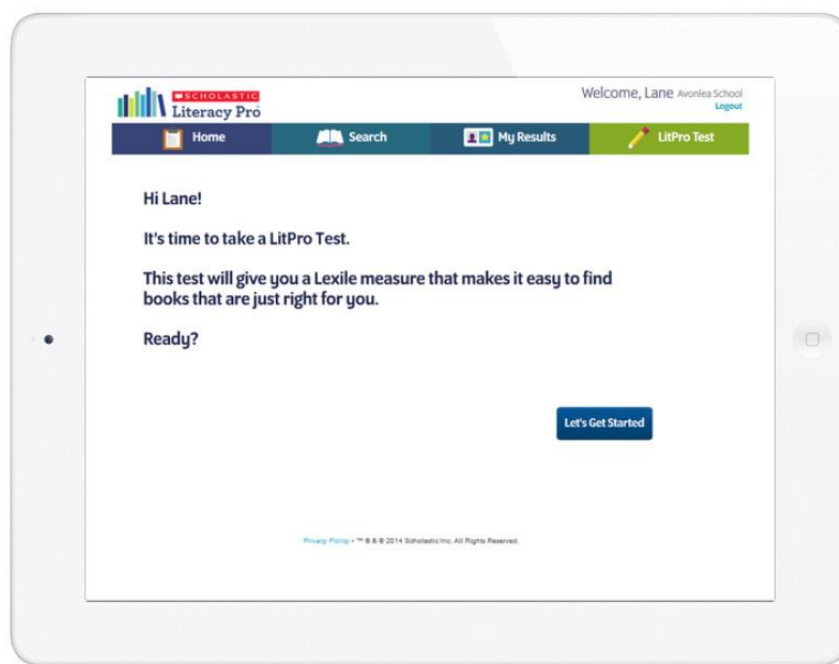
4: I know this word. It means _____ (synonym or translation).

5: I can use this word in a sentence. e.g.: _____ (if you do this section, please also do section 4).

WORDS	1	2	3	4	5
1. muscle					
2. voluntary					
3. involuntary					
4. skeleton					
5. modern					
6. brush					
7. realism					
8. impressionism					
9. force					
10. load					
11. diagram					
12. pivot					
13. reflect					
14. phase					
15. hemisphere					
16. shrink					
17. glacier					
18. surface					
19. valley					
20. continent					
21. fossil					
22. bug					
23. shell					
24. footprint					

B. Reading Proficiency Test

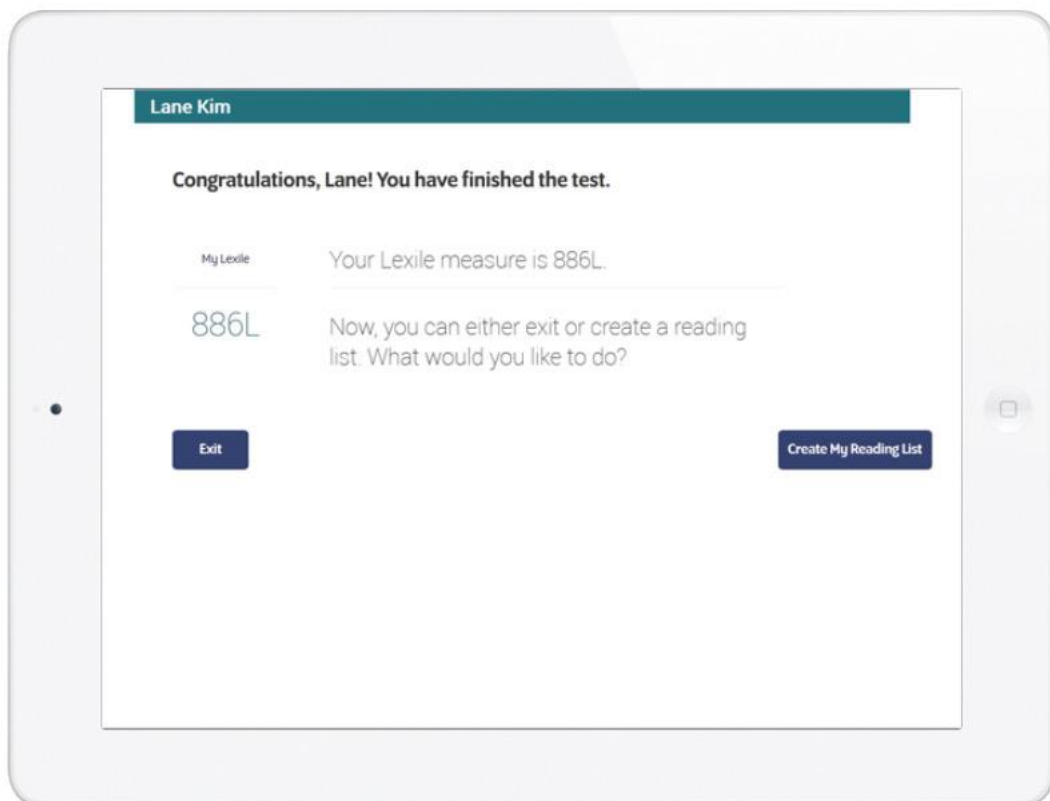
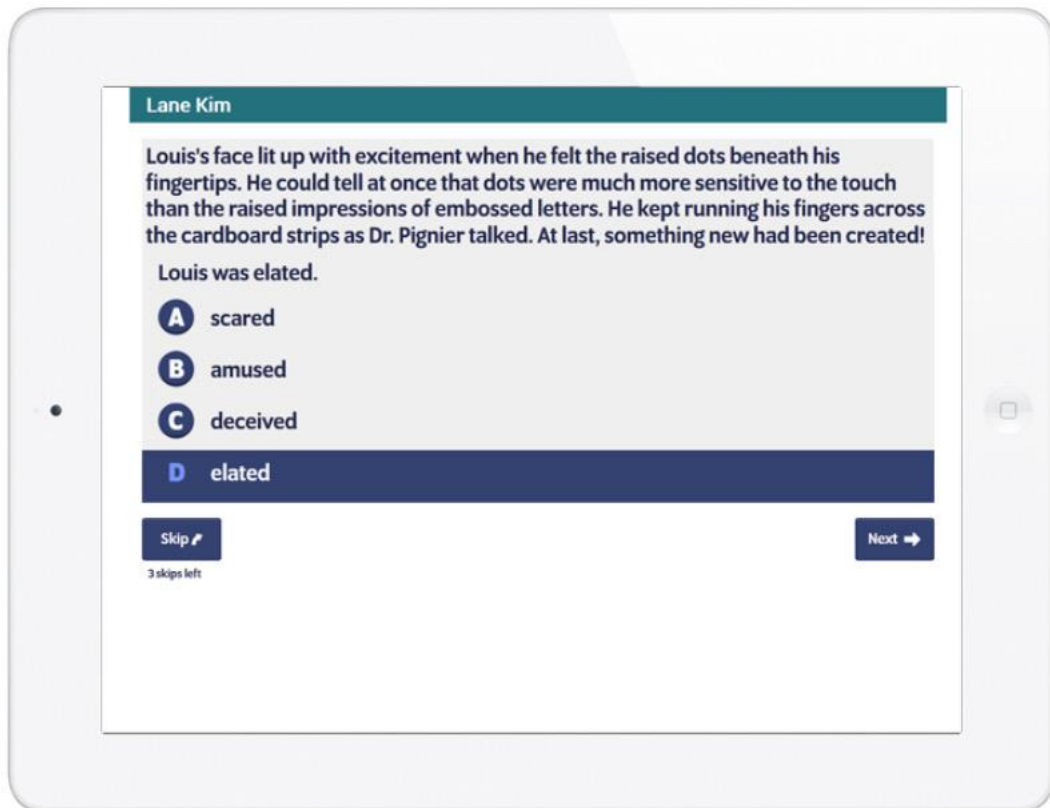
<http://www.inkas.com.tr/literacypro/> (A computer-assisted reading proficiency test)



Scholastic Reading Pro Teacher's Guide



Sample Item	Lexile
Q. Polar bears are powerful swimmers. They have two layers of fur and a thick layer of fat. Fur even grows over the bottom of their paws. These layers protect polar bears from the freezing Arctic waters they hunt in. Puffins also hunt in the waters of the Arctic. They have thick waterproof feathers to protect them from the cold, and a big beak for storing fish. Arctic animals _____. A. adapted B. invaded C. cooperated D. healed	700L-850L
Q. The Sun shines down from space. It takes eight minutes for the Sun's light to reach Earth. The Sun is much closer to Earth than other stars. That is why it looks so big. Hello, bright yellow Sun! The Sun is a star. The Sun is so big that one million Earths could fit inside it. The Sun is _____. A. huge B. rocky C. rough D. weak	400L-550L
Q. I know how to fly a kite! It will fly if you run that way. How did you know? Look at it fly! I didn't know it would fly so far! The kite was _____. A. high B. last C. dark D. wet	100L-250L





Learn and think

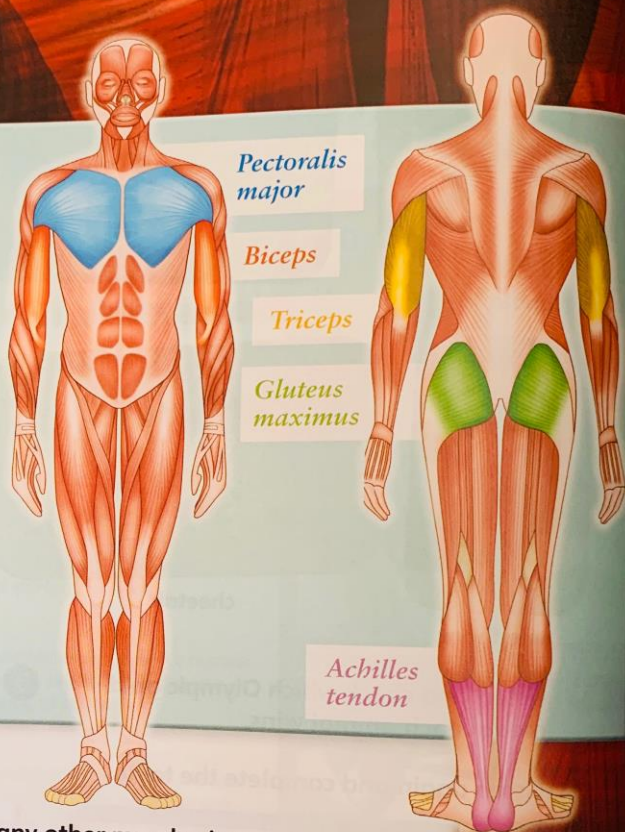
Muscles

1 Read and feel the muscles in your body.

What are muscles?

Underneath your skin you have a layer of fibres. These fibres are your muscles. Muscles have one very important job – they move us. Without muscles you can't walk or run, laugh or cry, stand up or sit down. You also can't breathe or eat, so we need our muscles in order to live.

This is what it looks like under your skin. Many muscles have very strange-sounding names because they are in Latin.



Pectoralis major

Biceps

Triceps

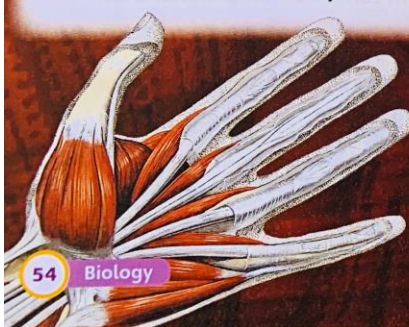
Gluteus maximus

Achilles tendon

2 ^{CD2}₂₉ Listen and say the names of the muscles in English. Can you name these and any other muscles in your language?

3 **Think!** Read the text. Where else in your body have you got involuntary muscles?

There are two kinds of muscles: voluntary muscles and involuntary muscles. The voluntary muscles only work when your brain tells them to do something. If you want to send an email, for example, your brain will send a message to the muscles in your fingers telling them to type. Most of the voluntary muscles are attached to the bones in your skeleton. Involuntary muscles already know what to do. They don't need messages from your brain to get them to move. For example, after you swallow, muscles take the food down into your stomach automatically. Involuntary muscles also make sure that your heart doesn't stop beating.



54 Biology

1 Read and complete the smart facts with the words from the box.

biggest busiest face smile mouse surprised

Smart facts

The word muscle comes from the Latin *musculus*, which means 'little ⁽¹⁾ _____. The Romans thought the muscle at the top of your arm looked like this little animal running under the skin!

There are more than 30 muscles in your ⁽²⁾ _____, helping you to look happy, sad, ⁽³⁾ _____ or angry. You use 15 of them just to ⁽⁴⁾ _____!

The gluteus maximus is the ⁽⁵⁾ _____ muscle in the body. It's the muscles in your bottom that you sit on.

The ⁽⁶⁾ _____ muscles in the body are the eye muscles. You move them more than 100,000 times a day!

2 Read about the exercise that muscles need. Then work in groups. Discuss the questions.

Muscles need energy to work and they get this from the food that you eat. They need carbohydrates from foods like fruit, pasta and potatoes to turn into energy. This is one of the reasons why it is important to eat a healthy diet.



Muscles also need a lot of exercise to keep them strong and working well. It is important to exercise all the different sets of muscles. However, you should not overdo the amount of exercise in one part of your body because that can be bad for you too. If you walk a lot and play sports regularly, you are probably getting enough exercise to keep your muscles healthy. If you spend all day playing on your computer or games console, your fingers and thumbs will be healthy (or too tired!), but the rest of your muscles won't be very strong!

1 What muscles do you think these exercises help?

Your arm muscles.



2 Think about yesterday.

- Where did you walk? How far?
- Did you run, jump, swim or cycle?
- Did you exercise your arm muscles?

3 **Project** Keep an exercise diary over the next week.

a Copy and complete the table.

Day	Type of exercise	How long	Muscles I used
Mon			
Tues			
Wed			
Thurs			
Fri			
Sat			
Sun			

b After a week, compare your diaries in groups. Do you think that you are getting enough exercise?

Biology

Impressionism

1 Look at the two pictures of London and answer the questions.

- 1 What places or sights can you name in each painting?
- 2 What time of day were they painted?
- 3 Which do you think is more modern? Why?



by Nathan Walsh



by Claude Monet

2 Read and complete the texts with A, B and the artists from Activity 1.

3 Listen and check.

Realism

Realism is a style of painting that shows things as they are in real life. The paintings often look like photographs. Picture by is an example of a realistic painting.

Impressionism

Impressionist paintings look like they were painted by an artist who just took one quick look at the subject and painted the 'feeling' that he or she had. Although a lot of work goes into these paintings, they don't contain a lot of details. Picture by is an example of impressionism.

The Impressionists

The most important artists of the style that we call Impressionism were Pierre-Auguste Renoir, Claude Monet, Edgar Degas and Camille Pissarro. The style began in Paris, France in the mid-1800s and was popular among artists until the beginning of the twentieth century. Impressionists liked to take their easels outdoors and paint images of the world that they saw around them. These were sometimes scenes from the city, but were more commonly scenes from the countryside. They didn't paint kings and queens or saints. They painted real people from the streets and on the farms.

The Impressionists weren't worried about painting exactly what they saw. They used a lot of paint and applied it with short brush strokes. Their paintings were almost 3D and this helped them create the 'impression' of the scene that they wanted to paint. If you stand close to an impressionist painting, you can't always see what the picture is, but when you walk back and look at it from across the room, everything becomes clear.

4 Read the text. Underline the information in different colours.

- Who were the main artists? (green)
- Where were they from? (red)
- When did they paint? (blue)
- What did they like to paint? (orange)
- How did they paint? (yellow)

1 Project Do an impressionist painting.

- 1 The Impressionists painted with thick paint. Add glue to make your poster paints thick.
- 2 Prepare thick blue, red, yellow and white paint and put the four colours on a plate.

You need:

- cardboard to paint on
- PVA / wood glue
- plastic plates
- plastic cups
- different-coloured poster paints
- water
- paintbrushes



- 3 Add a little blue paint to some water in a plastic cup. Paint half of the cardboard with the blue water. This is the sky half of your painting. Then add a little yellow paint to some of your blue water to do the grass half of the painting.

- 4 Add some red to the green water to make it brown. Paint brown outlines of the details that you want, for example trees, mountains, a house or people.

- 5 To paint an impressionist sky, dip a thick brush in white paint and use short brush strokes. You can add blobs of blue too.



- 6 Now mix other colours and experiment with brush strokes and colours.

I used blue with blobs of thick white paint for the sky and green for the grass with dark green detail. I also added brown trees with thick brush strokes.



- 7 Write a short text. Describe your painting and how you did it.

LEVERS

1 Read and write the names under the pictures.

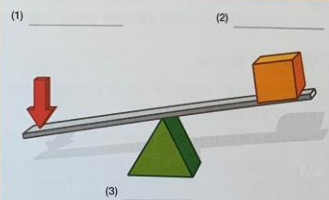
Maria is lifting a heavy log. It is so heavy that it is difficult to pick it up. She is using a lot of force.

Gemma is lifting a similar log. She is using a pole resting on a rock to help her. She is finding it easy to lift the log. She is not using as much force.



2 ^{CD 3} ₂₆ Listen and read about levers. Label the diagram.

force load pivot



What is a lever?

Gemma is using a lever. It is a kind of machine and it makes work easier to do. When we use a lever, we don't need as much force to do the work.

How does a lever work?

When we apply a force to a lever, it helps us move a load more easily.

In the picture in Activity 1, Gemma is applying the force by pushing down on the pole. The load that she wants to move is the log. The lever needs a pivot to work. The lever turns on the pivot. Gemma is using a rock as the pivot for her lever.

3 Read and complete the smart facts with the words from the box.

humans fruit
sticks animals

Smart facts

It isn't only (1) _____ who
use levers. Some (2) _____
use them too. Orang-utans use
(3) _____ as levers to
open (4) _____.



Learn and think

1 Project Do experiments with levers.

You need: • a ruler • two rubbers

A simple lever



- Put the ruler on one of the rubbers.
 - Put the other rubber at one end of the ruler.
 - Hit the other end of the ruler.
- 1 What happens to the second rubber?
 - 2 What is the lever? What is the pivot?

Using a lever



- Use the ruler and a rubber as a lever. Put one end of the ruler under a book and press down on the other end.
- 3 What happens to the book?
 - 4 What other things can you lift with your lever?

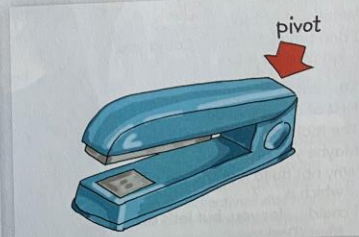
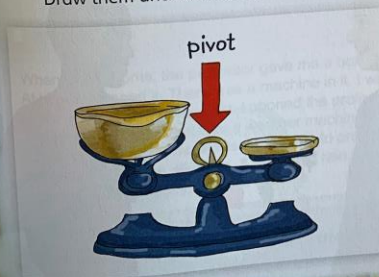
Levers at home

- Find some more common levers. Draw them and label the pivot.



Using a pivot

- Try putting the pivot in different places. What do you notice when:
- 5 ... the pivot is closer to the book?
 - 6 ... the pivot is further from the book?





Learn and think

The moon

- 1 How much do you know about the moon?
Write your guesses in the first box: *t* (true)
or *f* (false).

	My answer	Correct answer	Points
1 The moon orbits Earth every 30 days.			
2 The moon does not turn like Earth.			
3 The moon makes its own light.			
4 The moon is older than Earth.			
5 The moon is more than a million kilometres from Earth.			
6 It takes a rocket about 13 hours to reach the moon.			
7 There is no gravity on the moon. (If you drop something, it floats.)			

2 CD 4
05

Listen and check. How many points did you score?

3 CD 4
05

Listen again and complete the facts about the moon.

Moon facts

LENGTH OF MOON ORBIT:

(1) _____ days, (2) _____ hours,
(3) _____ minutes,
(4) _____ seconds

AGE: (5) _____ billion years old

DISTANCE FROM EARTH:

(6) _____ km

TIME YOU NEED TO DRIVE THERE:

(7) _____ days

90 Physics

Learn and think

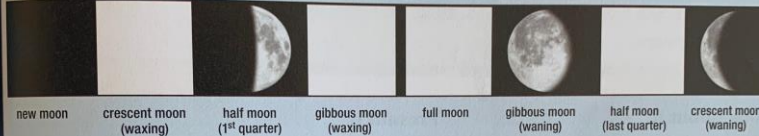
- 1 Read and draw the missing moons in the diagram.



The phases of the moon

The moon hasn't got its own light; it reflects the light from the sun. As the moon orbits Earth, the shape of the moon that we see in the sky **changes**. This is because it reflects the sunlight from different positions in its orbit.

We see it change from a thin crescent into a full circle and then watch it shrink to a thin crescent again before it disappears. As the moon gets bigger, we say it is **waxing**. As the moon gets smaller again, we say it is **waning**.



People in the northern and southern hemispheres see the moon from different directions because of the moon's orbit. The diagram shows the phases of the moon in the northern hemisphere, but in the southern hemisphere, the shape of the moon 'grows' from right to left. That means that the **waxing** crescent is on the **left** and the **waning** crescent is on the **right**.

- 2 In which hemisphere do you live? Look at the moon tonight. Draw the shape that it will be in two weeks' time.

- 3 **Project** Make your own moon phases.

You need:

- a pencil
- a foam ball
- a dark room
- a lamp which you can move



- Stick a pencil into a foam ball. The ball is the moon. Use the pencil as a handle to hold your 'moon'.
- Make the room dark and turn on the lamp.
- Put the lamp in the middle of the room at the same height as your eyes. Look towards the lamp. The lamp is the sun and you are Earth.
- Hold the ball just above your head, directly between you and the light. The side of the ball that is facing you will be dark. This is the new moon.
- Slowly turn round on the spot, keeping the ball above your head. Look at how the light shines on the ball. Watch the phases of your very own moon.

Learn and think

Glaciers

1 Can you answer any of these questions?

1 What are glaciers?

2 Where do you find them?

3 How are they made?

4 What happens to them?

5 Why are people worried about them?

2 Texts a–e answer the questions in Activity 1. Read and match the answers with the questions.

a

Glaciers are found all over the world in every continent. They cover about 10% of the surface of the world. There are two different types of glaciers: **valley glaciers** are found in high mountains and **continental glaciers** are found around the North and South Poles. These glaciers are also called ice sheets.

valley glacier

continental glacier

b

You need very special conditions to make a glacier. You need a place that has very cold winters with lots of snowfall and very cool summers which won't melt the ice. All glaciers start life as snowflakes. These snowflakes fall in billions onto the cold ground where they don't melt. As more and more snow falls, the weight of the snow on top presses on the snow below and it turns into ice. The more the snow falls, the deeper the ice gets. This sheet of ice gets so heavy that it starts to move.

c

Glaciers often change size. If a glacier gets bigger, it is a healthy glacier. Many people these days are worried because glaciers are getting smaller much more quickly than they are growing. This is a sign that the temperature on Earth is rising.

d

Valley glaciers slide slowly down the mountain sides. When they get lower down where the air is warmer, they start to melt and form rivers and streams. Continental glaciers spread out until they reach the sea. The edges of the glaciers break off in huge bits. These bits are called icebergs and they float about in the sea. When they reach warmer waters, they slowly start to melt.

e

Glaciers are rivers of ice. These 'rivers' can be more than 1 km deep. Because the ice is so heavy, the glacier moves. It moves really slowly, at a speed of about 1 m every day, so it would take them nearly three years to travel one kilometre. Glaciers are big. The smaller ones are about the size of a football pitch and the longest are more than 160 km.

1 CD 4 **Listen and correct the mistake in each sentence.**

That's wrong! They move ... No, they aren't! They're ...

2 **Read and complete the smart facts with the words from the box.**

melt above ship cities water

Smart facts

- You can only see a tiny bit of an iceberg ⁽¹⁾ _____ the water. Most of it is hidden under the water.
- About 70% of all the world's fresh ⁽²⁾ _____ is in glaciers.
- In 1912, a famous ⁽³⁾ _____, the *Titanic*, hit an iceberg and sank. 1,503 people drowned.
- If all the glaciers ⁽⁴⁾ _____, the seas will rise by about 70 m. This will cover many ⁽⁵⁾ _____ around the world.

3 **Project** **Find out how much of our planet is covered by glaciers.**

1 Look at this map. The blue areas show how much of Earth was covered by glaciers 20,000 years ago, during the last ice age. What percentage (%) was this?

2 Find out where there are glaciers today. Draw and colour blue areas on the map below.




Environmental studies **103**

Fossils

1 Read about fossils. Which photo doesn't show a fossil?

Fossils are the remains of any animal or plant that has lived on Earth. They can be any part of the animal: the bones, teeth, hair, shell or even its footprint. Sometimes they can be the whole animal. Anything that shows us that there was once life is a fossil.



2 Read about how fossils are formed. What do we call scientists who look for fossils?

In the time of the dinosaurs, a Tyrannosaurus rex dies and falls into a swamp. Most of its body is eaten by bugs and the rest rots away. After a few years, only its hard skeleton is left at the bottom of the swamp.



The weight of the mud in the swamp pushes the bones deeper and deeper until they reach rock. Over millions of years, these bones turn into a type of rock.



Over many more millions of years, the landscape changes. The swamp is now rock and humans have learnt enough science and technology to understand our

past. Palaeontologists digging in the area find the first of the fossilised bones. They are very excited because they know that they have found some important fossils.



After a lot of careful digging, the palaeontologists have found the complete fossilised skeleton. The bones are taken to a museum, where they are carefully put together. Now the T-rex can go on show for everyone to see.

3 **Think!** How many words can you make from the answer to Activity 2?

tail, late, eats, ...

1 Think! Read the text. Where should this information go?

- a ☐ but they were also the favourite prey of large sea lizards
- b ☐ we can tell a lot about them from these fossils
- c ☐ octopus, squid and cuttlefish
- d ☐ and the biggest were over 3 m in diameter
- e ☐ it might be an ammonite fossil
- f ☐ around the same time as the dinosaurs

2 Listen and check.

Ammonites

One of the most common types of fossils found are of ammonites. Although the ammonites died out millions of years ago, **1**

Ammonites lived in the sea between 240 million and 65 million years ago, **2**. They had soft bodies and they didn't have spines. They lived in coiled shells and had long tentacles. They also had beaks.



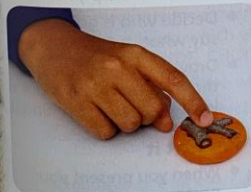
The smallest ammonite shells were 2½ cm **3**. They ate fish and crabs, **4** like the mosasaur. Modern relatives of these fascinating creatures include **5**.

Next time you are by the seaside, keep an eye out for a spiral pattern on loose bits of rock because **6**.



3 Project Make your own 'fossil'.

- 1** Make a smooth flat circle with the plasticine about 2 cm thick.



- 2** Press the object into the plasticine until it is half buried.

- 3** Take the object out carefully. It should leave an imprint in the plasticine.

You need:

- plasticine
- the object that you want to 'fossilise'
- thick plaster of paris



- 4** Pour the thick plaster of paris into the imprint in the plasticine. Leave it until it is completely dry.



- 5** Carefully remove the plaster from the plasticine and there's your fossil!

D. Interview Questions

<i>Questions for CLIL Group</i>	<i>Questions for Techno-CLIL Group</i>
1. Did you like learning English and another lesson together?	1. Did you like learning English and another lesson together with technology?
2. Did you have any difficulty during lessons?	2. Did you have any difficulty during lessons?
3. What was the happiest moment for you during the lessons?	3. Did you have any difficulty using technology during lessons?
	3. What was the happiest moment for you during the lessons?

Curriculum Vitae

PERSONAL INFORMATION

Surname, Name: Ünsal, Büşra

Nationality: Turkish (T.C)

Date and Place of Birth: 01 January 1996, Bahçelievler

Marital Status: Single

Phone: +90 544 534 34 26

Email: busra.unsal@ihlaskoleji.com

EDUCATION:

Degree	Institution	Year of Graduation
BA	Istanbul University	2017
High School	İhlas Private High School	2013

WORK EXPERIENCE:

Year	Place	Enrollment
2017-Present	İhlas College	English Teacher
2014-2017	Istanbul University Language Club	Volunteer English Teacher for Adult Learners

FOREIGN LANGUAGES:

English (fluent), German (pre-intermediate)

PUBLICATIONS:

2018 Conference paper published in "TEACHERS RESEARCH! IATEFL ReSIG International Conference" ("Reducing 7th Grade Turkish EFL Learners' Speaking Anxiety in Oral Production Through Classroom Debate Technique")

HOBBIES:

Violin, swimming, researching, documentaries, learning new languages, creative writing, charity works.