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**APPLICATION OF CONTENT AND LANGUAGE INTEGRATED
LEARNING (CLIL) IN DESIGNING MOODLE LEARNING
ACTIVITIES FOR STUDENTS OF MECHATRONICS
MA thesis**

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ABSTRACT

The aim of the present MA thesis is to carry out a needs analysis research in order to determine the socio-linguistic needs of students and teachers of mechatronics in Tartu Vocational Education Centre. The results provide rationales for designing a preliminary CLIL course outline for B2-level students of mechatronics and sample Moodle teaching materials as a first step in integrating the schools' curriculum. The need for integrated materials is great due to the general shift towards changing the paradigm of vocational education.

The thesis can be divided into two main parts – theoretical and practical. Chapter One presents a theoretical overview of CLIL as a teaching approach. The practical part consists of two chapters – an overview of the needs analysis research carried out in Tartu Vocational Education Centre among the students and the vocational teachers of mechatronics presented in Chapter Two and the description of the CLIL teaching materials in addition to the course outline in Chapter Three.

The paper is based on 46 resources and includes nine appendices.

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INTRODUCTION

The aim of the present MA thesis is to determine what the needs of students and teachers for CLIL (Content and Language Integrated Learning) materials are and which parts of the curriculum they are ready to acquire and teach in English. The findings of the research will be used to design sample Moodle teaching activities and a preliminary integrated course outline for B2-level students of mechatronics since the demand for new materials based on CLIL methodology is great. Moodle (modular object oriented digital learning environment) is a free software package that helps educators to create effective online learning environment. Applying it in education is considered as an innovative and effective learning management system (Alhaji et al, 2012). In recent years Moodle has become widely used among educators around the world as a tool for creating online dynamic websites for their students. The sample teaching activities for the present MA thesis will be designed in Moodle environment in order to blend CLIL teaching aspects such as supporting self-awareness, learners' autonomy, higher-level thinking skills, and development of ICT (Information and Communications Technology) literacy in learners.

Difference between CLIL and ESP. In the introductory part it is important to define the difference between a CLIL and an ESP lesson in order to avoid the confusion of the terms. A CLIL lesson, as it is seen by Elzbieta Jendrych and Halina Wisniewska (2010), is neither a language lesson in the traditional understanding, although it shares some aspects with current English language teaching (ELT) approaches, nor a typical subject class as the level of language fluency of learners may have an impact on the content acquired. It means that curriculum subjects are taught and learnt through the language that is not the mother tongue. ESP (English for Specific Purposes) covers both English for Academic Purposes (EAP) and English for Occupational Purposes (EOP) and is usually understood as a separate language-oriented course. EAP is aimed at tertiary level educational institutions' learners,

who are not required to be familiar with the content of the discipline they study. As it is stated by Andy Gillett (1996: 17-23), EAP courses can be held before the students' academic courses start in order to bring them up to the level that is necessary to cope with academic studies. Thus, EAP courses concentrate on teaching specific language study skills – the language for academic writing and reading tasks, academic listening (note-taking) and speaking (making presentations).

EOP, however, is for vocational purposes and at least some knowledge related to the occupation is required from learners (Jendrych & Wisniewska 2010). It is common to EOP courses that learners know much more about the subject matter than the language teacher and they need to improve language skills within a certain area. Thus, the teacher's role is to help them talk in English about the subjects they already know.

Political and economic background: meeting global requirements. The situation in the labour market in Estonia does not differ from those in the other European countries. For example, Latvian researchers Malinovska et al (2009: 344) admit that, in order to cope with dramatic changes in the work environment, workers have to be prepared for the acquisition of knowledge and developing new multi-skills such as creative thinking, being able to manage technological changes, recognise and respect peoples' diversity (Malinovska et al 2009: 344-345). Thus, the CLIL model is one of the models used in education in order to achieve new requirement of employers through the methodology's core methods: training the four basic language skills (reading, speaking, writing and listening), authenticity, self-directed and co-operative learning, experiential learning, learning styles, reading strategies (Malinovska et al 2009: 246). In the overall European situation of a severe economical crisis, it is important to upgrade employees' skills, and one of the ways to achieve it is seen through increasing the mobility of the labour market and deepening international cooperation (Commission of the European Communities 2008: 3-13).

In their report prepared for the European Commission, professor Mike Campbell et al (2010: 8-9) advise, that the education systems will need to take into account people's prior learning as well as their life situations, including gender, educational disadvantage and age. According to the report, nearly one third of Europe's population aged 25-64, around 77 million people, are insufficiently skilled. To meet the demands of the modern labour market, it is advised to "form flexible paths" for providing initial training and to pay attention to the development of digital and entrepreneurial competences (Campbell et al 2010: 4).

The situation in the vocational education system in Estonia. The Ministry of Education and Research (Haridus- ja Teadusministeerium 2009: 6, 36) has published a development plan of Estonian vocational education for the period of time from 2009 to 2013. According to the plan, new trends in vocational education in the nearest future can be described by the learner-centered approach, increased quality, innovation. Vocational education should be open and available to different age groups and it is seen as essential for it to meet the requirements of present-day society and economy.

According to the data gathered by the Estonian Ministry of Education and Research, one of the greatest challenges of recent time is the fact result of the decline in childbirth in the beginning of the 1990s (Haridus- ja Teadusministeerium 2009: 17-18). In this situation it is extremely important to notice every learner and provide education that meets learners' individual needs and cognitive abilities. Thus, education has to be flexible to make it possible for learners to acquire qualifications and skills while working and taking care of families. A solution to this challenge is seen by the Ministry of Education and Research in e-learning, using modern technologies and in expanding the availability of vocational education for different target-groups. A student should be trained into an adaptable worker, who is ready for lifelong learning. Consequently, according to the vision of vocational education '*Kutseharidus 2020*', it is important to form learners' attitudes and values, as well as creativity and initiative.

Integration as a new concept of vocational education. According to the new concept of vocational education, the integration of subjects should be accomplished (Pilli & Kuusik n.d.: 5-6). National curricula for vocational secondary education establishments will include the former amount (at least 40 weeks of study) of general education subjects. Yet, a significant change will take place and half (20 weeks) of these general studies will be integrated into the vocational training modules. The first part of the new national curriculum planning was carried out in working groups. The main work, however, is the responsibility of schools and should be done by teachers of different subjects in cooperation with each other. As a result of this collaboration new school curricula will be created.

Rationales for integration. Integration is not a fresh tendency of modern education and has a strong scientific justification (Pilli and Kuusik: n.d., p. 7-8). Human consciousness operates on the basis of linking principles. Acquiring new information is much more effective when it is associated with some prior knowledge or audio/visual experience. However, links do not occur automatically because humans have a limited ability to transfer knowledge from one field to another and human memory obtains information through the same links as it was stored. The best way to prepare students for the future career is to imitate authentic real-life situations in order to raise learners' motivation. In the light of the overall tendency towards the integration of subjects, CLIL can be one of the best opportunities for teaching English and special vocational content subjects.

English in Vocational Education. According to new trends in the national educational system of Estonia (Haridus- ja Teadusministeerium: 2009; Riigikogu 2013), the shift in vocational education is planned for the year 2014 when the new national curriculum will be adopted and applied. The new curriculum requires quite a large number of subjects to be taught through integration. Consequently, there is an increasing need for content and language integrated learning (CLIL) study materials for different occupations.

The situation with teaching English in Tartu Vocational Education Centre. At present, in Tartu Vocational Education Centre (TVEC) students are mostly taught specific technical English during a 40-hour course and 160-hours of general English. The materials used for teaching ESP do not meet the needs of students of different occupations. The textbooks available for teaching (*Tech Talk* by V. Hollett, 2005; *Oxford English for Electrical and Mechanical Engineering* by Glendinning & Glendinning, 2001), deal with general technical English, and teachers should combine materials from various sources themselves in order to compile an English for Specific Purposes course for students of certain technical occupations. A similar problem was previously described by Julia Kovalenko in her MA thesis (2010).

However, a shift in this teaching paradigm is already in progress. According to the new national curriculum for vocational education establishments, students will be taught ESP to a larger extent; the amount of general English will be minimised. Teachers have to get ready for the change and prepare new teaching materials, cooperate with their colleagues in order to integrate subjects more effectively.

Specifying the occupation. As it was mentioned previously, vocational education system involves various technical occupations. There is a great demand for specific language teaching materials compiled for a certain occupation. The outcomes of the present work it is to carry out needs analysis and to design sample teaching activities and a preliminary integrated syllabus for learners of mechatronics. The area of mechatronics is defined more specifically in Chapter Two. Shortly, mechatronics is often seen as a blend of mechanics, electronics, a synergy of control theory, computer science, sensor and actuator technology.

To sum up the previous, it can be noted, that the introductory part of the present paper gives an overview of different approaches to improving learners' knowledge of specific technical English (ESP, CLIL). In addition to that, there is also introduced economic and political background of Estonia and other countries in order to give justification to ongoing

changes in the educational system and in the system of vocational education in particular. The main tendency heads towards integration of subjects and choosing CLIL as the most suitable methodology in order to improve students' qualifications in various areas simultaneously and meet the requirements of the 21st century's labour market.

The structure of the main part of the present work can be divided into two main parts – theoretical and practical. The theoretical part concentrates on presenting an overview of teaching approach CLIL (Chapter One). The practical part is divided into two chapters – overview of the needs analysis research carried out in Tartu Vocational Education Centre among the students and the vocational teachers of mechatronics (Chapter Two); the sample CLIL activities constructed in Moodle environment and the preliminary integrated course outline for students of mechatronics (Chapter Three). In addition to that, nine appendices are enclosed in the end of the thesis. The paper is based on 46 resources.

CHAPTER 1

PRINCIPLES AND APPLICATION OF CLIL

One of the aims of the present work is to give an overview of content and language integrated learning in order to design sample Moodle CLIL teaching activities for students of mechatronics. In the existing wide range of numerous teaching approaches, why integration and CLIL in particular should be chosen? In order to answer this question, in Chapter One there is presented a more detailed overview of CLIL model, including possible teachers' attitudes towards this approach and possible mistakes in organising CLIL-based teaching that should be pre-planned and avoided. In the light of changing educational paradigm, new requirements should be met.

Concept of CLIL

Content and Language Integrated Learning (CLIL) is often seen as an “umbrella term” for different methods of teaching language through content Peeter Mehisto et al (2012: 29-30). CLIL gives learners a different learning experience, if compared with traditional foreign language teaching, and prepares them for real-life situations in the global, technological society where knowledge of other languages is essential.

Possible models of CLIL. Trying to define CLIL can be a challenge since the term itself is so wide and involves various models. Yet, it is possible to combine different characteristic traits of CLIL in order to develop the most appropriate model suitable for the conditions of a certain school. For example, Kay Bentley (2010: 6) presents the spectrum of CLIL types (see Table 1). As seen from the table, Bentley categorises CLIL into three possible types, which vary from soft CLIL (teaching topics of the curriculum as part of a language lesson) to hard CLIL (partial immersion where almost half of the curriculum is taught in the target language).

Table 1. *Spectrum of CLIL types by Kay Bentley*

	Type of CLIL	Time	Context
Soft CLIL	Language-led	45 minutes once a week	Some curricular topics are taught during a language course.
↓	Subject-led (modular)	15 hours during one term	Schools or teachers choose parts of the subject syllabus which they teach in the target language.
Hard CLIL	Subject-led (partial immersion)	About 50% of the curriculum	About half of the curriculum is taught in the target language. The content can reflect what is taught in the L1 or can be new content.

Furthermore, Do Coyle introduces CLIL through the 4Cs Framework (n.d.), which is described as a model integrating learning (content and cognition) and language learning (communication and culture). In the context of a vocational school, content can be understood as special vocational subjects (e.g., in mechatronics). In addition to that, there exist some CLIL programs developing cross-curricular links among different content subjects. Communication covers both written and oral production of the target language and can involve information gaps, self- and peer-evaluation (Bentley 2010: 7). Cognition is associated with developing learners' cognitive skills, including creative thinking and evaluating. The role of culture is seen in the development of understanding ourselves and people from other cultural background and other home languages. In addition to that, in the context of educating skilled workers of various occupations, culture can be recognised not only as an international aspect, but also as the culture of overall working environment. The modern labour market, as it was mentioned previously in the introductory part of the present MA thesis, is mobile and open to people of different occupations. Hence, the new skilled worker has to be ready to assist new arrivals at their workplace and demonstrate the knowledge of a foreign language, as well as adapt easily to new cultural conditions if working abroad.

Characteristic features of CLIL. The approach includes many characteristic features, however, different authors highlight various essential aspects. Thus, Peeter Mehisto et al (2012: 29-30, 69) list the following: active learning (peer teamwork, evaluation of progress by

students themselves, involvement into the learning process by being able to set learning); authenticity (learning is student-centered and connected to students' lives and the use of contemporary materials from media will maximise students' interests); scaffolding (constructing new knowledge on students' existing skills and prior experience). In addition to that, CLIL is often associated with the aspects are discussed further: developing language skills, raising self-awareness, developing learning styles, and cognitive skills.

Developing language skills through CLIL. While planning a CLIL lesson, it is important to build up a framework based on a combination of four language skills – reading, listening speaking and writing (Darn: 2006). The preferences of skills are considered thus:

- Reading, using meaningful material, is seen as the major source of input.
- Listening is a normal input activity, vital for language learning.
- Speaking focuses on fluency. Accuracy is seen as less important.
- Writing is a series of lexical activities through which grammar is recycled.

Language across the curriculum. Consequently, acquiring the knowledge of the target language together through mastering the four essential language skills is one of the main outcomes often associated with CLIL. According to Bentley (2010: 11), CLIL without exploring the language should not be considered CLIL. The main focus of CLIL approach is on understanding the subject and being able to communicate ideas, rather than on grammar structures. Bentley advises not to exclude grammar from integrated teaching but to present both grammar and vocabulary in chunks. Yet, it has to be taken into consideration that certain language competence aspects benefit more than others from CLIL. Christiane Dalton-Puffer (2007: 4-6, 15) acknowledges that vocabulary, receptive skills, morphology, creativity, fluency gain most, whereas syntax, writing, informal language, pronunciation and pragmatics would remain unaffected.

Raising self-awareness and developing learning styles. To sum up the previous, in planning a CLIL lesson it is important to integrate language and learning skills, base lessons on reading and listening texts, approach the language rather lexically than grammatically and take into consideration students' learning styles (Darn: 2006). On the whole, being aware of students' learning styles can be described as a stepping-stone to learners' personal achievement and can help the teacher to create links for further positive communication (Mehisto et al 2008: 167-168). Learning styles are classified by Mehisto into visual, auditory and kinaesthetic. Students themselves may be unaware of their individual learning styles and raising their awareness is one of the teacher's roles in organising the teaching process. It is beneficial to start a CLIL course with students evaluating their personal learning styles because it helps students to gain control of their learning process. In addition to that, students develop a capacity of self-evaluation and understanding of themselves as a part of learning community.

Developing cognitive skills through CLIL. In addition to the positive traits of CLIL mentioned previously in this chapter, good CLIL practice, according to Peeter Mehisto et al (2008: 30), should involve higher levels of thinking and cognition: recognising, judging, reasoning, imagining, analysing. In the context of the present work it is important to take into account Bloom's taxonomy and Bloom's revised taxonomy (see Figure 1), which are described by Mehisto et al (2008: 155) as the main teacher's tools in lesson planning, materials' design and evaluating the process of learning.

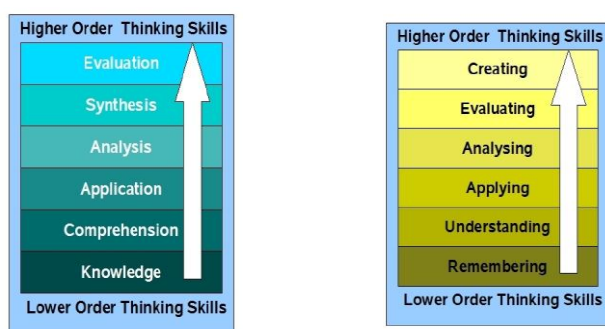


Figure 1. *Blooms taxonomy and Bloom's revised taxonomy* (Churches 2009: 5)

The original Taxonomy of Educational Objectives categorised thinking skills dividing them into Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS). According to this categorisation, learner could not understand a concept without remembering it and it was not possible to apply the knowledge without understanding it.

In Bloom's Revised Taxonomy the use of nouns was replaced with verbs describing activities of daily classroom practice. In the modified model creativity was considered to be higher within the cognitive domain than evaluation. Thus, supporting creative and critical thinking through different target activities is seen as characteristic of CLIL teaching models. Mehisto et al (2008: 153-165) defines critical thinking as a process involving creation/generation and further development of ideas and processes. Although there exists a lack of CLIL materials, it is possible to find useful teaching hints for developing creative and critical thinking. For example, Mehisto et al (2008: 153-165) give an overview of possible classroom activities aimed to foster thinking skills. On the basis of his overview a table with teaching strategies in vocational studies was derived (see Appendix 3).

In conclusion, CLIL has a lot of positive traits such as increasing cultural awareness, internationalisation, preparation for both study and working life, increased motivation. CLIL is overly student-centred and takes into consideration learners' learning styles, provides scaffolding in order to construct new knowledge based on students' previous experiences, develops the four language skills, supports creative and critical thinking and takes into account Bloom's revised taxonomy. CLIL is also characterised by active and authentic learning. The approach is aiming to raise students' self-awareness and form them into independent learners through self- and peer-evaluation. In other words, CLIL is beneficial due to its methodology and throughout the areas it is intending to influence.

Materials' selection and adoption in CLIL

It can be argued, that there is no need for constructing any special materials for applying CLIL in the context of vocational subjects, since it is possible to use the existing ESP materials. Yet, these materials are rather topic-based, not subject-based and thus do not cover the curriculum but just a small part of separate topics. According to Kay Bentley (2010: 50), CLIL materials differ from materials used in traditional foreign language teaching classes, where topics are mostly chosen to practice grammar. CLIL materials, however, are selected because of the subject of content and the role of language is to support the subject.

Another possibility is to use materials compiled for native speakers. However, Chris Baldwin (2011) states that adapting and constructing special materials for CLIL lessons is essential. Materials designed for native speakers of the target language do not suit to CLIL unless the content is downgraded and is relatively easy for the learners. According to Baldwin, it is important to take into consideration students' needs, individual differences, their language level and level of content knowledge. The weaker the students' language level is, the more language-oriented approach should be applied. For students with a better knowledge of the language the cognitive load can be more extended.

Consequently, there is a great need for special CLIL materials, constructed with taking into consideration individual needs of a particular occupation, students' group, school's curriculum, technological opportunities and skills of the teaching staff.

Criteria for compiling CLIL teaching materials. Further there are presented essential criteria for compiling teaching materials, which can be divided into general criteria, applicable to any set of materials, and more specific, CLIL didactics-derived criteria.

While compiling CLIL teaching materials, Peeter Mehisto (2012: 22) advises to take into consideration Krashen's 'input hypothesis' of language learning claiming that a rich input is extremely important in the process of acquisition. Stephen Krashen himself also sees the 'input and output hypotheses' to be closely related to the 'need hypothesis' (1998: 180-181).

According to his idea, the target language is acquired only when there is a 'need' to communicate. It is important to force learners to use the target language for both oral and written communication, while the input should be above the learners' level in order to provide the development of the language from one level to another (Krashen 2011: 13-20).

To sum up the previous, it can be concluded, that it is essential to provide rich input for the learners (authentic texts, listening tracks and videos). Otherwise, as Wu Wenquan (2010: 138-139), professor of University of Shanghai for Science and Technology, warns, the less input the learners get, the less output would they be able to produce. Due to that reason there should always be a gap between the learner's level and the input provided in the materials.

General criteria for constructing teaching materials. The following issues and general criteria suggested by Mehisto (2012: 30), need to be taken into consideration, while developing CLIL materials in order to ensure that they meet the general norms of student learning materials: technical requirements (electronic materials must meet safety requirements set by national education authorities, they have to ensure face-to-face communication with others, direct students to non-electronic sources of learning and foster the development of media literacy); environmental issues (should reflect safety issues and reflect recycling, renewable energy); social issues and avoiding stereotypes (stereotypes should be avoided in presenting people of different age groups, minorities, occupations).

To conclude the previous, if aiming to design any kind of specific teaching materials such as CLIL or ESP, in hard copy or online, it is crucial to take into consideration general principles for constructing materials, including safety issues and avoiding stereotypes.

Specific criteria for constructing CLIL materials. In addition to the general criteria, it is necessary to pay attention to specific CLIL criteria listed below. These specific principles are based upon a tool for creating CLIL materials developed by Mehisto (2010, 2012: 15-33). The tool consists of 10 characteristic features of quality CLIL learning materials:

1) *making the learning process (language, content, learning skills) visible to students* by providing clear instructional goals and a systematic feedback on student's progress. Learners should gain some control over their learning.

2) *systematically fostering academic language proficiency*: scientific language should be empowered throughout the whole learning process and simplified if needed. (Cummins 2007:126).

3) *fostering learning skills development and learner autonomy*: materials can include learning skills tips, can guide students to determining what they think/feel. Reading activities can involve examining the text for different purposes (skimming and scanning) and help teach them learning strategies (Hattie 2012: 193)

4) *including self, peer and other types of formative assessment*: materials contain assessment of planned outcomes for achievement of content/language, learning skills goals.

5) *helping create a safe learning environment*: cognitive overload is avoided in materials (provide language scaffolding, 'chunking' and logical framework of the content.

6) *fostering cooperative learning*: material introduce criteria or an assessment grid to analyse group work results and improve critical thinking.

7) *seeking ways of incorporating authentic language and authentic language use*: materials establish cultural connections and help construct knowledge about ethnically and culturally diverse people. Language should be used for authentic purposes (problem solving, creating a project)

8) *fostering critical thinking*: fact-based questions should be avoided, instead activities should be cognitively challenging and incorporate high-level thinking processes.

9) *fostering cognitive fluency through scaffolding helping student to reach well beyond what they could do on their own*. According to Mehisto (2012: 24), scaffolding can be provided for content (highlighting ideas and terms, adding subtitles, connecting the topic to learner's personal experiences); language (shortening sentences/paragraphs; introducing

synonyms; providing explanations of some key vocabulary in the margins; grouping language according to use e.g., procedures, equipment; incorporating dictionary links for difficult terms); learning skills development (providing a sample correct answer at the start of an exercise, asking students to guess meaning from context, providing samples of error correction techniques).

10) *helping to make learning meaningful*: materials should establish connections of the content with students' interests and prior knowledge, deepen it by presenting new facts. Materials should provide cross-curricular links and projects.

In the context of the present MA thesis it is aimed to design sample Moodle teaching activities based on CLIL principles that would reinforce the knowledge of technical English of students of mechatronics in TVEC. Moreover, the online sample materials would provide a support for the collaboration of the content teachers of mechatronics and the language teachers. It is intended to take into consideration most of the specific materials' design criteria listed previously and developed by Mehisto (2010, 2012: 15-33). Many criteria can be beneficially accomplished in Moodle environment, e.g., providing systematic feedback on students' progress, including formative assessment, self- and peer-evaluation, providing an opportunity to work with authentic reading and listening materials, creating a well-organised learning environment by providing 'chunked' information and logical structure of the content. Apart from the language skills, this will help students develop their self-awareness and form them into independent learners.

Assessment in CLIL

Formative assessment was already mentioned previously among the specific CLIL criteria for compiling study materials. Yet, the aspect of assessment should be examined more closely, since the Moodle environment allows to provide an instant and systematic assessment. Hence, the question of assessment cannot be excluded from the theoretical overview. Assessment is probably the feature that makes online study materials different from

the ones in a course book – assessment has to be pre-planned and included as an essential part of online materials.

Learning outcomes and assessment criteria. For many teachers it can be complicated to apply assessment in CLIL, because it aims to teach both language and content. From this perspective it is confusing for teachers what, how and when to assess. It is advised to assess depending on the type of CLIL course (Bentley 2010: 84-85). As it was mentioned previously in Chapter One of the present MA thesis, more attention to that language is paid in soft CLIL programs, which are often part of the language course. Hard CLIL programs concentrate more on both language and the content or sometimes just the content. Yet, Ana Llinares et al (2012: 282) warn, that teachers have to be careful and determine the role of the language and the subject when assessing students' achievement of learning outcomes. In the process of assessing the language it is also important to distinguish between structures acquired by learners in the academic environment and outside of it.

In addition to the previously mentioned aspects, the following skills can be taken into consideration in CLIL assessment: communication, cognitive, practical skills (e.g., in carrying out experiments, measuring). In order to apply assessment in CLIL effectively, according to Bentley, it is essential to make the process learner-centered and set standards for assessment (e.g., to take into account learners' individual needs and abilities, strengths and areas for improvement in subject content in order to give learners feedback on these).

It is of extreme importance to decide on assessment criteria to help the teacher judge how well a learner has achieved the learning outcomes. It is possible to create assessment sheets and checklists for learners with the specific criteria listed.

Types of assessment in CLIL. Kay Bentley (2010:89) presents an overview of different assessment types in CLIL and describes two main types of assessment – summative and formative assessment. *Summative assessment* is the assessment of learning in order to get a picture of what kind of specific content, language knowledge the learners have achieved.

This type of assessment is often quite formal. Diagnostic tests used to identify problems learners have with subject content is one of the examples of summative assessment.

Formative assessment is the assessment for learning aiming to give students useful feedback on their progress, it is often informal. Information for formative assessment can be collected by observing students, collecting data of written work, during group work or oral presentations (performance assessment). Other types of formative assessment are peer assessment (learners assess and give feedback on each other's progress) and self-assessment (learners assess their own progress). For both forms of assessment, learners need to know the learning outcomes and the criteria. How is it possible to describe learning outcomes the most efficiently? Kay Bentley advises to use 'can do' statements to do so (2010: 90).

To sum up the previous, a lot of different aspects should be taken into consideration while designing CLIL teaching materials. Learning outcomes and assessment criteria should be preplanned to make the process of learning well-structured and beneficial for learners. In the CLIL sample materials for students of mechatronics created for the present MA thesis, it was decided to include both summative and formative assessment to make the process of evaluation of students' progress more complete.

Teachers' roles in CLIL: content and language teachers' responsibilities

Teachers are often seen as the main driving power of organising CLIL-based teaching in schools, since schools try to cope with reforming the system of education using their own accessible means and resources. According to Chris Baldwin (2011), it is vital for language teachers and content teachers to cooperate in planning CLIL lessons. Peeter Mehisto et al (2008: 11) mention that content teachers are also expected to teach some language. The role of language teachers is seen as supporting content teachers by providing the language needed for students to manipulate with the content. Surprisingly, Mehisto et al (2008: 11) also describe the role of a content teacher as supportive. As the integration of the language and the content has a dual focus, from one point of view, the process of learning the language can be

integrated into the content classes and in this case the information can be presented in charts, diagrams, key-concepts and terminology. From another point of view, content can also be included into the language lessons and this can be achieved only with the support of content teachers. The language teacher then is responsible for incorporating vocabulary, terminology and texts from content subjects into the language classroom. Thus, it can be concluded that CLIL theorists avoid placing the leading role upon either language or content teachers. It appears that, according to Mehisto et al (2008: 11), both language and content teachers have a supportive role since they support the integrated teaching and learning process as a whole. In the context of a certain school it can be understood as a need for taking into consideration the weakest and the strongest skills of teachers participating in the process of reorganising the educational paradigm.

Problematic issues of CLIL

In order to present a more adequate overview of CLIL teaching approach, it is important to pre-plan possible obstacles, which could help to find solutions to arising problems. It is possible to classify the problems associated with organising CLIL lessons into two main categories: materials-related and human-resources-related problems. The lack of resources is a serious obstacle since creating/adopting materials is extremely time-consuming (Baldwin & Kelly 2010).

However, the greatest concern is rather associated with the negative attitudes and disbelieves among students, teachers and audience outside educational institutions (Mehisto et al 2008: 20-23). It is often stated that students studying in a foreign language cannot possibly achieve the same level of content knowledge that their peers studying in the mother tongue are able to achieve. In addition to that, CLIL is thought to be suitable only for learners with outstanding academic abilities. Mehisto et al argue that a common practice of multicultural education rejects this disbelief. Similarly to the concerns of Peeter Mehisto et al, Do Coyle (2008) warns about the existing prejudices about CLIL and lists some of them, including the

fact that CLIL is often believed to favour languages and sometimes even seen as a threat to the subject. However, the results of research prove that there are no significant differences amongst students with poor or excellent school readiness when their mother-tongue literacy skills were compared; even young learners are able to acquire the content in the target language if provided with the support of home and teachers and a well-structured framework of information (Merisuo-Storm 2003).

Problems with teacher training and teachers' attitudes. The role of teachers in CLIL cannot be underestimated, since it is probably one of the main powers of expanding CLIL into everyday classrooms. Yet, shortage of teachers is recognised as a common problem among numerous educational institutions aiming to expand CLIL. Initial teacher training in universities of many countries does not provide a special training in CLIL, thus, providing well-trained teachers who both speak the target language and have a qualification in the content subject can be extremely demanding. Having a language teacher qualification is not enough for teachers due to the fact that CLIL is more specific than a traditional language teaching (Eurydice 2006). Vera Savic (2010) studied teachers' attitudes to and experiences in CLIL in Serbia. She concludes that that most of respondents believed that CLIL requires more subject knowledge than teachers of English possess. The Norwegian practice shows that teachers have two-three qualifications apart from the qualification of a language teacher (Eurydice 2006).

CLIL in Estonia. Practicing CLIL in Estonia is mainly associated with immersion and teaching subjects in the Estonian language in non-Estonian schools. According to Anu-Reet Hausenberg and Kristi Saarsoo (2008), a teacher should be provided with separate CLIL methodology training, as well as he/she should have a C1 level of knowledge of the target language and have a higher education in the subject they teach. The authors present an idea that CLIL methodology training can be a part of general university teacher training program.

To sum up the situation with the existing problems in organising CLIL-based teaching in schools, there exists a real challenge in providing suitable materials, trying to overcome negative attitudes among students and teachers, shortage of well-trained teachers with the sufficient language skills. It should be admitted, that CLIL can be challenging for teachers, since initial teacher training does not include specific CLIL training, neither is it provided systematically throughout the country as an in-service training.

The attitude of the education authorities in Estonia. Teachers often tend to look for the support of authorities and are not ready to take the whole responsibility for organising the process of the integrated teaching (Savic 2010). Therefore, it is important to present the attitude of the local authorities dealing with recent revolutionary changes in education. The authorities in Estonia, responsible for activating the process of integrating subjects teaching in vocational schools, admit that planning an integrative learning process can be challenging for schools (Pilli & Kuusik n.d.: p 33-34).

The problematic issue of teacher training and teachers' qualifications is not denied. Being competent in more than one field can be beneficial for teachers. Moreover, planning the integrative teaching process is recognised by Pilli and Kuusik (n.d.: p 33-34) as extremely time-consuming. In order to plan the integration, it is necessary to have enough time to find common concepts and themes connecting a variety of subjects. Probably the most problematic issue of all is the organisation of teaching process within the school, since it is much easier to organise teaching module and separate subject wise, it is more convenient to measure and evaluate teachers' work than if dealing with complicated wholly integrated modules.

Pilli and Kuusik provide possible solutions to these problems (n.d.: p. 34-35):

- 1) Integrated modules must be designed, taught, assessed in collaboration with other teacher. In this case it should not be expected, that one module at time should be taught by only one teacher. It is recommended that school authorities will take into account the

collaboration among teachers working in integrated modules and pay teachers one extra working hour per week.

2) Learning should not be considered only as an auditory work, which is easier to account but it can cause obstacles in developing learners' key proficiencies. Some part of individual learning can take place online to make information more accessible to learners. This should be taken into consideration in teachers salaries.

3) Feedback is an important part of learning since it helps learners to take responsibility for their own learning.

To sum up the previous, Chapter One concentrates on presenting an overview of CLIL and its application in the teaching process and materials' design. The approach involves numerous positive aspects such as increasing cultural awareness, and motivation, preparation for working life, being student-centred and taking into consideration learners' learning styles, providing scaffolding to construct new knowledge, developing the four language skills, supporting creative and critical thinking, raising students' self-awareness and forming them into independent learners. In addition to that, there are listed some negative aspects and possible problems that can arise while applying CLIL model on practice. Some questions are still open and cannot be answered instantly. Yet, it should be noted, that these challenges are recognised by the officials dealing with reorganising vocational education in Estonia. Hopefully, it is possible to solve most of the problems in case if they are pre-planned and dealt with gradually.

CHAPTER 2

NEEDS ANALYSIS

The present chapter presents general practice of needs analysis and introduces the research carried out in Tartu Vocational Education Centre (TVEC) in February-April 2013 among the students and the content teachers of mechatronics. It is aimed to use the findings of the survey for compiling a sample CLIL course syllabus and Moodle teaching activities.

Determining learners' needs

Before designing any study materials, it is essential to define what the needs of the target groups are. Further there are presented several opportunities for determining learners' needs.

General practice. Professor of Sydney University Jack C. Richards (2001) introduces seven methods of collecting data for understanding learners' needs:

1) *Questionnaires* can be filled out by employers (to identify situations in which the target language will be used) and by learners themselves (to identify learning needs).

2) *Self-ratings* are often included into questionnaires. The problematic issue of this method based on learners' self-evaluation, is that the answers can be subjective.

3) *Interviews*: in order to gather as much information as possible, both learners and their future employers can be involved into the procedure.

4) *Observations* carried out in a target socio-linguistic situation in order to collect examples of tasks that have to be performed in learner's future occupational settings.

5) *Collecting learner language samples*: the method involves collecting different language tasks aiming to get information about learners' ability to complete the tasks. It allows to determine learners' language needs, however, it is very time-consuming.

7) *Task analysis* aims to analyse tasks learners will have to perform in their future socio-linguistic situations, which can help evaluate language needs.

8) *Case studies*: learners themselves write down the situations where they used the language in and problems they had.

To sum up the overview of possible needs analysis methods, it is preferred to use different methods in order to get a more adequate picture of learners' needs. One of the easiest ways to gather information is to use questionnaires, because it is less time-consuming and the data can be analysed easily. Due to these beneficial aspects it was decided to use a questionnaire in the present study. However, one of the obstacles of this method could be formulating the questions and achieving the right balance between open and closed questions.

Needs analysis of the learners and the teachers of mechatronics in TVEC. One of the aims of the present work was to find out what the linguistic needs of the students and the teachers of mechatronics in TVEC are and to determine their attitudes towards content and language integrated learning.

Defining the area of mechatronics. From the perspective of selecting topics for the study materials, it is essential to gain an understanding of the area on the whole and the subtopics it involves. Shortly it can be stated, that mechatronics is widely recognised as an interdisciplinary science. The term itself (a blend of 'mecha' for mechanisms and 'tronics' for electronics) was first used in Japan by an engineer at Japan's Yaskawa Electric Co. in 1969 (Popovchenko 2006). It is often stated, that mechatronics grew out of robotics and it is often associated with this field. Actually, robotics is only one field of mechatronics. According to Stephen Ashley (1997), the word 'mechatronics' itself has a broader meaning than electromechanics – a field which can be labelled as 'an ancestor' of mechatronics and involves the use of electrostatic and electromagnetic devices (Ashley 1997). Ashley includes into mechatronics' related technical areas modeling and design, system integration, actuators and sensors, robotics, motion control, vibration and noise control and optoelectronic systems.

The present situation in mechatronics and modern fields of its development. Since the 2000-s building high memory capacity have improved rapidly and lead to the boom in

production of in-car navigation systems and other audio-visual consumer electronic products (Habib 2007: 15). Nowadays more and more educational establishments develop new curricula to meet new requirements of the world. According to educators providing training in mechatronics, interdisciplinarity of mechatronics emphasises individual- and team-based learning through a problem- and project-based approach to fulfill the challenges of modern technology and the demands of the modern world (Habib 2007:13).

As it was described above, mechatronics is a wide field and provides a lot of opportunities for students to build a career according to their individual interests and preferences. Maria Popovchenko (2006) gives an overview of expanding new spheres in mechatronics, which involve machine-tool construction and equipment for automation of technological processes; aviation, space and military techniques; motor car construction (antiblocking brake system (ABS), automatic parking); office equipment; computer facilities (e.g., printers); medical equipment; home appliances; micro machines (for biotechnology, means of telecommunications); control and measuring devices. These are the fields where students of mechatronics are able to find a job after graduating from their education establishment. Thus, the area is extremely broad and it is essential to carry out needs analysis in order to specify topics for the material design.

Methodology

In order to accomplish aims set for the present MA thesis, a needs analysis research was carried out during the period of time from February to April 2013. The data was collected by administering questionnaires to the students of mechatronics and the teachers of specific vocational subjects.

Sample. Needs analysis research was carried out in TVEC. In total, 61 students of mechatronics participated in the research. The groups studying on the basis of basic and secondary education were questioned; six different groups were represented. On the whole, 59 male students and two female students participated in the survey; an average age of the

students was 21.3, varying from 17 to 37 years. 59.3% of all the respondents study on the basis of secondary education. Only one third of all students admitted having occupational work experience, which was mostly up to one year. 13% of the student respondents have worked abroad.

In addition to the student participants, ten teachers of special vocational subjects of mechatronics participated in the research. Eight male teachers and two female teachers filled out the survey, an average age of the participants was 53.6, varying from 24 to 74 years, the median was 60+ years. Background information of the teachers showed that 80% of them have work experience more than 20 years and none of them has worked abroad.

Questionnaire and the procedure. To find out what the socio-linguistic needs of the students and the teachers are, two separate questionnaires (see Appendices 1 and 2) for the teachers and for the students were compiled. The questionnaires are based on the schools' curriculum for mechatronics (Tartu Kutsehariduskeskus 2009) and the Vocational Standard for Mechatronic Technicians (Sihtasutus Kutsekoda 2001). Two questionnaires were used to gather data for the needs analysis – one to get information about the students' linguistic-situational needs and attitudes towards learning content subjects through integrated approach (students' questionnaire, SQ), the other questionnaire was used to find out what the teachers' attitudes and readiness to teach subjects through the target language are (teachers' questionnaire, TQ). The types of questions included multiple choice questions, open-ended questions, rating scales (e.g., self-evaluation).

Both questionnaires have a similar framework divided into five main parts:

- background information about the respondent (SQ questions 1-6, TQ questions 1-5);
- information about use of English in everyday life in occupation-related areas (SQ questions 7-10, TQ questions 6-9);

- questions about applying CLIL in the classroom and preferences in possible English language-based teaching classroom activities (SQ questions 11-18, TQ questions 10-20);
- a block of questions about preferences and possibility of studying/teaching various compulsory and elective vocational subjects of the mechatronics' curriculum in English (SQ questions 19-20, TQ questions 21-22);
- questions about the possible use of English in various situations in students' future workplace (SQ questions 23-27, TQ questions 21-24).

Modules 2-5 are divided into sub-parts according to the four language skills (reading, writing, speaking, listening) in order to follow CLIL characteristic features.

Both the students' and the teachers' questionnaires were partly filled out online in *connect.ee* environment; some of them were answered on paper in order to accelerate the procedure of data collecting. Most teachers' questionnaires were filled out on hard copy due to the fact that teachers were the hardest to motivate to participate in the research. As a result, some useful comments were received during the procedure of a semi-structured interview.

Research questions. The survey was aiming to answer the following questions:

- 1) What language skills do the learners and the teachers of mechatronics apply the most in everyday life in occupation-related fields and in which situations most commonly?
- 2) What kind of English language learning involving activities do the students prefer to participate in during a content lesson in the classroom and what kind of activities are the content teachers of mechatronics ready to provide?
- 3) What kind of compulsory and elective vocational subjects the from mechatronics' curriculum do the learners and the teachers evaluate as possible to be taught/learnt in English and to which extent (totally/partly/not at all)?

4) In what kind of the four language skills involving activities are the students likely to need English in their future workplace according to their own and their teachers' evaluation?

Results

In order to make adequate conclusions about the experience with the language and teaching/learning preferences, it is important to evaluate the participants' level of English (SQ question 6, TQ question 5). Both the learners and the teachers were asked to assess their own knowledge according to the scale *good-average-bad*. It was decided not to include CEFR (Common European Framework of Reference for Languages, see Appendix 8) levels into the scale, because the students might not be familiar with this terminology. The results (see Table 2) show, that the students assessed their level of English higher than the teachers (67.5% of the teachers stated their level of English was poor as opposed to 8% of the students with poor knowledge of English). Thus, most of the teachers participated in the survey admitted having bad knowledge of English. The strongest skill was reading, since only 50% of the teachers stated that it was bad. The situation is much worse with the other skills, where writing was assessed as the weakest skill in 80% of all cases, both speaking and understanding the speech were assessed as equally poor. In open-ended questions, some teachers admitted having no experience of learning English at all.

In comparison to the teachers' answers, the students of mechatronics in TVEC evaluated their knowledge of English much higher. According to their answers, reading, similarly to teachers, is the strongest skills. The speaking skill collected the most "bad" answers (12 %), and, consequently, was evaluated as the poorest. However, it is still much stronger if being opposed to the teachers' results. From one point of view the results are understandable, because almost two thirds of teachers were older than 60 years and most of them have not learnt English. From another point of view, it is possible that teachers evaluate

their knowledge of the language more adequately or they are more self-critical. On the whole it can be noted, that the receptive skills are reported as stronger than the productive skills.

Table 2. *The respondents' knowledge of English:*

Skill	Students			Teachers		
	Good	Average	Poor	Good	Average	Poor
Reading	64	32	4	20	30	50
Writing	46	46	8	10	10	80
Speaking	48	40	12	10	20	70
Understanding the speech	68	24	8	20	10	70
Average result	56.5	35.5	8	15	17.5	67.5

Using English in everyday occupational environment. In this part of the questionnaire (SQ questions 7-10, TQ questions 6-9) the participants were asked to evaluate how often they use English in different occupation-related activities and situations. The activities were presented according to the four language skills (reading, writing, listening and speaking) and had to be evaluated on the *often-seldom-never* scale. The results are presented in Appendix 4 (Tables 1-4).

In analysing *reading-related situations*, the most surprising finding was that quite a large number of the teachers (40%) do not read occupation-related literature in English at all (see Table 2, Appendix 4). One of the teachers mentioned as a comment to an open-ended question using additional materials such as dictionaries and *google translate*. Among the students only 21.7% admitted that they never read specific literature in English. A common tendency among the students and the teachers was discovered in searching information in the Internet and working with different computer software, since it involved using English to a larger extent. According to the results, both the teachers and the students also read assembly instructions and user manuals in English. Reading accident reports, check-lists and other specific documentation was the less common activity for both target groups.

In *writing-related activities* the findings (see Table 2, Appendix F) were consistent with the ones discovered about reading-related activities. Both the teachers and the students use the writing skill mostly for searching for some information in the Internet as well as for working with a computer. However, only 3.3% of all the learners never use English in searching information in the Internet, while among the teachers 20% answered that they never use English to seek information on-line. The less popular activity among both groups was using the language for filling out specific documentations such as reports and check-lists.

On the whole, *speaking* (Table 3, Appendix 4) appeared to be the less common skill used in everyday occupational environment by both the teachers and the students. An overview of average scores throughout all the four language skills used in everyday occupational environment will be examined further in this chapter, the results are presented in Table 5 of Appendix 4. None of the teachers admitted using English for communicating constantly, which is probably logical, since in the school environment possibilities of communication in English are limited. The situation-wise analysis showed, that both among the students' and the teachers' answers it is possible to sort out the less popular activities among other relatively unpopular choices. The students stated making work arrangements, giving instructions (55.4% of negative answers) and speaking about technical documentation-related topics (48.3% on the 'unpopularity' scale) in English as the less popular activities. Among the teachers giving instructions in English was also one of the most unpopular choices, since 90% of teachers stated they never do it. In addition to that, another the less common choice for using English was speaking about materials, their properties and designations (80%).

As for *listening-related activities* (Table 4, Appendix 4), the most frequent choice among the students were watching videos on occupational topics, since only 7.1% of all the respondents admitted that they never do it). A similar tendency appeared in the teachers'

answers, 20% of them stated that they never watch occupation-related videos. However, this percentage is still much higher than in the students' answers. It can be concluded that watching videos is one of the most common, real-life resembling activities for both the students and the teachers, thus to some extent this activity should be further included into sample online CLIL materials.

The less popular choice among the teachers' answers was using English for listening to work orders and instructions (90% admitted they never practise that) and listening to oral reports (80% never do that). Similarly to that, 46% of all the student respondents admitted that they never listen to oral reports, which was the less common choice among all others. It is an interesting finding, because making presentations and listening to reports can probably be one of the easiest activities to organise in the context of a classroom. Thus, it could be a relatively easy for starting applying CLIL in teaching content subjects with a slight support of a language teacher.

General overview of the use of the four language skills. An overview of the topic-wise situational analysis of the use of the four language skills by the participants is already presented above. In order to find out what are the language skills used the most widely by the participants, average scores were calculated and presented in Table 3 below.

Table 3. *Using English in various occupation-related activities by the students and by the teachers. Overall scores throughout the four language skills*

	Students			Teachers		
	Constantly	Sometimes	Never	Constantly	Sometimes	Never
Reading	35.4	50	14.6	28	50	22
Writing	26.4	42.5	31.1	12	38	50
Speaking	10.2	47.8	42	0	26.7	73.3
Listening	24.9	43	32.1	13.7	33.8	52.5

According to the data analysis, the reading skill is the most commonly used by both target groups. In addition to that, the comparison of the use of the other three language skills clearly shows the identical tendency for both participants' groups. Thus, the writing and the

listening skills are used equally, if being compared to other skills. However, the students still write and listen in English more than their teachers. Speaking remains the most underrepresented among both participants' groups.

Applying CLIL in the classroom: integrating the language and the content. In this part (TQ questions 10-20; SQ questions 11-18) the participants were asked to evaluate which activities are the participants ready to take part in/organise in the classroom in English (according to the four language learning skills) and what kind of compulsory and elective subjects of the mechatronics' curriculum can be taught to students in English and to what extent. In addition to that, the teachers' awareness of CLIL was checked.

The students' overall attitudes towards CLIL. The students evaluated the importance of English and readiness to start learning content subjects of the mechatronics' curriculum in English on *yes-no-hard to say* scale. The results are presented in Table 5 of Appendix 4. More than 90% of the students evaluated the knowledge of English as important and 52.4% were ready to start learning special vocational subjects to some extent in English. However, there were some doubtful students, who expressed their opinion in their comments to the questions. For example, some students stated that mechatronics was a complicated occupation, requiring the knowledge of content subjects to a larger extent. Thus, learning content subjects in Estonian could be easier.

The teachers' awareness of CLIL and attitude to it. According to the data collected during the research (table 6 of Appendix F), not all the teachers have previously heard about CLIL, 30% of the respondents whether doubted having heard about the concept of integrated learning, or admitted that they do not have any prior information about it. Most of the teachers have not received any training in CLIL (80%). However, half of the teachers stated, that they have taught their subjects in another language to some extent. It is possible, that it was not English but Russian, as one of the teachers mentioned. At least in answering the question

about having an experience of collaborating with other teachers in organising a CLIL lesson, 90% of all the responds were negative. A positive tendency is that most teachers (60%) believe in CLIL's usefulness for both content and language acquisition (see Table 7 of Appendix 4). Some teachers commented orally on the survey and pointed out possible plusses and minuses of integrated learning. From one point of view, specific terminology in mechatronics-related areas is not translated into Estonian and for a teacher it is a wonderful opportunity to be able to use English terminology instead. Yet, teachers were extremely worried about the situation with specific terminology in Estonian. According to their concerns, students do not acquire specific terminology in their mother tongue in that case, and if the problem is being viewed in a wider national context, then Estonian terminology and scientific language remain undeveloped.

Being ready to start with CLIL in the classroom. A huge difference appeared in the teachers' and the students' responds about being ready to start teaching/acquiring vocational subjects through English. None of the teacher respondents reported being ready to start practising CLIL in the classroom, while 52.4% of the students admitted being ready to try learning in English.

Readiness to participate in/provide various CLIL activities in the classroom. The participant of both groups, who had previously stated being ready to start with CLIL in the classroom, were asked to choose optional activities they would the most likely to participate in/provide in the classroom. The results are presented in Table 8 of Appendix 4. Since *connect.ee* environment allowed to answer these questions (SQ 11-18, TQ 10-20) to all the participants, then it is possible that in the questions about suitable CLIL activities there were more responses than the positive "ready to start" answers from the previous questions. The teachers' responses give a reason to speculate that they answered the questions about the possible classroom activities in spite of the fact that none of them stated being ready to start

with CLIL in one of the previous questions. Thus, although the teacher's first reaction to starting with CLIL was overly negative, they still reported being ready to provide some of integrated activities when they were given a chance to choose from a list of possible methods from the list. Consequently, this could be the place for developing further collaboration between the language and the content teachers of the vocational school.

The analysis of suitable CLIL *reading-related activities* (see Table 8 of Appendix 4) showed that both the teachers and the students would prefer reading specialised texts, searching for occupation-related information in the Internet and exploring charts and tables as possible activities for taking part/organising in English in a content subject classroom. A common tendency appeared as well in choosing the less popular integrated activities. Only 5.9% of the students and none of the teachers were ready to provide/take tests in English. Reading specific documentation was not a popular choice both among the teachers and the students. An interesting difference appeared in learning/providing specific English terminology. The students were motivated enough to learn it in the content classroom (13.6% of positive responses), while the teachers struggled to provide it (only 5.3% stated they would choose this method).

Among *writing activities' preferences* the less commonly chosen activities both among the teachers and the students were taking/providing tests and filling out/asking to fill out technical specifications and instructions. Peculiarly, the teachers tended to avoid asking students to write a summary paper and to describe charts/tables/drawings on the occupation-related topics, since none of the teachers stated they would do it in the content classroom. The students, however, were more motivated to participate in these activities. The most commonly chosen CLIL writing activities among both participant groups were writing a summary on a basis of texts/videos presented in the classroom; writing down specific English terminology; translating from English into mother tongue and backwards. Surprisingly, the teachers were

slightly even more motivated to provide these activities than the students were to participate in them (14.3% opposed to 13.8% of the students' positive responds). Somehow working with terminology was recognised by the teachers as a suitable writing-related activity, not a reading-related activity.

A great difference appeared in the analysis of possible *speaking-related CLIL activities*. The only activity that was reported by the teachers as a possible one, was asking students to make topic-related presentation in English (chosen by 40% of the teacher respondents, which is a very high score). Other speaking-related activities involving the use of English to some extent were not chosen by the teachers at all. In contrast to that, the students were motivated to participate in all the activities provided in the list. The most popular choice was participating in subject-related discussions. It can only be speculated about the real reason for such a great difference in the respondents' answers. Probably the teachers evaluated their language skills the most adequately in this situation, acknowledging that it is impossible for them to lead discussions and group work with their level of English. The students seemed to be very motivated to participate in discussions and group work using English. However, everyday situation of an English-language lesson shows quite a distinct picture. Thus, students usually do not tend to participate in class discussions very actively whether lacking the language skills or just being passive, lacking the courage to express their opinion due to some personality traits. Whatever is the real reason for such a great controversy in the teachers' and the students' answers, it is clear that speaking- and communication-related activities cannot be excluded from a lesson if aiming to acquire the target language. Sadly it should be admitted, that the content teachers of mechatronics in TVEC lack both the language skills and the motivation to provide these activities in the classroom.

The analysis of *listening-related activities* preferences showed that both target groups reported watching videos as the most suitable activity for an integrated classroom. The teachers (44.4% of positive responses) were more positive about providing this activity than the students about participating in it (24.4%). Listening to presentations and audio-files in English were not the most popular choices, however, they were also graded as acceptable activities by both groups. A great difference appeared in being ready to listen to instructions for filling out specific documentation and listening to some topic-related material presented by the teacher, because, obviously, teachers struggled to use these methods in the classroom due to the lack of their language skills (0% of the teachers chose these activities). On the other hand, the students marked these activities among the most popular ones.

To find out what kind of skills are preferred to be used as CLIL activities in the classroom by both target groups, average scores were of positive answers were calculated (see Table 4 below). According to the results, the teachers' preferences seem to be quite even throughout the four language skills. The writing skill-related activities gained slightly less positive scores than the rest. An overall analysis of average scores of the teachers' and the students' answers shows that the teachers' scores are slightly lower than the students' scores. However, as it was mentioned previously, according to the topic-wise analysis, the teachers were more motivated to apply some of CLIL methods in the classroom than the students. Among the students' answers the speaking skill-related activities gained noticeably higher average scores than the other skills involving activities. Furthermore, similarly to the teachers' responses, the writing skill involving activities gained the lowest scores of preferences. To sum up the results presented in Table 4, speaking- and listening-related activities were more popular for participating/organising both among the students and the teachers, while activities involving reading and writing were less popular among both groups.

Table 4. Average scores of preferences throughout the four language skills involving activities among the students and the teachers of mechatronics

Average scores	Percentages of positive answers among the students	Percentages of positive answers among the teachers
Reading-related CLIL activities	12.5	9.9
Writing-related CLIL activities	11.1	7.9
Speaking-related CLIL activities	25	10
Listening-related CLIL activities	16.7	11.1

The students' and the teachers' attitudes towards learning/teaching compulsory and elective subjects in the mechatronics' curriculum in English. To answer the question what kind of subjects from the mechatronics' curriculum is it possible to teach/learn in English and to which extent, both respondent groups were asked to evaluate compulsory subjects of the mechatronics' curriculum on the *fully/partly/not at all* scale (TQ question 21; SQ question 19). The results are presented in Table 9 of Appendix 4 and are shown in percentages. The data was analysed according to separate curriculum subjects, in addition to that, an average attitude throughout the whole curriculum was measured.

The subject-wise analysis of the data showed that the students tend to evaluate computer-related subjects (digital systems, use of computers and administration, logic and programming, programmable (PLC) controllers), as easier to be taught through the target language. All of these subjects got relatively low scores in the 'cannot be taught in English at all' grid. This finding is not surprising, since these subjects already require the use of English to quite a large extent. It looks like the students do not mind being internationalised and immersed into English during their apprenticeship, which is definitely one of the easiest and the most practical way to develop the language skills. The subjects that were evaluated as the closest to impossible to being acquired in English were the ones that scored more than 30% among students on the 'impossibility' scale: labour law and safety related subjects (bases of labour law, labour and environmental safety), some practical subjects (machine elements and assembly and cutting machine works) where stress is placed upon carrying out practical

projects and assignments, not upon dealing with theory to a larger extent. The fact that electrical engineering appeared to be one of the hardest and the most impossible subjects for learning in English is probably a school-specific result, since it is taught by one teacher who is believed to be extremely strict and demanding.

According to the data, the students tend to be more positive about CLIL and learning compulsory subjects of the mechatronics' curriculum in English to some extent than the teachers. Moreover, 33.7% of the students reported that compulsory subjects can be fully taught in English (if being compared to 5.4% of the teachers). It is remarkable that the average score of positive attitudes of the two groups towards teaching compulsory subjects of the curriculum in English partly does not vary to such a great extent, thus, 41.1% of the students and 48.1% of the teachers believe that these subjects can be taught partly through English. From another point of view, 46.5% of the teachers and only 25,2% of the students state that major subjects cannot be taught at all in the language other than mother tongue.

The same tendency can be noted about elective subjects of the curriculum (TQ question 22; SQ question 20). Much less the teachers than the students believe that elective subjects can be fully taught in English (see Table 10 of Appendix 4). Yet, the percentage of the teachers (55.6%), who admit that elective subjects can be taught partly in English, is slightly higher than the percentage of the students (50.7%).

If to compare the attitudes towards both compulsory and elective subjects being taught in English, then it can be noted that both groups tend to believe that elective subjects are more likely to be taught in English partly than compulsory subjects. The percentage of those who state that special subjects of the mechatronics' curriculum cannot be taught in English at all, is smaller for elective subjects than for compulsory subjects. Thus it can be concluded, that both the students and the teachers are careful about starting integrated learning through the core compulsory subjects and would rather start applying CLIL through teaching and learning less important or easier elective subjects.

Evaluation of the importance of English in students' future workplace. Both target groups participated in the research were asked to evaluate which of the four language skills involving situations are the students likely to experience in their future workplaces. The results of this analysis are presented in Tables 11-14 of Appendix 4.

According to the respondents' evaluation of possible *reading-related situations* involving use of English, the teachers reported as the most essential activities reading user and assembly manuals and working with computer-aided design and manufacturing software (CAD, CAM). None of the teachers stated that in these situations English would not be needed at all. In addition to that the teachers stated that the procedure of applying for a job, assembly/testing of mechatronic systems and use of processor technologies in automated control systems would require use of English to a larger extent. The less popular choices among the teachers were use/maintenance of occupational equipment (as an overly practical activity) and reading labour law-related documents probably due to specific terminology. This finding is rational if to take into consideration the teachers' general attitude that the purpose of Estonian education is to school staff for the Estonian labour market.

According to the students' evaluation, the less important activity in their future workplace is reading reports, check-lists and accident reports in English. Among the most probable situations mentioned by the students were listed the same four situations chosen by the teachers except applying for a job. Instead of that the students added to their 'popularity' list working with specific materials and mechatronic system elements and their designations, which is logical, since working with various designations involves the knowledge of specific codes and language-specific abbreviations.

The analysis of *writing-related situations* showed that teachers consider the process of applying for a job (CVs, job applications) as the most English-involving, since only 20% stated it was unimportant. This finding is consistent with the teachers' evaluation of reading-related activities, where applying for a job was stated as the most important. Surprisingly, the

students agreed here with their teachers and also reported the job application process as the most language-involving (only 6% stated it was unimportant). The students also stated the following situations as important and requiring use of English: working with CAD, CAM software, working with measuring mechatronic tools, mechatronic systems' elements and maintenance of occupational equipment. If analysing the less important situations for use of English, then both target groups considered labour law-related writing activities as the less essential. In addition to that, the teachers listed as unimportant assembly and testing of the mechatronic systems and working with mechatronic measuring tools. The last was controversial to the students' evaluation, who reported this activity as an important in the sense of use of English. Moreover, apart from marking filling out employment agreements and forms as an unlikely situation in their future workplace, the students also graded as improbable filling out specific documentation such as check-lists, accident reports.

Furthermore, possible *speaking-related situations* at the students' future workplaces were analysed. Both respondent groups consistently marked applying for a job and participating in a job-interview as the most language-requiring situation. In addition to that, the teachers stated that English will be needed in a future workplace for presenting duties and talking about workplace, contrarily to the students who, otherwise, reported these activities as unlikely. Presenting workplace and duties received the highest score on the 'unimportance' scale among the students (12.5%). The teachers evaluated as the less important working with mechatronic systems, their elements and designations (40% marked that English is unimportant for this activity).

Surprisingly, the results of the students' and the teachers' evaluation were the most controversial in deciding over the importance of English in various speaking-related situations in a future workplace. The teachers' choices of the most unimportant situations for the use of English (working with tools, mechatronic systems, using and maintaining occupational equipment) were unexpectedly marked in the student' list of the most important activities.

Here it is only possible to speculate about the real reason for that. Presumably, the difference in evaluation may be affected by the individual psychological differences (e.g., differences in learning styles and types of multiple intelligences). It is possible that the students are more team-work oriented and used to learning through collaboration, while the teachers at the age of 60+ are more used to working independently, since their prior knowledge of the subjects allows to make decisions and act autonomously.

Another curious tendency appears in the results of *listening-related situations*' analysis. Among the teachers' answers it was easy to distinguish between 'popular' and 'unpopular' choices. Listening to demonstrations was considered as the most probable activity in a future workplace, only 11.1% of the teachers marked it as unessential. Working with mechatronic systems and occupational equipment (similarly to the result of speaking-related situations' analysis) were reported by 33.3% of the teachers as the less likely for use of English. In contrast to this pattern, the students' evaluation is much less distinct. Neither of the activities gained more than 8.3% on the 'unpopularity' scale and due to that it can be concluded, that the students evaluated all of possible listening-involving situations as significant. The following activities can be determined as the most important of the list: working with specific materials and their designations, working with elements of mechatronic systems and occupational equipment. Only 2.1% of all students reported these socio-linguistic situations as unimportant. Thus, a similar pattern as with speaking-related situations in a future workplace appears. The activities marked by the teachers as the most unlikely are reported by the students as the most probable.

Since the evaluation of various situations throughout the four language skills seems to be quite uneven, it is important to determine what the overall attitude of the teachers and the students to the linguistic skills is and what kind of skills are considered as more important in a students' future workplace.

Comparison of average attitudes towards the importance of the four language skills in a students' future workplace. Table 5 below presents average scores of the importance of the four language skills in students' future workplace throughout all different situations and tasks. To find out what the most and the less important skills are that the students are likely to use at work, average scores from Tables 11-14 in Appendix 4 were placed into a summary table. The skills that collected the highest percentage of 'unimportant' scores were considered as the less important; and otherwise - the skills that collected the less of 'unimportant' scores were considered as the most important according to the evaluation of the two target groups.

Table 5. *Comparison of average attitudes towards the importance of the four language skills in a future workplace*

	Students			Teachers		
	Very important	Important	Not important at all	Very important	Important	Not important at all
Reading	48.2	45.4	6.4	28.2	56.4	15.4
Writing	38.8	52.9	8.3	20.9	47.3	31.8
Speaking	36.9	54.9	8.2	16	61.8	22.2
Listening	35.4	59.3	5.3	20.5	55.7	23.8

According to the data collected during the research, the students recognised the receptive skills (reading and listening) as more important than the productive skills (writing and speaking). If being compared to the students' evaluation of their own knowledge of English, this finding shows a corresponding tendency - the receptive skills were evaluated as stronger than productive skills. The teachers' result show, that reading is assessed as the most important skill that the students would likely to use the most in their future workplace. This finding also corresponds with the teachers' self-evaluation of their own language skills. According to this, reading was evaluated as the strongest skill of the teachers', it was also the one they relied on the most to get information, since it allowed them to use dictionaries or the Internet tools for translation (e.g., *google translate*), as it was found out from their answers to open-ended questions and oral comments. Partly it can be explained by differences in

experience of learning languages or any other learning experiences, since learning through communication and visualisation is more suitable for the students. The teachers with the median age of 60+ would probably be more likely to consider the learning process as a hard individual work, often with texts and dictionaries. The results can be also explained by the differences in learning styles or multiple intelligences. However, none of that was evaluated during the research, thus in this way it is just an assumption without any empirical proof.

Conclusion of results and rationales for compiling a preliminary syllabus for the Moodle teaching activities. One of the aims of the present work was to find out what the linguistic and situational needs of the students and the teachers of mechatronics in the Tartu Vocational Education Centre are. The results of the research carried out during the period of time from February to April 2013 showed that students' knowledge of English is much better than their teachers' language skills. On the whole, the receptive skills (especially reading) are reported as stronger than the productive skills by both target groups. It appeared that the students are more motivated to acquire some parts of the curriculum subjects in English than their teachers ready to teach (none of the teachers reported being ready to start with CLIL in the classroom). It can be an essential starting point, since the students are motivated and ready to start with CLIL, there is a need for materials and it is essential to search for ways of collaboration between school teachers in order to meet students' needs and interests.

Answering research question one, reading is also the most commonly used skill in everyday occupational environment both by the students and the teachers and speaking is the most underrepresented. Interestingly, writing and listening were not evaluated as the strongest skills, however, they are used relatively often by both groups. The detailed situation-wise analysis showed that both in reading- and writing-related situations the most usual activity for both groups is searching and reading for some information in the Internet. Thus, working with Moodle activities should not cause technophobic obstacles and should be real life resembling. The most rarely experienced situations among both target groups is reading and filling out

specific documentation such as check lists and reports. It is an interesting finding and this activity should be rather included than excluded from sample Moodle teaching activities, since students have limited opportunity to practice their English in this sociolinguistic situation and this activity is listed among compulsory in the Vocational Standard for Mechatronic Technicians (Sihtasutus Kutsekoda 2001). As it was already mentioned, speaking was not a common skill used in everyday environment, which is logical, since most of everyday occupational activities are school-centred. However, one of the aims for development of TVEC stated in the development plan of school for the years 2014-2018 (Tartu Kutsehariduskeskus 2013) is to make school and the process of learning more internationalised and create more opportunities for students to expand barriers for career outlooks, improve students (and teachers) language skills. Thus, it is essential to prepare students for the future changes and help them master their speaking skill, which they feel themselves the most unsure at. Moodle materials can definitely provide options for fostering collaboration among students and teachers. Speaking is the skill the content teachers struggle the most to assist with their students in the classroom. Consequently, speaking should be the skill that language teachers should provide their support with. Moreover, it is the skill that can help to link virtual Moodle environment with the classroom activities, since oral tasks can be partly coordinated in real life surrounding. However, some speaking activities can still be organised online (e.g., videoblogging, creating/posting videos). As a justification to the previous statement the results of analysis of listening activities should be highlighted: the students hardly ever listen to oral presentations and reports in English. Yet, making presentations and listening to reports can be one of the easiest activities to organise in the context of a classroom. Thus, it could be a relatively easy to start applying CLIL in teaching content subjects with a slight support of a language teacher. The most common listening activity both target groups admitted practicing constantly is watching occupation-related

videos. Moodle environment enables to incorporate videos into the learning process, which definitely is a motivating and authentic activity for students.

A huge difference appeared in the teachers' and the students' responds about being ready to start teaching/acquiring vocational subjects through English (research question two). None of the teacher respondents reported being ready to start practising CLIL in the classroom, while more than half of the students admitted being ready to try learning in English. However, the real situation with being ready to start with subject and language integrated learning may seem disastrous, this finding is rather positive for the further design of CLIL-based Moodle sample activities. In the context of TVEC this could be the first step-stone for starting with systematic integrated learning. These sample materials can be developed into a real practical support for content teachers, whose language skills are insufficient. In addition to that, the materials would reinforce the collaboration between the language and the content teachers and, as a result, meet the students' needs, who feel motivated enough to start acquiring some parts of content subjects through English. It should be mentioned that, in spite of the teacher's first negative reaction to applying CLIL, they still admitted being ready to provide some of integrated activities when they were given a chance to choose from a list of possible methods from the list. Therefore, this finding provides an opportunity for developing further collaboration between the language and the content teachers of the vocational school.

The activity-wise analysis showed that a common tendency appeared in writing- and reading-related activities, as the most feared activity for the both target groups was taking and administering tests in English. This could be a place for forming positive attitudes towards CLIL by providing a positive experience in acquiring the content and getting assessed, since CLIL enables a great variety of assessment forms (including formative assessment and self-evaluations) which do not have to be a classical test. Activities that would definitely motivate

both groups are working with specialised texts, exploring charts, terminology and various Internet-based activities. Reading specific documentation such as check lists and reports repeatedly received rather negative feedback from both target groups, which is quite logical, since, as the results of common everyday life situations showed, they have the less experience with filling out specific documentation. Thus, in order to reinforce the weakest skill and to provide tips together with positive experience, it is important to include this topic into sample Moodle activities. Among listening activities watching/showing videos was chosen as the most common by both groups.

Surprisingly, speaking-related activities appeared as the most motivating for the students if being compared to the other skills involving learning activities. The students acknowledge that the speaking skill is needed in order to become a successful learner/worker. According to their own evaluation, speaking was their weakest skill, thus it is highly positive that the students are extremely motivated to practice it. Unfortunately, the content teachers of mechatronics participated in the research lack both the language skills and the motivation to provide these activities in the classroom. Thus, it is the role of the language teacher to provide the supportive link in order to reinforce and develop the students' speaking skill and organise classroom discussions, group work, (video) presentations in English. To sum up the previous, speaking- and listening-related activities were more popular for participating/organising both among the students and the teachers, while activities involving reading and writing were less popular among both groups.

According to the result of the survey, the teachers and the students have different opinions about what subjects can be fully or partly taught in English and their choices of the subjects suitable for CLIL differ (research question three). As it was mentioned in the introductory part of the present MA thesis, the new concept of vocational education takes the destination towards integration of subjects (Pilli & Kuusik, n.d.: 5-6). The main work of

creating new integrated school curricula is seen as the responsibility of schools and should be done by teachers of different subjects in cooperation with each other. Needs analysis carried out in order to determine the subjects suitable for integrated teaching in English has partly failed. An important finding for organising CLIL in TVEC within the curriculum of mechatronics' occupation is that the students are quite positive about acquiring content of vocational subjects in English. Yet, the teachers' answers revealed the weak sides of trying to apply CLIL on practice. The content teachers hesitate to start teaching in English themselves due to insufficient knowledge of English. However, they do not exclude an opportunity of CLIL totally, which makes it possible to apply integrated teaching with a support from language teachers. Thus, the amount of integrated modules can depend on quality of personal contact and the amount and productivity of collaboration between the subject and the language teachers. It is easier to integrate various subject topics with the language by placing the materials into Moodle or any other Internet-based environment. Both teacher groups would have free access to the materials and to overview of assignments done by a student in addition to his/her grades.

Another challenge with choosing topics for integrated syllabus is the fact that the current school curriculum faces a problem that some subjects duplicate corresponding topics within the subjects' syllabus. While planning an integrated module, it is important to take into consideration schools' opportunities and availability of materials and devices, rooms, the difficulty and importance of the subject, the knowledge of English of a certain content teacher. In order to choose topics for the Moodle sample activities and the preliminary course outline, it was decided to find opportunities for integration of the subjects of the existing mechatronics' curriculum by grouping them into structurally logical chunks and blend them with some more general topics which are essential for developing learner autonomy and self-

awareness and can help the students to plan their future careers. The preliminary syllabus and CLIL sample materials are presented further in Chapter Three.

During the research both target groups were asked to evaluate possible workplace activities and situations that might require use of the four language skills (research question four). The evaluation of possible listening- and speaking-involving situations showed an extremely controversial result, since the activities marked by the teachers as the most unlikely are reported by the students as the most probable. Still it was possible to define some consistent tendencies. For instance, the procedure of applying for a job was stated as the most language-requiring. Again, labour law-related writing activities as the less important. Similarly to the previous findings, reading activities reading user and assembly manuals and working with computer-aided design and manufacturing software (CAD, CAM) were also among the most popular choices. An overall analysis showed that self-evaluation of the participants' own language skills has influenced the attitude towards the importance of use of the four language skills in various situations in students' future workplace since the strongest receptive skills (reading and listening) were recognised as more important than weaker productive skills (writing and speaking). The teachers' result show, that reading is assessed as the most important skill that they would likely to use the most in students' future workplace.

To sum up, the research showed some important results that will be taken into consideration in the design of sample Moodle CLIL-based activities for students of mechatronics:

General ideas

- The students are motivated to start with CLIL;
- The content teachers hesitate to start with CLIL due to the lack of the language skills

but ready to try if provided some support from a language teacher;

- The easiest way to start with CLIL is to place materials online (e.g., into Moodle), since it is real-life resembling and can provide a lot of authentic information resources. In addition to that, it can foster collaboration between teachers;

- On the existing stage of integration in TVEC the sample materials designed for the present MA thesis can be understood only as a pilot-project needed to be developed further in the future, since it requires more of specific knowledge of mechatronic content that one language teacher possesses.

Skill- and activity-based criteria

- All four language skills should be included into materials;
- It is important to foster collaboration and the speaking skill through Moodle activities (e.g., videoblogging, creating/posting videos and audio files) aiming to link online and classroom learning (making presentations and participating in discussions);

- Reading and listening can provide rich language input for CLIL activities and it is also recognised by the respondents;

- Listening activities such as watching videos are motivating for students and can be easily included into Moodle environment (in contrast to the fact that many ESP course books often lack authentic listening materials);

- Specialised texts, user and assembly manuals, charts and terminology should be included into the pilot-project materials, since their necessity was recognised by the respondents.

Criteria based on the subject-wise analysis of preferences

- Despite the fact that some of the activities listed in the questionnaire were reported by the respondents as unessential (e.g., working with specific documentation), it was decided not to exclude them from the materials and, vice versa, try to reinforce unpopular choices in order

to change the negative attitude and provide positive experience, since these activities are present in the Vocational Standard for Mechatronic Technicians (Sihtasutus Kutsekoda 2001);

- It was recognised by the participants that the language is necessary not only for being successful in a job but also for getting a job and being able to show yourself as the best candidate.
- The integration of subjects should take into consideration the existing school resources and should be based on the existing school curriculum for students of mechatronics (Tartu Kutsehariduskeskus 2009).

To sum up, the aspects listed previously will be taken into consideration while designing sample CLIL-based Moodle teaching activities and a preliminary integrated course outline for students of mechatronics, which are presented further in Chapter Three and in Appendices 7 and 8.

CHAPTER 3

CLIL MATERIALS' DESIGN

The following chapter provides justification for constructing CLIL-based sample teaching activities in Moodle environment. The preliminary integrated course outline and the sample teaching materials are introduced in the end of the present chapter and in Appendices 7 and 8.

Rationales for combining CLIL and Moodle

Moodle has numerous benefits and ways of application in organising the learning process. According to Nigerian researchers Suleiman Ahmad Alhaji et al (2012: 445-455) Moodle is beneficial because it allows to manage a large number of students, can be used for fully online courses and for improving face-to-face courses (known as blended learning), its activities such as forums, databases and wikis build richly collaborative communities of learning around the subject.

Moodle and CLIL: common aspects. Is it possible to combine Moodle and CLIL and find common aspects to link them? Probably it is the easiest way to do it in a short period of time on the first stages of changing educational paradigms in the vocational education. A comparison of common characteristic features of Moodle and CLIL methodology is presented in Appendix 5.

Amongst other rationales for combining Moodle and CLIL can be named the in order to form a student into independent learner the following aspects can be listed:

1) *development of time-management skills*: learners have an adequate overview of their improvement throughout the course, the structure of the course is very logical with all the topics presented at once, which allows to navigate easily;

2) *expanding the barriers of the learning process*: Moodle provides both online and offline activities in support to the face-to-face teaching (Alhaji et al 2012: 445-455);

3) *filling the 'missing link' needed for adapting to new jobs*: ability to analyse and organise information, take responsibility (Campbell et al 2010: 25);

4) *Making learning interactive and multilayered*: features that help increase the likelihood that both content and language learning will be meaningful, as it is considered important by Peeter Mehisto (2012: 17);

5) *Supporting creativity, learner independence and collaboration* (Bentley 2010: 52).

In addition to that, it can be stated that using modern technological approaches in teaching meets the requirements of the globalised world trying to cope with the obstacles caused by the economic crisis.

Bloom's digital taxonomy. Bloom's Revised Taxonomy was already mentioned in Chapter One as one of the main tools for planning CLIL-based learning in order to achieve the development of HOTS – high order thinking skills. Andrew Churches (2009: 3-7) evaluates the Revised Taxonomy as a modern approach, which is more suitable if dealing with new digital generation of learners, with new technologies and actions/activities related to them. Learners do not have to start learning from the lower taxonomy levels to improve their skills, rather they can start at any level and cover the lower levels later. However, Andrew Churches (2009: 3-7) argues, that the verbs from Bloom's revised taxonomy do not meet new requirements emerged from the expanding use of Information and Communication Technologies (ICT) in students' everyday lives and modern classrooms. Due to that change in the processes of learning and teaching, Churches makes a suggestion to digitalise the existing model. These modifications together with examples of infotechnology-related activities are presented in Figure 1 of Appendix 6.

In the present work it was aimed to design sample Moodle teaching activities, thus, it is important to understand, how the Digital Taxonomy is going to be applied. In the Figure 2 of Appendix 6 there is presented a pyramid scheme linking different Moodle activities and thinking processes reflecting Taxonomy domains. It can be argued that Moodle teaching

activities do not support collaborating and communication among students, thus, violate the criteria for CLIL-based materials. However, modern theorists provide a counterargument to that. Andrew Churches presents in his Digital Taxonomy a wide range of communication activities that can be applied in Moodle virtual environment. These communicational activities involve debating, moderating, collaborating, posting and blogging, replying, chatting, questioning etc. On the whole, activities mentioned in both variations of digital taxonomies were taken into consideration while designing sample Moodle CLIL-based activities for the present MA thesis.

Preliminary CLIL course outline and sample teaching activities for students of mechatronics

The findings of the research carried out in Tartu Vocational Education Centre from February to April 2013 were used to design the sample Moodle teaching activities and the preliminary integrated course outline for B2-level students of mechatronics since the demand for new ideas for integrated materials based on CLIL methodology was great. The teaching activities were placed into Moodle environment in order to blend CLIL teaching aspects such as supporting self-awareness, learners' autonomy, higher-level thinking skills, and development of ICT literacy in learners. This project is the first stepping-stone for starting with systematic integrated learning and can be developed into a real practical support for content teachers, whose language skills are insufficient. In addition to that, by starting with the integration gradually, it would be possible to reinforce the collaboration between the language and the content teachers and, as a result, meet the students' needs, who feel motivated

Aims. Designing a CLIL course for students of mechatronics was aiming to develop

- students' communication skills and ability to process data;
- the four language skills for academic and occupational purposes;
- interpersonal skills;

- planning and time-management skills;
- ability to learn autonomously;
- ability to apply the content knowledge gained in both national and international occupational environment.

Objectives. The learning objectives are set according to the four language learning skills and on the basis of requirements listed in CEFR assessment grid for B2-level language learners (see Appendix 9) and St. Giles' level descriptors (n.d.)

Reading: can read authentic texts, articles and reports; understand main ideas of both concrete and abstract technical topics; find, process and compare information from multiple sources and use it in own production; discuss causes, consequences, hypothetical situations; understand specialised articles with relatively unfamiliar content provided that he/she can use a dictionary to confirm terminology; read many kinds of texts quite easily at different speeds and in different ways according to their purpose in reading and the type of text.

Writing: can pass on information in reports and essays on a variety of subjects related to his/her interests; write formal letters and CVs; compare and contrast ideas; describe advantages and disadvantages of various options; write a comment on both concrete and abstract occupation-related topics; develop an argument giving reasons in support of or against a particular point of view; write clear, detailed text on a wide range of subjects related to the occupation-related field; write a text highlighting the personal significance of events and experiences.

Listening/Understanding the speech: can understand a talk or lecture on known topics and majority of radio and TV broadcasts related to current affairs and general knowledge; main ideas of presentations on different subjects; can understand the majority of video information in standard dialect; can understand in detail what is said to them in the standard spoken even when there is some noise in the background; can identify the speaker's mood and tone.

Speaking: can take active part in discussions and debates on topics known to him/her; present his/her point of view, justify it and argue to reach a compromise; produce an extended speech on a topic related to his/her interests; make a presentation; discuss occupation-related topics discuss causes, consequences, hypothetical situations; develop an argument giving reasons in support of or against a particular point of view.

Grammar and vocabulary to be mastered: Grammatical forms and vocabulary necessary to achieve course objectives specified above.

To sum up, the CLIL course is aimed at developing learners' linguistic skills so as to allow them to cope in their future workplace.

Modules. The preliminary course outline consists of six modules: an introductory module and five topic-based modules. The list of modules is presented in Appendix 7. Sample teaching materials in Moodle have been designed for the introductory module and the first two topic-based modules. The other modules (electronics, electricity, mechanics and ICT) integrate specific content subjects of the TVEC curriculum for mechatronics (Tartu Kutsehariduskeskus 2009) with English and involve more specific subject knowledge than one language teacher possesses. Moreover, the aim of the present study was not to prepare the full set of integrated study materials as the process of integration will last until the year 2017, according to the plan of Estonian Ministry of Education and Research (Haridus- ja Teadusministeerium 2009) the Development Plan of TVEC in 2014-2018 (Tartu Kutsehariduskeskus 2013). The basis of integration of vocational subjects was the definition of mechatronics as an area itself (see Figure 2 below).

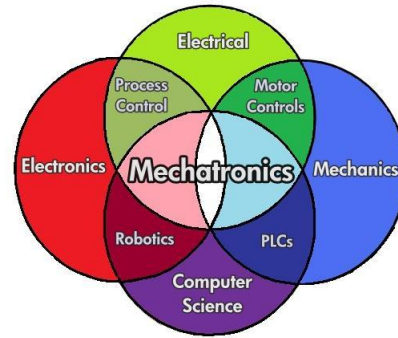


Figure 2: Mechatronic related areas (http://www.scccareertech.com/images/mechatronics_new.jpg).

Thus, the CLIL course will consist of six modules all in all, each of them dealing with one are of mechatronics.

Structure of modules. A tool for planning the integration of the content subjects, cognitive skills and English has been designed (see Appendix 8). The tool is based upon Do Coyle's 4Cs Framework of CLIL (n.d.) and takes into consideration the four language learning skills.

According to Do Coyle's model, the structure of each topic-based CLIL module includes four subsections: general learning integrating subsections (content and cognition) and language learning involving subsections (communication and culture). The content part is aimed for planning activities built around special vocational subjects in mechatronics and knowledge of work ethics and employment-related procedures. The planning tool includes an overview of the mechatronic' curriculum content subjects (Tartu Kutsehariduskeskus 2009) suitable for integration with English in each topic-based model (see *integrationalism*). Cognition is associated with developing learners' cognitive skills (creative thinking, evaluating, time-management skills). Culture is seen in the development of understanding ourselves and people from other cultural background, development of the ability to assist others at work. Communication involves both communication in the online environment and the ability to do teamwork offline while working on various projects.

In order to plan teaching activities by taking into consideration the four language skills each subsection of Do Coyle's model was divided into four parts (reading, writing, listening and speaking).

Thus, the framework of models is beneficial for further planning of activities for integrated lessons by setting the learning outcomes according to the skills that are aimed to be developed. When the learning outcomes are set, it is essential to plan the teaching activities followed by defining the ways of assessment in order to explain how the teacher is going to check the acquisition of material and the accomplishment of the learning outcomes.

It should be mentioned, that at present neither all of the Co Doyle's Cs nor all the four language skills are represented in the integrated framework equally. Further the ideal plan is to develop all the skills equally throughout the CLIL course. However, some topics may be too specific to enable the integration of all the parameters (e.g., the introductory part). On the contrary, the other modules can be more suitable for developing all the criteria within the designed framework due to the wider range of subtopics and curriculum's subjects included into the module (e.g., module 1 'Career outlooks' and module 2 'Safety').

In conclusion, the modules are built around the main mechatronics' related areas and take into consideration the structure of the curriculum of TVEC for mechatronics (Tartu Kutsehariduskeskus 2009), Do Coyle's 4Cs model and the four language skills. Some introductory topics were added to the syllabus aiming to develop learners' general knowledge about working in the manufacturing industry and self-awareness of being a skilled learner/worker. The structure of the course will help students to acquire content subjects and develop their interpersonal skills. The framework of the course can be used by teachers as a tool for planning the integration of the mechatronics' curriculum and designing specific activities taking into consideration learning outcomes and assessment.

Thus, the CLIL course framework designed for the present MA thesis is beneficial both for students and for the teachers responsible for organising the integrated teaching process in TVEC.

General characteristics of sample CLIL activities for students of mechatronics.

An overview of sample CLIL activities for students of mechatronics designed as an outcome of the present MA thesis is provided in Appendix 8, which contains tables suitable to be used as a tool for planning integrated lessons. All in all, the tables include the learning objectives, the description of the activities and assessment for three topics of the CLIL course for mechatronics: introduction, career outlooks and safety.

As it was mentioned previously in the present work, according to Kay Bentley (2010: 6) there are three possible types of CLIL which vary from soft CLIL to hard CLIL (see Table 1). Taking into consideration the results of the needs analysis of the students and the content teachers of mechatronics in Tartu Vocational Education Centre as well as the teaching situation there (possibilities for collaboration of the content and the language teachers and the availability of teaching resources together with IT-devices), it can be concluded, that neither the soft CLIL model nor the hard model would be suitable for the conditions of the Centre. Rather it should be the *medium subject-led model* that can be characterised by a certain amount of hours taught in English during the term and certain parts of different subjects chosen by teachers in collaboration in order to be taught in the target language. Most of the existing printed materials are more suitable for organising soft CLIL model and cover some curricular topics that are taught during a limited language course. The sample teaching activities designed for the present MA thesis

Bentley (2010: 7) also recommends the inclusion *self-evaluation* in the process of learning in addition to *peer- and group feedback*, since cognition is associated with developing learners' cognitive skills, including creative thinking and evaluating. Self-evaluation was integrated into the present sample CLIL teaching activities as an essential part

of forming and raising students' self-awareness. This also corresponds with the idea of Mehisto et al (2008: 167-168) that making students aware of their learning styles is a step-stone to their personal achievement. It is one of the original aspects of the present Moodle materials, since students are encouraged to test and define their *learning style* and can get an instant result in the interactive environment. In addition to that, students are guided to evaluating their own language learning process and the process of raising professional self-awareness.

Learning outcomes and assessment criteria should be pre-planned to make the process of learning well-structured and beneficial for learners. In the sample teaching activities created for the present MA thesis it was decided to include both summative and formative assessment.

According to *Bloom's revised taxonomy* described previously in Chapter One (Churches 2009: 3; Mehisto 2008: 155), verbs are used for giving instructions in the sample Moodle activities constructed for students' of mechatronics.

The materials are built around fostering the four language learning skills. The authentic materials used for compiling the sample activities include videos and employment-, safety- and health-related documentation, which, according to the results of the survey carried out for the present MA thesis, are seen by the participants as useful and real-life resembling. Thus, a rich input is provided and learners have an opportunity to apply new knowledge on practice and reflect on their learning process.

The author of the sample teaching activities aimed to reinforce communication among learners not only by providing opportunities for collaboration in Moodle environment, but also by linking the online activities to the everyday classroom context (preparing presentations, presenting projects). The survey results showed that the students are motivated to participate in oral activities and in the context of VECT those can be organised with a support of a language teacher.

Scaffolding is provided by chunking the information into step-by-step activities and instructions, logical framework of the course, easiness of navigation and the opportunity to get an instant overview of the whole structure.

To sum up, the designed sample activities include the following key features: a logical and well-structured framework based upon Do Coyle's 4Cs Model (n.d.) and built around the four language skills, taking into consideration opportunities of the particular vocational school, providing a rich input of authentic occupation-related materials, developing learners' autonomy and time-management skills, raising self-awareness. Yet, it has to be acknowledged, that the CLIL course outline and Moodle activities designed for the present MA thesis as a pilot project in order to be developed and expanded further during the process of ongoing integration in TVEC. This time-demanding and complicated process will take several years up to the year 2018. Thus, it was not aimed to develop a complete set of teaching materials and a fully integrated course for mechatronic occupation. However, the present teaching activities and the syllabus have a real practical value and got approved by the content teachers of mechatronics in Tartu Vocational Education Centre.

CONCLUSION

The aim of the present MA thesis was to carry out a needs analysis research in order to determine the socio-linguistic needs of students and teachers of mechatronics in Tartu Vocational Education Centre. The results provided rationale for designing the preliminary CLIL course outline for B2-level students of mechatronics and sample Moodle teaching materials as a first step in integrating the schools' curriculum. The need for integrated materials is great due to the general shift towards changing the paradigm of vocational education (Riikgikogu 2013; Tartu Kusehariduskeskus 2013; Pilli & Kuusik n.d.). The economic and political background of Estonia and other countries is introduced in the introductory part of the present thesis in order to give justification to ongoing changes in the educational system and in the system of vocational education in particular. The main tendency heads towards integration of subjects in order to improve students' qualifications in various areas simultaneously and meet the requirements of the 21st century's labour market.

Chapter One presents a theoretical overview of CLIL (Content and Language Integrated Learning) as a teaching approach and its application in education and materials' design. CLIL is seen as beneficial due to its methodology and throughout the areas it is intending to influence (e.g., increasing cultural awareness, internationalisation, preparation for both study and working life, increased motivation). CLIL is student-centred and takes into consideration learners' learning styles, provides scaffolding in order to construct new knowledge based on students' previous experience, develops the four language skills, supports creative and critical thinking. The approach is aiming to raise students' self-awareness and to form them into independent learners through self- and peer-evaluation. In addition to that, there are listed some negative aspects and possible problems that can arise while applying CLIL model on practice. Luckily, these challenges are recognised by the

officials dealing with reorganising vocational education in Estonia. Hopefully, it is possible to solve most of the problems in case if they are pre-planned and dealt with gradually.

Chapter Two presents general practice of needs analysis and introduces the research carried out in Tartu Vocational Education Centre (TVEC) in February-April 2013 among the students and the content teachers of mechatronics. The aim of the research was to determine what the needs of students and teachers for CLIL materials are and which parts of the curriculum they are ready to acquire and teach in English. The research showed some important results that were taken into consideration in the design of sample Moodle CLIL-based activities for students of mechatronics. It was found out that the content teachers hesitate to start with CLIL due to the lack of the language skills but ready to try if provided some support from a language teacher. Thus, the easiest way to start applying CLIL is to place materials online into Moodle, since it is real-life resembling and can provide a lot of authentic information resources. In addition to that, it was obvious that all four language skills should be included into sample activities to some extent. Reading and listening can provide rich language input for CLIL activities, writing gives an opportunity to practice new skills in the output. In addition to that it is essential to foster collaboration and the speaking skill through Moodle activities aiming to link online and classroom learning.

Despite the fact that some of the activities listed in the questionnaire were reported by the respondents as unessential (e.g., working with specific documentation), it was decided to reinforce unpopular choices in order to change the negative attitude and provide positive experience, since these activities are present in the Vocational Standard for Mechatronic Technicians (Sihtasutus Kutsekoda 2001). Employment-related activities were also included into the outline as a separate module due to the great interest towards it among the research participants.

Chapter Three provides justification for constructing CLIL-based sample teaching activities in Moodle environment. The findings of the research carried out in Tartu Vocational

Education Centre from February to April 2013 were used to design sample Moodle teaching activities and a preliminary integrated course outline for B2-level students of mechatronics since the demand for new ideas for integrated materials based on CLIL characteristic aspects was great. The teaching activities have been designed in Moodle environment in order to blend CLIL teaching aspects such as supporting self-awareness, learners' autonomy, higher-level thinking skills, and development of ICT literacy in learners.

While compiling the framework for the integration of subjects, it was taken into consideration the existing school's resources and the existing school curriculum for students of mechatronics (Tartu Kutsehariduskeskus 2009). The present project is the first stepping-stone for starting with systematic integrated learning and can be developed into a real practical support for content teachers, whose language skills are insufficient. In addition to that, by starting with the integration gradually, it would be possible to reinforce the collaboration between the language and the content teachers and, as a result, meet the students' needs, who feel motivated to participate in CLIL-based programs.

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APPENDICES

Appendix 1. Application of Content and language Integrated Learning (CLIL) in mechatronics. Teacher's questionnaire.

Dear Teacher,

I am carrying out a research for my master's thesis aiming to find out, which areas from the mechatronics' curriculum and to what extent can be covered in English. Data collected during the research will be used for determining learners' needs of using the language at their future workplace and compiling teaching materials.

The questionnaire is based on mechatronics' curriculum of Vocational Education Centre of Tartu and the professional standard for mechatronics technicians. The questionnaire is anonymous and consists mostly of multiple-choice questions. It will take you about 25 minutes to answer the questions, the time is not limited.

Thank you for your help!

I Teacher's personal background

Please provide information about yourself:

1) Age:

2) Gender: M F

3) Work experience: 0-5 years; 5-10 years; 10-15 years; 15-20 years; more than 20 years

4) Work experience abroad: YES NO

5) Your knowledge of English:

Skill	Good	Average	Poor
Reading			
Writing			
Speaking			
Understanding the speech			

II In which situations do you use English in everyday work?

6) Using English in everyday work: **READING**

	Constantly	Sometimes	Never
Reading specific literature			
Searching for information on-line			
Reading specific documentation (reports, check-lists, accident reports)			
Reading technical specifications and instructions (user and assembly manuals)			
Working with a computer (including use of English menus in different programs)			

*If you wish to comment on the previous question or add something, please do it here:

7) Using English in everyday work: **WRITING**

	Constantly	Sometimes	Never
Searching for information on-line			
Filling out specific documentation (reports, check-lists, accident reports)			
Filling out technical documentation			

Working with a computer (including use of English menus in different programs)			
Exchanging information on mechatronics- related forums			

*If you wish to comment on the previous question or add something, please do it here:

8) Using English in everyday work: SPEAKING

	Constantly	Sometimes	Never
Speaking about your workplace/occupation			
Making work arrangements, giving work orders/instructions			
Speaking about technical documentation-related topics.			
Speaking about materials, their properties and designations			
Speaking about work principles, use and maintenance of measuring and other tools used in mechatronics			
Speaking about use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

9) Using English in everyday work: LISTENING

	Constantly	Sometimes	Never
Watching area-related videos (both on TV and in the Internet)			
Listening to work orders/instructions			
Listening to presentations			
Listening to oral reports			
Listening to instructions for filling out technical documentation			
Listening to information about materials, their properties and designations			
Listening to information about work principles, use and maintenance of measuring and other tools used in mechatronics			
Listening to information about use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

III Applying CLIL in the classroom: integrating the language and the content

10) I have heard about Content and Language Integrated Learning (CLIL)

YES NO Hard to say

11) I have received specific training in CLIL

YES NO Hard to say

12) I have already taught the content subject through another language

YES NO

13) I have co-operated with other teachers (eg language teachers) in organising CLIL lessons.

YES NO

14) I think that applying CLIL is

- useful for language acquisition
- useful for content subject acquisition
- is useful for acquiring both the language and the subject
- I doubt that CLIL is useful at all

15) I am ready to start teaching my subject(s) in English

YES NO Hard to say

16) If the answer to the previous question is NO, then explain for what reasons you are not ready to teach the subject(s) in English?

17) If you answered YES to the question nr 11, then what kind of activities are you ready to organise in the classroom in English in order to develop learner's READING skills? (Multiple choices are possible).

- I can use specialised texts in English to give to my students to read.
- I can ask my students to find information in the Internet using sources in English
- I can show charts, tables and drawings containing some information in English
- I can show PowerPoint presentations containing information in English
- I can introduce to my students specific terminology in English
- I can give to my students to read specific documentation (reports, check-lists, accident reports)
- I can give to my students to read technical specifications and instructions (user and assembly manuals)
- I can compile instructions and assignments for a test in English
- Other (please specify):

18) If you answered YES to the question nr 11, then what kind of activities are you ready to organise in the classroom in English in order to develop learner's WRITING skills? (Multiple choices are possible)

- I can ask my students to write a summary or make notes in English on the basis of videos/texts
- I can ask my students to write a paper on the basis of Internet resources in English.
- I can ask my students to describe charts, tables and drawings containing some information in English
- I can ask my students to write down specific terminology in English.
- I can organise a translation activity from English into students' mother tongue and backwards
- I can ask my students to fill out specific documentation (reports, check-lists, accident reports)
- I can ask my students to fill out technical documentation
- I can ask my students to write user and assembly instructions in English
- I can ask my students to write answers to a test questions in English.
- Other (please specify):

19) If you answered YES to the question nr 11, then what kind of activities are you ready to organise in the classroom in English in order to develop learner's SPEAKING skills? (Multiple choices are possible)

- I can organise subject-related discussions in English
- I can organise discussions in English concerning filling out specific documentation (reports, check-lists, accident reports)
- I can ask my students to prepare a topic-related oral presentation in English
- I can ask my students to use English during group works and carrying out projects.
- Other (please specify):

20) If you answered YES to the question nr 11, then what kind of activities are you ready to organise in the classroom in English in order to develop learner's LISTENING skills? (Multiple choices are possible)

- I can show videos in English in the classroom
- I can let my students listen to audio-files in English
- I can present instructions for filling out specific documentation (reports, check-lists, accident reports) in English
- I can present orally some part of a topic-related material in English in the classroom
- I can let my students listen to subject-related presentations presented in English by their classmates
- I can ask my students to use English during group works, discussions and carrying out projects.
- Other (please specify):

21) Which *compulsory subjects* of the mechatronics' curriculum can be taught to students in English and to what extent?

	Can be fully taught	Can be partly taught	Cannot be taught at all
Introduction into speciality			
Electrical engineering			

Material studies			
Bases of electronics			
Digital systems			
Technical drawing			
Use of computers and administration			
Bases of economics and business			
Bases of labour law			
Labor and environmental safety			
Bases of communication and customer service			
Technical documentation			
Electrical safety and electricity legislation			
Logic and programming			
Pneumoautomatics			
Programmable (PLC) controllers			
Hydroautomatics			
Locksmith' works			
Cutting machine works			
Machine elements and assembly			
Mechatronics			
Electrical equipment and appliances			
Electrical measurements and automation			
Automation			
Mechatronic devices			
Occupational apprenticeship			

*If you wish to comment on the previous question or add something, please do it here:

22) Which *elective subjects* of the mechatronics' curriculum can be taught to students in English and to what extent?

	Can be fully taught	Can be partly taught	Cannot be taught at all
Safety devices			
Bases of computer hardware			
Soldering works and materials			
Programming of numerically controlled (CNC) machine tools			
Operating systems theory			
Bases of object-oriented programming			
Welding bases			
Data and information security			
Real estate automation			

*If you wish to comment on the previous question or add something, please do it here:

IV Using English in students' future workplace

23) I think that my students will have to use English in their future workplace:

YES NO Hard to say

*If you wish to comment on the previous question or add something, please do it here:

24) How important is English for your students in these READING-related situations in their future workplace?

	Very important	Important	Not important at all
Applying for a job: reading job advertisements			
Labour law: reading employment agreements and forms			

Reading specific documentation (reports, check-lists, accident reports)			
Reading technical specifications and instructions (user and assembly manuals)			
Working with computer-aided design and manufacturing software (CAD; CAM)			
Use of processor technologies in automated control systems			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

25) How important is English for your students in these WRITING-related situations in their future workplace?

	Very important	Important	Not important at all
Applying for a job: writing a CV, a job application			
Labour law: filling out employment agreements and forms			
Filling out specific documentation (reports, check-lists, accident reports)			
Filling out technical specifications-related documentation			
Working with computer-aided design and manufacturing software (CAD; CAM)			
Use of processor technologies in automated control systems			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronics systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

26) How important is English for your students in these SPEAKING-related situations in their future workplace?

	Very important	Important	Not important at all
Applying for a job: participating in a job-interview, introducing yourself, speaking about one's education and work experience			
Communicating with co-workers			
Presenting one's workplace and duties			
Giving work orders and instructions			
Working with technical documentation			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

27) How important is English for your students in these LISTENING-related situations in their future workplace?

	Very important	Important	Not important at all
Listening to work orders and instructions			
Listening to demonstrations			
Communicating with co-workers			
Listening to oral reports			
Working with the technical documentation			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

Appendix 2. Application of Content and language Integrated Learning (CLIL) in mechatronics. Learner's questionnaire

Dear Learner,

I am carrying out a research for my master's thesis aiming to find out, which areas from the mechatronics' curriculum and to what extent can be covered in English. Data collected during the research will be used for determining learners' needs of using the language at the future workplace and compiling teaching materials.

The questionnaire is based on mechatronics' curriculum of Vocational Education Centre of Tartu and the professional standard for mechatronics technicians. The questionnaire is anonymous and consists mostly of multiple-choice questions. It will take you about 25 minutes to answer the questions, the time is not limited.

Thank you for your help!

I Learner's personal background

Please provide information about yourself:

- 1) Gender: M F
- 2) Year: 1; 2; 3; 4
- 3) I study on the basis of
 - basic education
 - secondary education

4) Occupational work experience: YES NO

If you have some occupational work experience, then please specify (how many months/years):

5) Work experience abroad: YES NO

6) Your knowledge of English:

Skill	Good	Average	Poor
Reading			
Writing			
Speaking			
Understanding the speech			

II In which situations do you use English in everyday work?

7) Using English in everyday work: READING

	Constantly	Sometimes	Never
Reading specific literature			
Searching for information on-line			
Reading specific documentation (reports, check-lists, accident reports)			
Reading technical specifications and instructions (user and assembly manuals)			
Working with a computer (including use of English menus in different programs)			

*If you wish to comment on the previous question or add something, please do it here:

8) Using English in everyday work: WRITING

	Constantly	Sometimes	Never
Searching for information on-line			
Filling out specific documentation (reports, check-lists, accident reports)			
Filling out technical documentation			
Working with a computer (including use of English			

menus in different programs)			
Exchanging information on mechatronics'-related forums			

*If you wish to comment on the previous question or add something, please do it here:

9) Using English in everyday work: SPEAKING

	Constantly	Sometimes	Never
Speaking about your workplace/occupation			
Making work arrangements, giving work orders/instructions			
Speaking about technical documentation-related topics.			
Speaking about materials, their properties and designations			
Speaking about work principles, use and maintenance of measuring and other tools used in mechatronics			
Speaking about use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

10) Using English in everyday work: LISTENING

	Constantly	Sometimes	Never
Watching area-related videos (both on TV and in the Internet)			
Listening to work orders/instructions			
Listening to presentations			
Listening to oral reports			
Listening to instructions for filling out technical documentation			
Listening to information about materials, their properties and designations			
Listening to information about work principles, use and maintenance of measuring and other tools used in mechatronics			
Listening to information about use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

III Applying CLIL in the classroom: integrating the language and the content

11) I think that knowledge of English is important

YES NO Hard to say

12) I think that I will have to use English at my future workplace:

YES NO Hard to say

13) I am ready to start learning vocational subjects in English

YES NO Hard to say

14) If the answer to the previous question is NO, then explain for what reasons you are not ready to learn vocational subjects in English?

15) If you answered YES to the question nr 8, then what kind of activities are you ready participate in in the classroom in English in order to develop your READING skills? (Multiple choices are possible).

- Reading specialised texts in English in the classroom or independently
- Searching for some information from the Internet using sources in English
- Exploring charts, tables and drawings containing some information in English
- Following PowerPoint presentations containing information in English
- Reading specific terminology in English
- Reading specific documentation (reports, check-lists, accident reports)
- Reading technical specifications and instructions (user and assembly manuals)

- Reading test instructions and assignments in English
- Other (please specify):

16) If you answered YES to the question nr 8, then what kind of activities are you ready participate in in the classroom in English in order to develop your WRITING skills? (Multiple choices are possible).

- Writing a summary on the basis of videos/texts presented in the classroom
- Writing a paper based on the Internet resources about the occupation-related topics in English.
- Describing charts, tables and drawings containing some information in English
- Writing down specific terminology in English.
- Translating from English into my mother tongue and backwards
- Filling out specific occupation-related documentation (reports, check-lists, accident reports)
- Filling out technical documentation
- Writing and filling out technical specifications and instructions (user and assembly manuals)
- Write answers to a test questions/assignments in English.
- Other (please specify):

17) If you answered YES to the question nr 8, then what kind of activities are you ready participate in in the classroom in English in order to develop your SPEAKING skills? (Multiple choices are possible).

- Participating in subject-related discussions in English
- Participating in discussions in English concerning filling out specific documentation (reports, check-lists, accident reports)
- Making topic-related oral presentations in English
- Using English during group works and carrying out projects
- Other (please specify):

18) If you answered YES to the question nr 8, then what kind of activities are you ready participate in in the classroom in English in order to develop your LISTENING skills? (Multiple choices are possible).

- Watching videos in English in the classroom
- Listening to audio-files in English
- Listening to instructions for filling out specific documentation (reports, check-lists, accident reports) in English
- Listening to some part of a topic-related material in English presented orally by teacher
- Listening to subject-related presentations presented in English by my classmates
- Listening to English during group works, discussions and carrying out projects.
- Other (please specify):

19) Which compulsory subjects of the mechatronics' curriculum can be taught to students in English and to what extent?

	Can be fully taught	Can be partly taught	Cannot be taught at all
Introduction into speciality			
Electrical engineering			
Material studies			
Bases of electronics			
Digital systems			
Technical drawing			
Use of computers and administration			
Bases of economics ad business			
Bases of labour law			
Labor and environmental safety			
Bases of communication and customer service			
Technical documentation			
Electrical safety and electricity legislation			
Logic and programming			
Pneumoautomatics			
Programmable (PLC) controllers			
Hydroautomatics			
Locksmith' works			
Cutting machine works			
Machine elements and assembly			

Mechatronics			
Electrical equipment and appliances			
Electrical measurements and automation			
Automation			
Mechatronic devices			
Occupational apprenticeship			

*If you wish to comment on the previous question or add something, please do it here:

20) Which elective subjects of the mechatronics' curriculum can be taught to students in English and to what extent?

	Can be fully taught	Can be partly taught	Cannot be taught at all
Safety devices			
Bases of computer hardware			
Soldering works and materials			
Programming of numerically controlled (CNC) machine tools			
Operating systems theory			
Bases of object-oriented programming			
Welding bases			
Data and information security			
Real estate automation			

*If you wish to comment on the previous question or add something, please do it here:

IV Using English in the future workplace

21) How important is using English in these READING-related situations in your future workplace?

	Very important	Important	Not important at all
Applying for a job: reading job advertisements			
Labour law: reading employment agreements and forms			
Reading specific documentation (reports, check-lists, accident reports)			
Reading technical specifications and instructions (user and assembly manuals)			
Working with computer-aided design and manufacturing software (CAD; CAM)			
Use of processor technologies in automated control systems			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

22) How important is using English in these WRITING-related situations in your future workplace?

	Very important	Important	Not important at all
Applying for a job: writing a CV, a job application			
Labour law: filling out employment agreements and forms			
Filling out specific documentation (reports, check-lists, accident reports)			
Filling out technical specifications-related documentation			
Working with computer-aided design and manufacturing software (CAD; CAM)			
Use of processor technologies in automated control systems			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and			

other tools used in mechatronics			
Mechatronics systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

23) How important is using English in these SPEAKING-related situations in your future workplace?

	Very important	Important	Not important at all
Applying for a job: participating in a job-interview, introducing yourself, speaking about one's education and work experience			
Communicating with teammates			
Presenting one's workplace and duties			
Giving work orders and instructions			
Working with technical documentation			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

24) How important is using English in these LISTENING-related situations in your future workplace?

	Very important	Important	Not important at all
Listening to work orders and instructions			
Listening to demonstrations			
Communicating with co-workers			
Listening to oral reports			
Working with the technical documentation			
Assembly and testing of mechatronic systems			
Working with specific materials, their use, properties and designations			
Work principles, use and maintenance of measuring and other tools used in mechatronics			
Mechatronic systems elements and their designations			
Use and maintenance of occupational equipment			

*If you wish to comment on the previous question or add something, please do it here:

Appendix 3. Developing critical thinking in a vocational school through CLIL

(Mehisto 2008: 153-165)

Type of critical thinking	Explanation of the term	Examples of activities for developing critical thinking in a vocational school
<i>Appreciating</i>	Understanding others and yourself	Students explain five things that they like about their occupation. Students name five attitudes they would appreciate in their colleagues at work of future apprenticeship place.
<i>Assigning</i>	Setting items apart for a particular aim.	Students attribute roles and tasks in a group, and afterwards evaluate how fairly work was divided.
<i>Associating</i>	Connecting items together.	Students interview working people to find out how soft skills such as teamwork and positive thinking can increase performance and production.
<i>Classifying</i>	Putting items into categories.	Students classify ethical issues they are likely to face in a job (eg. in nursing). They develop response scenarios and analyse potential consequences. Key phrases, nouns and verbs need for discussion and classification can be listed.
<i>Combining</i>	Putting items into a single whole.	Students list the serious physical or mental consequences of taking various combinations of drugs (in nursing). Students are provided with the list of nouns, verbs, adjectives that they combine into instruction for using equipment.
<i>Committing</i>	Understanding and accepting responsibility.	Students analyse the reasoning behind an industry's ethical code and think consequences of not following such a code. For instance, aircraft mechanics agree not to use spare parts without serial numbers. Uncertified parts may be of substandard quality and cause serious accidents.
<i>Comparing</i>	Identifying similarities and differences.	Students watch short videos and compare interpersonal styles across cultures. Students compare the language of someone working in a customer service to someone working in a warehouse.
<i>Considering</i>	Extracting the essence of a text.	Students reduce employee rules and regulations into a series of generalizations (eg wash hands before touching tools; separate cooked and uncooked food). Hygiene needs to be maintained on personal and work level.
<i>Converting</i>	Changing the aspects of an item/information.	Students convert a recipe from 5 to 500 servings. Students convert sentences used in the kitchen among staff into sentences that could be addressed to clients: <i>That's bloody hot!</i> versus <i>It is a rather sicy dish, madam.</i>
<i>Defining</i>	Determining key qualities and/or characteristics.	Students define work processes such as testing, checking, grinding, milling, measuring.
<i>Describing</i>	Reporting the features of an item information.	Student A describes an electrical scheme, which student B then draws. Student A looks at the result and describes changes to be made. The students compare the drawing with the original, assessing their collaboration and drawing conclusion. Students then complete the task with a visual, an auditory and a kinesthetic learner. They assess whether the task was completed as desired. This is followed by the analysis if instructions could be improved.
<i>Designating</i>	Assigning a name, a title or a function to an item.	Students name every tool they use, elements in the electrical circuit, in a microscope or in an aircraft wing. Students listen to dialogues and designate the register of language being used (formal, casual, professional, non/professional, etc).
<i>Discriminating</i>	Treating some item of information differently from others.	Students define how to tell the difference between high-quality and low-quality products. Students establish criteria for measuring products created in vocational classes. Students establish the differences between a safe and unsafe working environment. Students distinguish various types of damage on the fuselage of aircraft or on the body of a car.
<i>Extending</i>	Developing ideas further.	Students are provided with a dictionary definition of the word <i>professionalism</i> . Then they define what the word means to them personally and describe how they think professionals behave at workplace.
<i>Identifying cause and effect</i>	Defining what was at the root of an event and what result it produced.	Students look at ten workplace problems and decide how each one relates to the other nine problems. For example, students could determine whether each of the following problems is a cause or consequence of their own problems: a lack of time; too great

		workload; a dissatisfied client; tensions among staff; low morale; unfilled positions; lack of turnover in sales; low profitability; old equipment; no parking. Students then decide in which order the problems should be tackled.
<i>Imaging</i>	Forming a mental image.	Students lay their heads on the desk and close their eyes. Ask them to imagine ten years from now. What community are they living in? Are they living in a house, or a boat or somewhere else? How big is it? What do they live? What do they do on weekends? What food do they eat most of the time? How do they earn a living? What are the people like who they work with? What do they do well? How do people treat them? How do they treat others? What are the steps that need to be taken to achieve this – education, personal development, etc?
<i>Linking</i>	Finding relationships.	Students group together elements that form units (eg <i>nuts</i> and <i>bolts</i>)
<i>Observing</i>	Looking in detail at someone or something	Students observe one task on an assembly line (on a video or in real life) and describe all the steps involved in completing the task.
<i>Predicting</i>	Anticipating what is likely to happen.	Students read five different pastry dough recipes and predict the type of pastry each will produce. They bake the pastry and compare the results with their predictions. Students predict the results of leaving ingredients out of a recipe. Students predict the taste of unusual combinations of food.
<i>Reconciling</i>	Putting opposing items together to form a consistent whole.	Groups discuss ways of accommodating different customer expectations in order to create a profitable plumbing or carpentry business.
<i>Roleplaying</i>	Thinking like someone else and communicating and acting as that person would.	Students roleplay dealing with customer complaint.
<i>Separating</i>	Taking things apart to identify specific components.	Students separate tools according to function (testing, drilling, fastening, etc).
<i>Selecting</i>	Making a preferred, imperative or needed choice.	Students review a list of tasks and select tools and/or equipment for each task. Students choose key paraphrases so they can order supplies.
<i>Triggering</i>	Something that sets off another thought or event.	Students come up with words that are related by meaning (<i>bolt, nut, hub, wheel</i> , etc), field or study or sound. Variation: Students are in teams of five. One team at a time, each team is given a word and must come up with another word related to it (eg, <i>drill</i> > <i>hole, screw, nails, electric, professional, construction</i>). If a team fails to suggest a related word, after a certain period of time (15 seconds), the next team tries. If that team succeeds, it gets a point. From here on in, each team gets a point when it answers. No point is awarded if no answer is given.
<i>Utilizing</i>	Demonstrating how things could be, are being or have been put to use.	Students think up new uses for chocolate or industrial by-products.
<i>Verifying</i>	Specifying how information should be accepted as valid or true.	ICT students verify that every chunk of the computer software programme actually takes the user to the next level/step.

Appendix 4. Tables of the survey results

Table 1. *Using English in everyday occupational environment: reading-related activities*

Activities	Students			Teachers		
	Constantly	Sometimes	Never	Constantly	Sometimes	Never
Reading specific literature	21.7	56.6	21.7	20	40	40
Searching for information on-line	45.9	47.5	6.6	50	40	10
Reading specific documentation (reports, check-lists, accident reports)	20.7	51.7	27.6	0	50	50
Reading technical specifications and instructions (user and assembly manuals)	30.5	57.6	11.9	10	80	10
Working with a computer (including use of English menus in different programs)	58.3	36.7	5	60	40	0
<i>Average scores</i>	<i>35.4</i>	<i>50</i>	<i>14.6</i>	<i>28</i>	<i>50</i>	<i>22</i>

Table 2. *Using English in everyday occupational environment: writing-related activities*

Activities	Students			Teachers		
	Constantly	Sometimes	Never	Constantly	Sometimes	Never
Searching for information on-line	50.8	45.9	3.3	10	70	20
Filling out specific documentation (reports, check-lists, accident reports)	11.9	39	49.1	0	20	80
Filling out technical documentation	15	40	45	0	40	60
Working with a computer (including use of English menus in different programs)	39.3	45.9	14.8	40	30	30
Exchanging information on mechatronics' related forums	15	41.7	43.3	10	30	60
<i>Average scores</i>	<i>26.4</i>	<i>42.5</i>	<i>31.1</i>	<i>12</i>	<i>38</i>	<i>50</i>

Table 3. *Using English in everyday occupational environment: speaking-related activities*

Activities	Students			Teachers		
	Constantly	Sometimes	Never	Constantly	Sometimes	Never
Speaking about your workplace/occupation	11.9	50.8	37.3	0	30	70
Making work arrangements, giving work orders/instructions	10.7	33.9	55.4	0	10	90
Speaking about technical documentation-related topics.	5.2	46.5	48.3	0	30	70
Speaking about materials, their properties and designations	6.8	55.9	37.3	0	20	80
Speaking about work principles, use and maintenance of measuring and other tools used in mechatronics	10.5	52.7	36.8	0	30	70
Speaking about use and maintenance of occupational equipment	15.8	47.4	36.8	0	40	60
<i>Average scores</i>	<i>10.2</i>	<i>47.8</i>	<i>42</i>	<i>0</i>	<i>26.7</i>	<i>73.3</i>

Table 4. *Activities involving listening/understanding the speech*

Activities	Students			Teachers		
	Constantly	Sometimes	Never	Constantly	Sometimes	Never
Watching area-related videos (both on TV and in the Internet)	46.4	46.4	7.2	40	40	20
Listening to work orders/instructions	24.1	38.9	37	0	10	90
Listening to presentations	20.8	50.9	28.3	10	60	30
Listening to oral reports	14	40	46	10	10	80
Listening to instructions for filling out technical documentation	18.5	37	44.5	10	20	70
Listening to information about materials, their properties and designations	19.2	48.1	32.7	20	30	50
Listening to information about work principles, use and maintenance of measuring and other tools used in mechatronics	27.8	44.4	27.8	10	40	50
Listening to information about use and maintenance of occupational equipment	28.8	38.5	32.7	10	60	30
<i>Average scores</i>	<i>24.9</i>	<i>43</i>	<i>32.1</i>	<i>13.7</i>	<i>33.8</i>	<i>52.5</i>

Table 5. *The students' overall attitudes towards applying CLIL in the classroom*

Statement	Yes	No	Hard to say
Knowledge of English is important	95.1	1.6	3.3
English will be needed at my future workplace	90.1	3.3	6.6
I am ready to start learning vocational subjects in English	52.4	19.7	27.9

Table 6. *The teachers' overall attitudes towards CLIL*

Statement	Yes	No	Hard to say
I have heard about Content and language Integrated Learning (CLIL)	70	10	20
I have received specific training in CLIL	20	80	0
I have already taught the content subject through another language	50	50	-
I have co-operated with other teachers (eg. language teachers) in organising CLIL lessons.	10	90	-
I am ready to start teaching vocational subjects in English	0	87.5	12.5

Table 7. *The teachers' attitudes to the usefulness of CLIL*

<i>Statements about usefulness of CLIL</i>	<i>Percentages of the teachers' positive responses</i>
CLIL is useful for language acquisition	20
CLIL is useful for content subject acquisition	0
CLIL is useful for acquiring both the language and the subject	60
I doubt that CLIL is useful at all	20

Table 8. *Readiness of the students and the teachers to participate/organise CLIL activities in the classroom*

Activities	Percentages of positive answers among the students	Percentages of positive answers among the teachers
<i>Reading-related</i>		
Reading specialised texts in English in the classroom or independently	14.8	15.8
Searching for some information from the Internet using sources in English	17.1	15.8
Exploring charts, tables and drawings containing some information in English	15.7	15.8
Following PowerPoint presentations containing information in English	11.8	10.5
Reading specific terminology in English	13.6	5.3
Reading specific documentation (reports, check-lists, accident reports)	9.7	5.3
Reading technical specifications and instructions (user and assembly manuals)	11.4	10.5
Test instructions and assignments in English	5.9	0
<i>Average scores</i>	<i>12.5</i>	<i>9.9</i>
<i>Writing-related</i>		
Writing a summary on the basis of videos/texts presented in the classroom	13.8	14.3
Writing a paper on the occupation-related topics in English.	11.3	0
Describing charts, tables and drawings containing some information in English	10.3	0
Writing down specific terminology in English.	13.3	14.3
Translating from English into my mother tongue and backwards	13.8	14.3
Filling out specific occupation-related documentation (reports, check-lists, accident reports)	11.3	14.3
Filling out technical documentation	10.3	14.3
Writing and filling out technical specifications and instructions (user and assembly manuals)	8.2	0
Write answers to a test questions/assignments in English.	7.7	0
<i>Average scores</i>	<i>11.1</i>	<i>7.9</i>
<i>Speaking-related</i>		
Participating in subject-related discussions in English	28.9	0
Participating in discussions in English concerning filling out specific documentation (reports, check-lists, accident reports)	22.8	0
Making topic-related oral presentations in English	23.7	40
Using English during group works and carrying out projects	24.6	0
<i>Average scores</i>	<i>25</i>	<i>10</i>
<i>Listening-related</i>		
Watching videos in English in the classroom	24.4	44.4

Listening to audio-files in English	18.1	11.1
Listening to instructions for filling out filling out specific documentation (reports, check-lists, accident reports) in English	16.5	0
Listening to some part of a topic-related material in English presented orally by teacher	15.7	0
Listening to subject-related presentations presented in English by my classmates	13	11.1
Listening to English during group works, discussions and carrying out projects.	12.5	0
<i>Average scores</i>	<i>16.7</i>	<i>11.1</i>

Table 9. *The attitudes towards learning/teaching compulsory subjects of mechatronic's curriculum in English*

<i>Compulsory subjects</i>	Students			Teachers		
	Can be fully taught	Can be partly taught	Cannot be taught at all	Can be fully taught	Can be partly taught	Cannot be taught at all
Introduction into speciality	36.7	40.8	22.4	0	60	40
Electrical engineering	26.9	40.4	32.7	0	50	50
Material studies	29.4	47.1	23.5	0	50	50
Bases of electronics	34.6	40.4	25	0	60	40
Digital systems	34.6	48.1	17.3	20	40	40
Technical drawing	36	42	22	0	50	50
Use of computers and administration	46	40	14	10	60	30
Bases of economics and business	31.4	39.2	29.4	0	60	40
Bases of labour law	23.5	41.2	35.3	0	30	70
Labor and environmental safety	28	42	30	0	40	60
Bases of communication and customer service	37.3	35.3	27.5	10	40	50
Technical documentation	31.4	43.1	25.5	10	60	30
Electrical safety and electricity legislation	25.5	47.1	27.5	0	30	70
Logic and programming	47.1	37.3	15.7	20	40	40
Pneumautomatics	36	40	24	10	50	40
Programmable (PLC) controllers	40.4	42.3	17.3	20	40	40
Hydroautomatics	33.3	37.3	27.5	0	60	40
Locksmith works	35.3	37.3	27.5	0	40	60
Cutting machine works	35.3	33.3	31.4	0	50	50
Machine elements and assembly	35.3	29.4	35.3	0	50	50
Mechatronics	27.5	45.1	27.5	20	50	30
Electrical equipment and appliances	29.4	45.1	25.5	0	40	60
Electrical measurements and automation	30	46	24	0	40	60
Automatisation	32.7	42.3	25	10	60	30
Mechatronic devices	33.3	43.1	23.5	10	50	40
Occupational apprenticeship	38.8	42.9	18.4	0	50	50
<i>Average result</i>	<i>33.7</i>	<i>41.1</i>	<i>25.2</i>	<i>5.4</i>	<i>48.1</i>	<i>46.5</i>

Table 10. *The attitudes towards learning/teaching elective subjects of the mechatronic's curriculum in English*

<i>Elective subjects</i>	Students			Teachers		
	Can be fully taught	Can be partly taught	Cannot be taught at all	Can be fully taught	Can be partly taught	Can not be taught at all
Safety devices	25.9	51.9	22.2	0	60	40
Bases of computer hardware	39.6	49.1	11.3	20	40	40
Soldering works and materials	27.8	48.1	24.1	10	60	30
Programming of numerically controlled (CNC) machine tools	41.8	41.8	16.4	0	70	30
Operating systems theory	27.8	57.4	14.8	10	50	40
Bases of object-oriented programming	30.2	50.9	18.9	20	50	30
Welding bases	21.2	51.9	26.9	0	70	30
Data and information security	26.8	55.4	17.9	10	60	30
Real estate automation	24.1	50	25.9	0	40	60
<i>Average result</i>	<i>29.5</i>	<i>50.7</i>	<i>19.8</i>	<i>7.7</i>	<i>55.6</i>	<i>36.7</i>

Table 11. *The importance of reading-related situations in the students' future workplace*

	Students			Teachers		
	Very important	Important	Not important at all	Very important	Important	Not important at all
Applying for a job: reading job advertisements	55.8	36.5	7.7	20	70	10
Labour law: reading employment agreements and forms	44.2	46.2	9.6	20	50	30
Reading specific documentation (reports, check-lists, accident reports)	51	35.3	13.7	20	60	20
Reading technical specifications and instructions (user and assembly manuals)	49.8	46.4	3.8	50	50	0
Working with computer-aided design and manufacturing software (CAD; CAM)	59.6	34.6	5.8	40	60	0
Use of processor technologies in automated control systems	57.7	38.5	3.8	40	50	10
Assembly and testing of mechatronic systems	51.9	44.3	3.8	40	50	10
Working with specific materials, their use, properties and designations	45.1	49	5.9	10	70	20
Work principles, use and maintenance of measuring and other tools used in mechatronics	45.1	43.1	11.8	20	60	20
Mechatronic systems elements and their designations	41.2	52.9	5.9	20	60	20
Use and maintenance of occupational equipment	45.1	47.1	7.8	30	40	30
<i>Average result</i>	<i>48.2</i>	<i>45.4</i>	<i>6.4</i>	<i>28.2</i>	<i>56.4</i>	<i>15.4</i>

Table 12. *The importance of writing-related situations in the students' future workplace*

	Students			Teachers		
	Very important	Important	Not important at all	Very important	Important	Not important at all
Applying for a job: writing a CV, a job application	50	44	6	50	30	20
Labour law: filling out employment agreements and forms	40.8	49	10.2	20	40	40
Filling out specific documentation (reports, check-lists, accident reports)	37.5	45.8	16.7	10	60	30
Filling out technical specifications-related documentation	36.7	55.1	8.2	20	50	30
Working with computer-aided design and manufacturing software (CAD; CAM)	38.8	55.1	6.1	40	30	30
Use of processor technologies in automated control systems	37.5	54.2	8.3	30	40	30
Assembly and testing of mechatronic systems	35.4	56.3	8.3	20	40	40
Working with specific materials, their use, properties and designations	34	57.5	8.5	0	70	30
Work principles, use and maintenance of measuring and other tools used in mechatronics	39.6	54.2	6.2	10	50	40
Mechatronics systems elements and their designations	36.2	57.4	6.4	20	50	30
Use and maintenance of occupational equipment	40.4	53.2	6.4	10	60	30
<i>Average result</i>	<i>38.8</i>	<i>52.9</i>	<i>8.3</i>	<i>20.9</i>	<i>47.3</i>	<i>31.8</i>

Table 13. *The importance of speaking-related situations in the students' future workplace*

	Students			Teachers		
	Very important	Important	Not important at all	Very important	Important	Not important at all
Applying for a job: participating in a job-interview, introducing yourself, speaking about one's education and work experience	46	48	6	40	60	0
Communicating with teammates	41.2	48.8	10	20	60	20
Presenting one's workplace and duties	37.5	50	12.5	0	90	10
Giving work orders and instructions	40.4	48.9	10.7	0	77.8	22.2
Working with technical documentation	39.6	52.1	8.3	20	60	20
Assembly and testing of mechatronic systems	31.1	62.2	6.7	10	60	30
Working with specific materials, their use, properties and designations	36.2	57.4	6.4	20	60	20
Work principles, use and maintenance of measuring and other tools used in mechatronics	30.4	60.9	8.7	10	60	30
Mechatronic systems elements and their designations	30.5	63	6.5	20	40	40
Use and maintenance of occupational equipment	36.2	57.4	6.4	20	50	30
<i>Average result</i>	<i>36.9</i>	<i>54.9</i>	<i>8.2</i>	<i>16</i>	<i>61.8</i>	<i>22.2</i>

Table 14. *The importance of listening-related situations in the students' future workplace*

	Students			Teachers		
	Very important	Important	Not important at all	Very important	Important	Not important at all
Listening to work orders and instructions	37.5	54.2	8.3	30	50	20
Listening to demonstrations	35.4	56.3	8.3	44.4	44.4	11.1
Communicating with co-workers	33.3	60.2	6.5	10	70	20
Listening to oral reports	35.4	56.3	8.3	11.1	66.7	22.2
Working with the technical documentation	39.6	56.3	4.1	10	70	20
Assembly and testing of mechatronic systems	39.5	54.2	6.3	22.2	44.4	33.3
Working with specific materials, their use, properties and designations	34.8	63	2.2	22.2	55.6	22.2
Work principles, use and maintenance of measuring and other tools used in mechatronics	39.1	56.5	4.4	11.1	66.7	22.2
Mechatronic systems elements and their designations	31.9	66	2.1	22.2	44.4	33.3
Use and maintenance of occupational equipment	27.7	70.2	2.1	22.2	44.4	33.3
<i>Average result</i>	<i>35.4</i>	<i>59.3</i>	<i>5.3</i>	<i>20.5</i>	<i>55.7</i>	<i>23.8</i>

Appendix 5. Common beneficial aspects of Moodle and CLIL

Table 1. *Common aspects of Moodle and CLIL*

CLIL requirements	Moodle opportunities
Presenting information in chunks (charts, diagrams, drawings, experiments, key-concepts and terminology)	Moodle allows to present different kinds of graphical and visual information, allows to fill in a glossary of terms (both by teachers and students).
Cooperation between the content and the language teacher	Moodle enables both teachers to be course administrators. In addition to that, Moodle improves collaborative learning through activities, observing and sharing of resource among the teachers and students
Teacher's positive support	Good teaching and teacher-learner relationships do not disappear in spite of the technicality of the Moodle package.
Reflective learning and self-evaluation	Moodle tools to encourage and engage students primarily in learning and evaluations. The system allows the administrators to create surveys and self-assessments activities. Self-assessment form for students can be created.
Teachers' feedback and formative assessment	Students get a good overview of their grades together with teacher's feedback, which is posted individually and in a written form.
Communication	Chat tool which supports group discussions. Students can share their ideas and write responses via blog.
Safe environment and heading for correct use of the language	Tests permit multiple attempts for students, the attempts can be reviewed and students can learn from their own mistakes. Students can use various on-line dictionaries and spell-check resources while completing assignments.
The role of the language	Moodle is customised to support multilingual activities, it offers over 70 languages.
Cognitive skills	Active teaching methods are totally applicable to Moodle and provide good basis for development of higher order thinking (creating, evaluating, analysing).
Meeting learner's individual learning styles	Moodle is much easier for taking into account different learning styles. Providing activities for visual, auditory and kinaesthetic learners as well as multifunctional learners (videos, projects, audio-files). The system allows use of academic games, puzzles and quizzes.
Meaningful context and activities	The system enables to use countless authentic materials (according videos and pictures). The activities are meaningful, since they engage 'learning-through-doing' and provide the result in very short periods of time.
Interconnectivity	Moodle helps to create meaningful connections between topics and information outside the course.

Appendix 6. Bloom's Revised Digital Taxonomy and Moodle Taxonomy

Figure 1. Bloom's revised digital taxonomy (Churches 2009: 7)

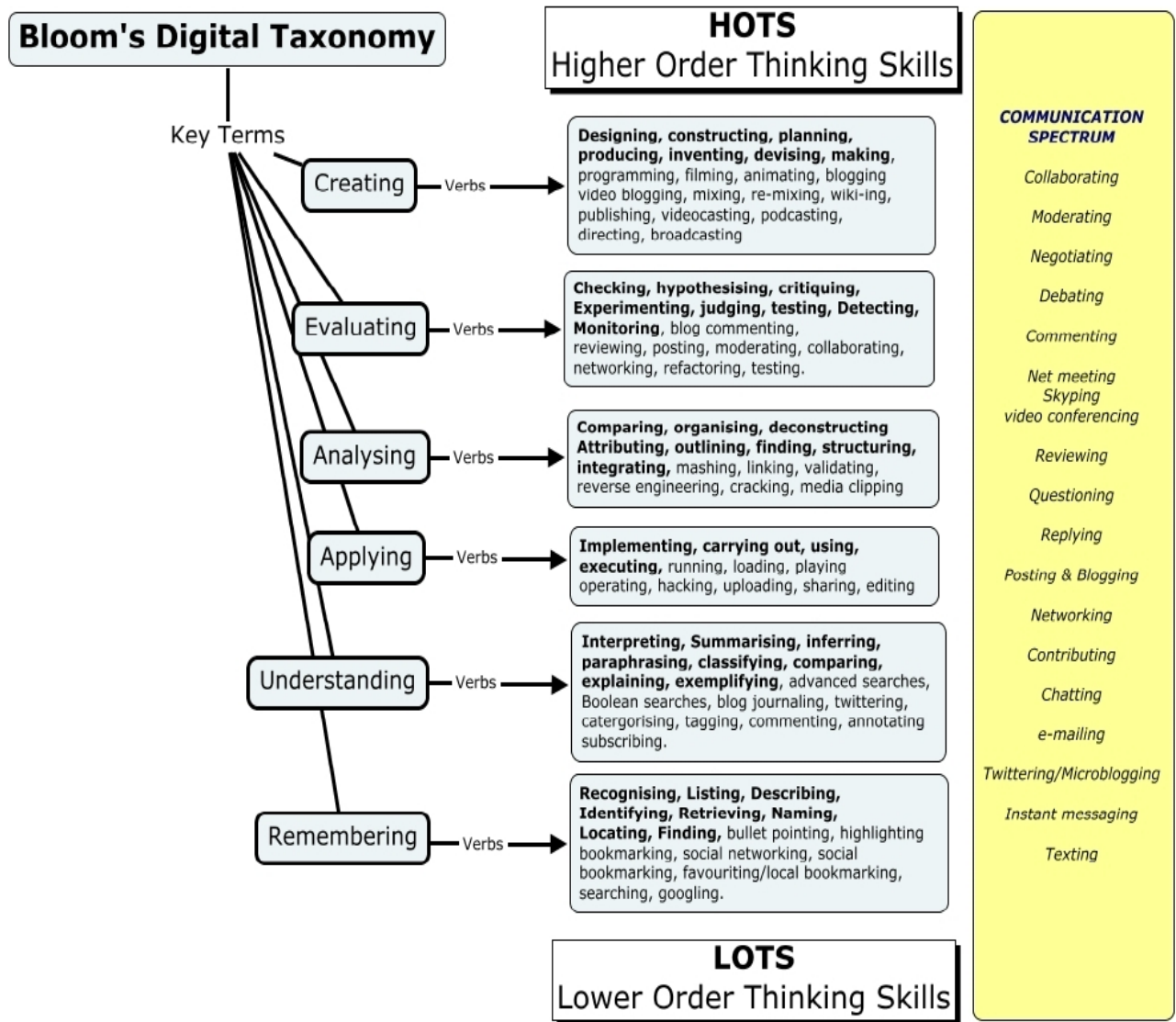
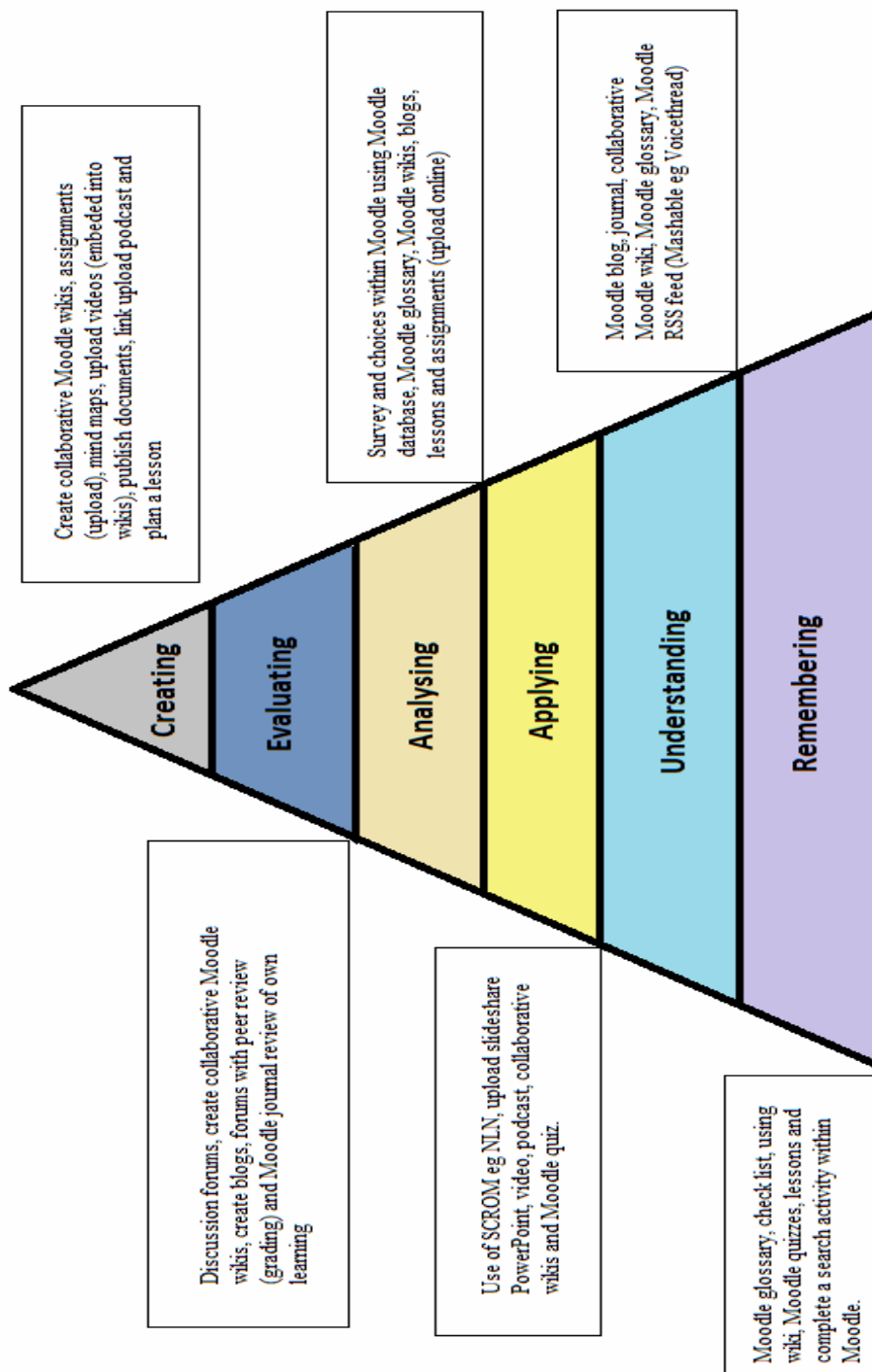


Figure 2. Blooms' digital taxonomy in the context of Moodle (E-TeachUK, 2010)



Appendix 7. Preliminary CLIL course syllabus for mechatronics

Introduction: Me as a learner

Subtopics: learning styles, learning strengths and weaknesses.

Integrationalism: introduction into speciality; occupational apprenticeship.

Module 1: Career outlooks

Subtopics: Job description, duties, responsibilities, skills, employment agreements and job applications.

Integrationalism: introduction into speciality; use of computers and administration; occupational apprenticeship; bases of labour law.

Module 2: Safety

Subtopics: safety check-lists, accident reports, safety instructions.

Integrationalism: safety and electricity legislation; labour and environmental safety; safety devices (elective subject); technical documentation.

Module 3: Electronics

Subtopics: tools, mechatronic systems, controllers, hydraulic and pneumatic actuators, CNC machines, autotronics, avionics, bionics.

Integrationalism: Integration with subjects: introduction into speciality; mechatronics; mechatronic devices; programmable (PLC) controllers; digital systems; bases of electronics; elective subjects: hydroautomatics; pneumoautomatics; soldering works and materials; real estate automation.

Module 4: Electricity

Subtopics: electrical equipment and appliances, forces, electrical designations, wiring and protection, renewable energy.

Integrationalism: electrical engineering; electrical safety and electricity legislation; electrical equipment and appliances; electrical measurements and automation; hydroautomatics; pneumoautomatics.

Module 5: Mechanics

Subtopics: materials and their properties, technical drawings, welding, metalworking.

Integrationalism: locksmith' works, cutting machine works, machine elements and assembly, technical drawing, material science; elective subjects: welding bases, soldering works and materials.

Module 6: ICT (Information and Communications Technology)

Subtopics: ICT systems, computer hardware, software development, CNC machines, the Internet, CAD and CAM systems.

Integrationalism: digital systems, use of computers and administration, logic and programming, programmable (PLC) controllers: elective subjects: bases of computer hardware, operating systems theory, bases of object-oriented programming, programming CNC machine tools.

Appendix 8. Overview of CLIL teaching activities designed in Moodle for students of mechatronics

Integration with subjects of mechatronics' curriculum and main topics of the syllabus (based on learning outcomes)

Introduction: Me as a learner				
Subtopics: learning skills, learning strengths and weaknesses				
<i>Integrationalism: introduction into speciality, occupational apprenticeship</i>				
	<i>Language</i>	<i>Learning outcomes</i>	<i>Tasks, activities</i>	<i>Assessment</i>
Content	Reading			
	Writing	1. Learner is able to analyse ones strengths and weaknesses as a worker; 1.1. Learner is able to present main duties of a mechatronic technician	1. Writing a self-evaluation 'Me as a mechatronic, my strengths' and weaknesses'	Self-evaluation and teacher's feedback
	Listening			
	Speaking			
Culture	Reading	1. Learner participates actively in planning of his/her own learning process. 1.1. Learner is able to take active part in Moodle discussion on the topic of apprenticeship experience, read and respond to other chat participants' opinions.	1. Learner participates in the Moodle survey in order to choose and set te suitable session time for further Moodle chat on the topic of apprenticeship. 1.1. Participating in Moodle chat discussion on various aspects of learners' apprenticeship experiences.	Not evaluated Teacher's feedback based on previously set evaluation criteria.
	Writing	1. Learner is able to take active part in Moodle discussion on the topic of apprenticeship experience, read and respond to other chat participants' opinions.	1. Participating in Moodle chat discussion on various aspects of learners' apprenticeship experiences.	Teacher's feedback based on previously set evaluation criteria.
	Listening			
	Speaking			
Cognition	Reading	1. Learner is aware of his/her learning style ;	1. Filling out a language skills test	Self-assessment and instant feedback
	Writing	1. Learner is able to apply the knowledge about his/her learning styles in planning the learning process.	1. Writing a self-evaluation and compiling a study plan providing hints for taking into consideration learning styles in the process of learning.	Self-evaluation and teacher's feedback
	Listening			
	Speaking			

Module 1: Career outlooks				
Subtopics: Job description, duties, responsibilities, skills, employment agreements and job applications				
<i>Integrationalism:</i> introduction into speciality, use of computers and administration, occupational apprenticeship, bases of labour law				
	<i>Language</i>	<i>Learning outcomes</i>	<i>Tasks, activities</i>	<i>Assessment</i>
Content	Reading	1. Learner understands duties and responsibilities of a mechatronic technician 2. Understands the main aspects of an employment agreement	1. Reading job descriptions, job advertisements 2. Reading a sample employment agreement, searching for relevant information	
	Writing	1. Can write a CV 2. Able to fill out an employment agreement	1. Writing a CV (Europass) 1.1. Making a mind-map about the occupation 2. Filling out a sample gapped employment agreement	Teacher's feedback Peer-evaluation Teacher's feedback
	Listening	1. Learner understands information about mechatronics' duties and working conditions if it is presented orally	1. Watching a video about career outlooks	
	Speaking			
Culture	Reading			
	Writing	1. Learner is familiar with the employment culture; 1.1. Learner is able to present duties and responsibilities from employer's and employee's point of view.	1. Creating a project 'My company' involving the description of the business, description of employer's and employee's duties and responsibilities according to the employment agreement.	Self-evaluation, peer evaluation
	Listening			
	Speaking	1. Learner is able to make a presentation about mechatronic technician's job 1.1. able to answer questions about characteristic aspects of the job, pros and cons of the job.	1. Making an oral presentation about the job	Peer evaluation, teacher's feedback
Cognition	Reading	1. Learner plans his/her learning process; able to manage his/her time	1. Following the dead-lines 1.1. Posting/presenting assignments on time	Self-evaluation, teacher's feedback
	Writing	1. Learner is able to express his/her opinion about the Internet resource provided; 1.1. able to analyse the text and to compare the theory with his/her personal experience; 1.1. communicates with his/her peers on the topic of "Golden rules of a job interview".	1. Reading through the Internet resource provided and participating in the Moodle chat on the topic of "Golden rules of a job interview";	
	Listening			
	Speaking	1. Learner is able to prepare a speech on the basis of the materials provided; 1.1. is able to distinguish between relevant and irrelevant information;	1. Pair work involving creating a role-play "Job interview".	Peer evaluation and teacher's feedback.

Module 2: Safety				
Subtopics: safety check-lists, accident reports, safety instructions				
<i>Integrationalism:</i> safety and electricity legislation, labour and environmental safety, safety devices (elective subject), technical documentation				
	<i>Language</i>	<i>Learning outcomes</i>	<i>Tasks, activities</i>	<i>Assessment</i>
Content	Reading	1. Learner understands texts related to workplace and safety.	1. Filling out a safety check-list.	Self-evaluation
	Writing	1. Learner uses a dictionary and other resources to work with a text and explore the language.	1. Compiling a vocabulary list, creating a Moodle glossary.	Teacher's feedback on the vocabulary list presented by a student.
	Listening			
	Speaking			
Culture	Reading			
	Writing	1. Learner is aware of safety-related procedures at a workplace; 1.1. able to fill out health issues related documentation.	1. Filling out a hearing loss/X ray pulmonary function test form.	
	Listening			
	Speaking	1. Learner is able to instruct a new arrival with a distinct ethical background at a workplace.	1. Preparing and presenting a pair work audio/video project involving taking pictures/filming hazards and giving safety instructions.	Peer evaluation involving giving feedback on two different works of their classmates.
Cognition	Reading			
	Writing	1. Learner is able to analyse workplace hazards through his/her own experience. 1.1. Distinguishes between safe and unsafe factors at a workplace.	1. Writing a risk analysis based on a safety check-list filled out previously.	Teacher's feedback.
	Listening			
	Speaking			

Appendix 9. European levels - Self Assessment Grid

		A1	A2	B1	B2	C1	C2
U N D E R S T A N D I N G	Listening	I can understand familiar words and very basic phrases concerning myself, my family and immediate concrete surroundings when people speak slowly and clearly.	I can understand phrases and the highest frequency vocabulary related to areas of most immediate personal relevance (e.g. very basic personal and family information, shopping, local area, employment). I can catch the main point in short, clear, simple messages and announcements.	I can understand the main points of clear standard speech on familiar matters regularly encountered in work, school, leisure, etc. I can understand the main point of many radio or TV programmes on current affairs or topics of personal or professional interest when the delivery is relatively slow and clear.	I can understand extended speech and lectures and follow even complex lines of argument provided the topic is reasonably familiar. I can understand most TV news and current affairs programmes. I can understand the majority of films in standard dialect.	I can understand extended speech even when it is not clearly structured and when relationships are only implied and not signalled explicitly. I can understand television programmes and films without too much effort.	I have no difficulty in understanding any kind of spoken language, whether live or broadcast, even when delivered at fast native speed, provided. I have some time to get familiar with the accent.
	Reading	I can understand familiar names, words and very simple sentences, for example on notices and posters or in catalogues.	I can read very short, simple texts. I can find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus and timetables and I can understand short simple personal letters.	I can understand texts that consist mainly of high frequency everyday or job-related language. I can understand the description of events, feelings and wishes in personal letters.	I can read articles and reports concerned with contemporary problems in which the writers adopt particular attitudes or viewpoints. I can understand contemporary literary prose.	I can understand long and complex factual and literary texts, appreciating distinctions of style. I can understand specialised articles and longer technical instructions, even when they do not relate to my field.	I can read with ease virtually all forms of the written language, including abstract, structurally or linguistically complex texts such as manuals, specialised articles and literary works.
S P E A K I N G	Spoken Interaction	I can interact in a simple way provided the other person is prepared to repeat or rephrase things at a slower rate of speech and help me formulate what I'm trying to say. I can ask and answer simple questions in areas of immediate need or on very familiar topics.	I can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar topics and activities. I can handle very short social exchanges, even though I can't usually understand enough to keep the conversation going myself.	I can deal with most situations likely to arise whilst travelling in an area where the language is spoken. I can enter unprepared into conversation on topics that are familiar, of personal interest or pertinent to everyday life (e.g. family, hobbies, work, travel and current events).	I can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible. I can take an active part in discussion in familiar contexts, accounting for and sustaining my views.	I can express myself fluently and spontaneously without much obvious searching for expressions. I can use language flexibly and effectively for social and professional purposes. I can formulate ideas and opinions with precision and relate my contribution skilfully to those of other speakers.	I can take part effortlessly in any conversation or discussion and have a good familiarity with idiomatic expressions and colloquialisms. I can express myself fluently and convey finer shades of meaning precisely. If I do have a problem I can backtrack and restructure around the difficulty so smoothly that other people are hardly aware of it.
	Spoken Production	I can use simple phrases and sentences to describe where I live and people I know.	I can use a series of phrases and sentences to describe in simple terms my family and other people, living conditions, my educational background and my present or most recent job.	I can connect phrases in a simple way in order to describe experiences and events, my dreams, hopes and ambitions. I can briefly give reasons and explanations for opinions and plans. I can narrate a story or relate the plot of a book or film and describe my reactions.	I can present clear, detailed descriptions on a wide range of subjects related to my field of interest. I can explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.	I can present clear, detailed descriptions of complex subjects integrating sub-themes, developing particular points and rounding off with an appropriate conclusion.	I can present a clear, smoothly-flowing description or argument in a style appropriate to the context and with an effective logical structure which helps the recipient to notice and remember significant points.
W R I T I N G	Writing	I can write a short, simple postcard, for example sending holiday greetings. I can fill in forms with personal details, for example entering my name, nationality and address on a hotel registration form.	I can write short, simple notes and messages. I can write a very simple personal letter, for example thanking someone for something.	I can write simple connected text on topics which are familiar or of personal interest. I can write personal letters describing experiences and impressions.	I can write clear, detailed text on a wide range of subjects related to my interests. I can write an essay or report, passing on information or giving reasons in support of or against a particular point of view. I can write letters highlighting the personal significance of events and experiences.	I can express myself in clear, well-structured text, expressing points of view at some length. I can write about complex subjects in a letter, an essay or a report, underlining what I consider to be the salient issues. I can select a style appropriate to the reader in mind.	I can write clear, smoothly-flowing text in an appropriate style. I can write complex letters, reports or articles which present a case with an effective logical structure which helps the recipient to notice and remember significant points. I can write summaries and reviews of professional or literary works.

RESÜMEE

TARTU ÜLIKOOL
INGLISE FILOLOOGIA OSAKOND

Larissa Aksinovitš

Application of Content and Language Integrated learning (CLIL) in Designing Moodle Learning Activities for Students of Mechatronics. (*Lõimitud aine- ja keeleõppe (LAK) rakendamise Moodle õppematerjalide loomisel mehhatroonika eriala jaoks*).

Magistritöö

Aasta: 2014

Lehekülgede arv: 97

Annotatsioon:

Antud magistritöö eesmärgiks oli läbi viia uuring Tartu Kutsehariduskeskuse (Tartu KHK) mehhatroonika eriala õppijate ja kutseõpetajate seas, et välja selgitada õppijate sotsiolingvistilised vajadused inglise keele omandamisel. Uurimuse tulemuste põhjal oli kavandatud koostada algupärane LAK (lõimitud aine- ja keeleõppe) ainekava mehhatroonika eriala jaoks. Lisaks ainekavale oli plaanis koostada näidisülesandeid Moodle keskkonnas B2-keeleoskustaseme õppijatele.

Vajadus uute integreeritud ainekavade ja materjalide osas on suur, sest vastavalt uuele Kutseõppeseadusele (Riigikogu 2013) aastal 2018 peab toimuma lõplik üleminek uutele lõimitud õppekavadele, kuis suurem osa keeleõppest peaks toimuma erialast lähtuvalt. Seega esimese sammuna mehhatroonika eriala õppekava integreerimisel viidi Tartu Kutsehariduskeskuses vajaduste uuring ning koostati näidisainekava ja –õppeülesandeid. Edaspidi saaks neid kasutada abimaterjalina integratsiooni edaspidiste staadiumite läbiviimisel.

Käesolev magistritöö koosneb sissejuhatausest, põhiosast ja kokkuvõttest. Põhiosa võib jagada kaheks osaks – teoreetiliseks ja praktiliseks. Teoreetiline osa on koondatud esimesse peatükki ning annab ülevaate LAK-õppe olemusest ja selle rakendamisest haridussüsteemis ja õppematerjalide koostamisel. Praktiline osa on kajastatud kahes peatükis. Peatükk 2 tutvustab vajadusi väljaselgitavat uuringut, mis oli läbi viidud Tartu KHK-s veebruarist aprillini 2013, uuringu metodoloogiast ja tulemustest. Uuring andis ülevaadet mehhatroonika erialaga seonduvatest lingvistilistest vajadustest, kuigi tuleb tõdeda, et tihtipeale õppijate ja kutseõpetajate arvamused ühe või teise aspekti kohta olid subjektiivsed, mõjutatud respondentide isiklike hoiakute ja keeleoskuse poolt.

Kolmas peatükk keskendub magistritöö jaoks loodud LAK näidisainekava ja –õppeülesannete tutvustamisele ning samuti hõlmab ülevaadet Moodle keskkonna iseärasuslikest joontest ja võimalustest. Lõimitud ainekava keele ja mehhatroonika ainete õpetamiseks koosneb sissejuhatausest ja kuuest moodulist, mis lisaks töökeskkonnaohutusele ja tööga seotud dokumentatsioonile hõlmavad ka mehhatroonika põhivaldkondi (elektroonika, mehhanika, elekter, arvutiteadused)

Antud magistritöö oli koostatud kooskõlas Tartu KHK Tööstustehnoloogia osakonna vajadusega läbi viia mehhatroonika õppekava lõiming ning töö kirjutamisel on lähtetud konkreetse kutsekooli võimalustest ja inim- ning õppevara ressursidest. Töö võib olla abiks edaspidise koostöö arendamiseks kutse- ja keeleõpetajate vahel ainete lõimimisel.

Magistritöö toetub 46-le allikale ning sellel on 9 lisa.

Märksõnad: kutseharidus, erialane keel, õppematerjalid, Moodle, lõimitud aine- ja keeleõpe (LAK)

Lihtlitsents lõputöö reprodutseerimiseks ja lõputöö üldsusele kättesaadavaks tegemiseks

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