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CLIL methodology evolution in Russian Technical University (Tomsk Polytechnic)

Content and Language Integrated Learning (CLIL) has a recognised status by the European Union as one of the leading effective means to implementing international language policy of multilingualism. The attempts to implement it into mainstream educational programmes are actively undertaken in Russia. The paper aims to sum up the experience of Tomsk Polytechnic University in running CLIL-based courses. Through "real classroom" data the authors present the way CLIL is implemented and what obstacles it encounters. Based on observations, discussions and surveys conducted by the authors, the conclusion on CLIL methodology improvements applicable to certain settings is made.

Key words: CLIL, bilingual education, multi-purposed language learning, double-agent courses, Bloom's taxonomy, cognitive load, BICS and CALP

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Использование CLIL в Томском политехническом университете: успехи и проблемы

Интегрированное предметно-языковое обучение (Content and Language Integrated Learning, CLIL) признано Европейским союзом как одно из наиболее эффективных средств реализации международной языковой политики многоязычия. В России активно предпринимаются попытки по его внедрению в основные образовательные программы. Целью данной статьи является обобщение опыта Томского политехнического университета в проведении курсов на базе CLIL. Посредством данных основанных на анализе проводимых занятий авторы представляют эффективный способ реализации CLIL, а также препятствия на пути его реализации. На основании наблюдений, обсуждений и опросов, проведенных авторами, делается вывод об изменениях в методологии CLIL для его реализации в конкретных условиях.

Ключевые слова: CLIL, двуязычное образование, многоцелевое изучение языка, курсы двойного агента, таксономия Блума, когнитивная нагрузка, BICS и CALP

1. Introduction

There is little left UNSAID about the applications of English for Specific Purposes (ESP), as one of the approach towards teaching a foreign language for professional purposes. Although, much is still "behind the curtains" regarding a CLIL approach to be used at the tertiary level.

The effectiveness of this or that approach is subject to ever-changing teaching/learning environment, not only in terms of generation-specific

features of teachers and learners, but also considering the peculiarities of pre-tertiary education systems, availability of experts, teachers' commitment and some other more global factors of the external nature. Even though that the theoretical aspects of CLIL have been developed in the world since 1990s, first in Canada and then in Europe, there is still the lack of the "real classroom" data that can be considered as a multifaceted CLIL pool or good for all "textbook" able to cover different contexts, cultures and educational and society demands.

The paper introduces the authors' experience of teaching English at the tertiary level within different approaches and a special accent will be done on CLIL-based courses. The authors do not claim to overview all the aspects of university CLIL practice, they offer the reflections in terms of their personal teaching experience and relate them to some theoretical issues of CLIL application and pedagogy as well with specific national features. In this context, the authors would like to focus mainly on the reasons that are behind the use of CLIL in higher education and to give a brief overview of the didactic and historic challenges that preceded its appearance. As findings and results there will be described several practices, on the base of which, the authors conducted the analysis of "strong and weak" sides of CLIL implementation that might be considered as a good ground and evidence to make some improvements and corrections towards teaching efficacy at the university level in general.

2. Methodology

2.1. Literature review

Having studied existing sources on CLIL as a methodological concept, we noted that nowadays this approach is currently gaining popularity in all educational institutions. However, the practices are fragmental and strongly influenced and conditioned by national contexts. After bilingualism in school teaching (e.g. bilingual schooling in the Quebec province [Baker, Jones, 1998]), CLIL was defined as a new integrated didactics.

The approach evolved differently in different countries. In North American countries it developed quicker than in Europe, South America and Asia. Starting from 2000, the European Union imposes great expectations on CLIL as it conforms to the EU language policy and provokes multilingualism (European Commission, 2003[1]; A Guide to Languages in EU, 2008[2]).

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[1] European Commission. Promoting Language Learning and Linguistic Diversity: an action plan 2004–2006. Brussels, 2003. URL: http://ec.europa.eu/education/doc/official/keydoc/actlang/act_lang-en.pdf

[2] URL: http://www.eubusiness.com/topics/Languages/eu-languages-guide

The number of studies on CLIL has recently grown. Most of them describe the national experience of various educational institutions; about 50 per cent are devoted to the assessment of efficiency of this approach in raising language proficiency among students [Lasagabaster et al., 2001, 2009, 2014; Dalton-Puffer et al., 2009]; other papers prove CLIL efficiency towards subject acquisition [Bruton, 2012; Roussel et al., 2017; Ting, 2017]; a great number of authors consider a cognitive thinking as the key and unique element of this approach [Van de Craen et al., 2007; Rumlich et al., 2016]. CLIL pedagogy is attributed to the 4C theory (Content, Communication, Culture and Cognition) that was proposed by D. Coyle [Coyle et al., 2012]. This theory was furthered into the CLIL pyramid introducing inter alia the strategies enabling to design a CLIL course at more effective level [Meyer, 2011]. In publications issued in Russia, CLIL primarily is considered as an innovative approach with the great potential to increasing learning outcomes in terms of language proficiency [Vdovina, 2013; Popova et al., 2016; Sidorenko et al., 2017; Gudkova et al., 2014; Burenkova et al., 2015].

2.2. Background

CLIL ideologist – David Marsh – introduced this term in 1994; later, he described the methodology, where a foreign language was exploited as a tool to study other subjects [Marsh, 2012]. As we can see from the recent surveys [Pérez-Cañado, 2012] CLIL is clearly on its way to becoming obligation for university education, not yet an option. This approach deals with learning towards achievement of a dual objective, where a foreign language is used as a means of teaching content and is the object of study at the same time. The specific nature of CLIL courses is to find the right balance between the difficulty of content and language. This balance can be achieved by careful planning and selection of content that has a linguistic potential, as well as a simultaneous selection of language that is most typical for a professional field [Ting, 2017]. Therefore, CLIL implies changes to the traditional repertoires of language and non-language teachers, requiring the development of a special setting where educators work collaboratively to formulate new didactics for "a real integration and function in language teaching" [Marsh, 2002].

2.2.1. Massive use of English in engineering education at TPU (1998–2005)

Attempts to massively introduce English into engineering curricular at Tomsk Polytechnic University (TPU) had been made long before this challenge was undertaken by other Russian universities. In 1998, Rector Yuriy Pokholkov initiated a language reform at TPU to intensify teaching students English as a Foreign Language (EFL) across the university. The reform

included five times increase in human resource, six times increase in academic workload and significant budget allocations to support all this innovative initiatives and infrastructure. The rector aimed at creating a multilanguage environment with the view to expedite academic mobility and internationalization of the university. The new educational philosophy was based on the assumption that "foreign languages are an integral component of an engineering profile because engineering graduates should be able to continue education and work in any country of the world" [Chuchalin et al., 2005].

The major dispute regarding the reform at the University arouse around the issue of teaching methodology. The university administration and course developers absolutely concurred that foreign language teaching at an engineering school should not be limited to translating technical texts like it was commonly practiced. The common understanding what "a good English course" should look like was based on the statement-purpose that it must deal with 'additional and practical values', useful and required in real-job world. Therefore, the methodology to be chosen should include the activities and tasks which would resonate with real-life situations and professional needs of graduates. In other words, "a good course" should be more learner-oriented.

The first solution offered as improvement concluded in changing the existing system of language training that had been *massive*, where the content of learning had been the same for all without taking into deep consideration students' needs and a knowledge level. New solution was based on building up a linear educational model and implied division of students into groups based on the level of language proficiency. Professional communicative adequacy was chosen as the leading educational principle and implied the development of competencies eligible and required in professional communication. The commitment to teaching adequate communication entailed designing more pragmatic and profession-oriented content. This concerned personification of knowledge and motivation of students, which for centuries has been considered as the main driving factor and the factor of success in learning languages, just for the reason that a language should not be taught but should be learned.

After two years of the reforms, foreign language education at TPU expanded by adding into engineering programmes the courses of English for Specific Purposes (ESP) in the amount of 612 hours per year. That was the first attempt to integrate language and content. The main difficulty that the course developers faced was to define the frame of professional competencies and, as a consequence, the learning outcomes because the mandatory State Educational Standards imposed inconsistent and ambiguous requirements to a graduator's language proficiency, for instance, "to be able to prepare reports,

to understand the main rules of corporate relations in international companies and to use a foreign language in professional activity" [Polyakova, 2015]. A course of a foreign language of that period was typically built across various profession-related situations based on general engineering topics.

2.2.2. Interdisciplinary tandems (2008–2011)

Unfortunately, the first effort of the university to create a resource base and improve foreign language proficiency by a large-scale training failed to achieve the expected results at full extent. Analysis showed that the practical component of ESP learning materials was not strong enough, mostly due to limited communicative situations and the nature of selected target vocabulary, mainly from the point of its validity. Rather than be rhetorical we conducted the collaborative experimental study on the corpus lexis that was offered within the course "Business English". The vocabulary analysis was carried out with the use of corpus software tools, specifically, AntWordProfile, Complete Lexical Tutor programs [Anthony, 2009]. The experiment's results unveiled some shortcomings of teachers'-created materials and the main of them was a small amount of real-life target vocabulary and the type of context itself, which conventionally help learners' to acquire the learning material. The context is to endow the retention of the word under consideration, thus it should be repetitive or include cases of key words repetitions, making them more learnable. In so doing, when selecting the vocabulary to learn, the range and the frequency of it should be counted as one of the top factors. The conducted experiment showed that the course texts contained only 27.4% of the target lexis that was not enough to speak about efficiency of a course [Rozanova et al., 2018].

Student surveys also showed that professional discussions were often limited to problem statement that never found the further development in some practical solutions that could be discussed from the point of professional knowledge growth. Moreover, some inaccuracies and terminology errors were common when translating professional texts. As a result, new knowledge often had only a weak association with professional fields was quickly substituted in the operational memory with the next set of knowledge and rarely developed into a practical skill of adequate professional communication. In other words, in Bloom's terminology, the lessons were targeted at the students' low cognitive levels of remembering, comprehending and applying and not at the high levels of analysing, synthesizing and evaluating (B. Bloom's taxonomy of cognitive domains) [Anderson et al., 2001].

To solve the problem, content teachers were invited to join a new type of a 'double agent' course also known at TPU as a course of pedagogical tandems. In this mode, a professional English course was taught together

by a linguist and by a content teacher. The teaching was based on the model of adjunct/linked learning, where a content teacher was responsible for the development of professional knowledge and skills and a linguist focused on useful language skills of each specific professional context. Compared to the previous model, the new teaching had a more complex organizational structure and links because of the need for collaboration at the level of two structural divisions.

Undoubtedly, the tandem approach was obviously efficient; however, its massive implementation required significant increase in allocated time to develop and use new teaching materials. Besides, that practice lacked sustainability, at least for two reasons:

1) no guarantee that the tandem will be "alive" and able to cooperate for next years;

2) low availability of content teachers with the language proficiency of at least B2.

2.2.3. CLIL practice at TPU (2011–2017)

Starting from 2011, RF national policies consider the language competence not only as a component of professional qualification of an engineer, but also as a tool to globalize and internationalize universities, to promote universities into international community [Knight, 2012; Ferents, 2013; Filippov, 2013]. The new national education strategy required some strong initiatives from the university management including new solutions in language education. University language policies reacted appropriately. The new "TPU Roadmap 2020" aims among others to create a comfortable bilingual environment, which should contribute to a significant increase in the population of international students and activate teachers' and students' participation in international research carried out by the world's leading centres[3].

The available resources were reformulated into a new CLIL-based course of Professional Training in a Foreign Language to support the reformed ideology. The new course inherited from the significant experience in the tandem teaching and the methodology and materials accumulated by that time. However, the following question provoked the debate when new disciplines were put into practice: Which language level should teachers possess to be able to deliver a CLIL course? Can this course repeat some content previously learned in the Russian language? What should be the nature of cooperation between language and content departments? What are the criteria to select teaching and learning material? How can a students' low language level be compensated?

Many of the questions above remain open until present day.

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[3] URL: https://tpu.ru/university/strategy/development/viu

2.3. Materials and methods

As we have already said, CLIL is debated much but it has not been well-termed yet and had the lack of practice base. All this is compounded by differences in cultural backgrounds and social-educational patterns, established in each country. "There is no single blueprint of content and language integration that could be applied in the same way in different countries – no model is for export" [Marsh, 2002]; "CLIL resembles acupuncture: it works but nobody seems to know why" [Chuchalin et al., 2005]; "the political support for CLIL teaching is generally strong, concrete guidance and support for teachers implementing it are largely absent" [Wiesemes, 2009].

2.3.1. CLIL methodology

In general CLIL is described as a dual purpose teaching, aimed at developing students' linguistic and communicative competence in the same learning context where general academic and professional competences are developed [Marsh, 2002]. Specific nature of CLIL courses concludes in finding the right balance between the difficulty of content and language. It can be graphically expressed as: "**cL**il = simple content + complex language" or "**Cl**il = complex content + simple language". That is, the increase in linguistic complexity should be compensated by a decrease in professional content complexity and vice versa. This balance can be achieved by careful planning and selection of content that has a linguistic potential, as well as a simultaneous selection of language that is most typical for a professional field [Ting, 2017].

A good balance can be reached, for instance, through the use of the scaffolding approach, which is based on the principles of duality (the possibility of transition to the native language, if needed), optimality (balance of quantity and quality), cognition (communication of thinking and speech) and interactivity (involvement in the process). Experts identify cognition as a key aspect and the main advantage of CLIL. According to David Marsh, CLIL is a form of learning that triggers different types of thinking and therefore not only helps strengthen the language competence, but can also influence formation of a conceptual understanding and the way we think [Marsh, 2002].

Cognition is well depicted in the two-phase communicative matrix by J. Cummins, who located the cognition processes in 4 quadrants, fig. 1. The model is based on the Bloom's taxonomy, fig. 2. In Cummin's model cognitive skills of lower order (remembering, comprehending and applying) refer to Basic Interpersonal Communicative Skills (BICS), and cognitive skills of higher order (analysing, synthesizing and evaluating) to Cognitive Academic Language Proficiency (CALP) [Cummins, 2000; Cummins, 2008].
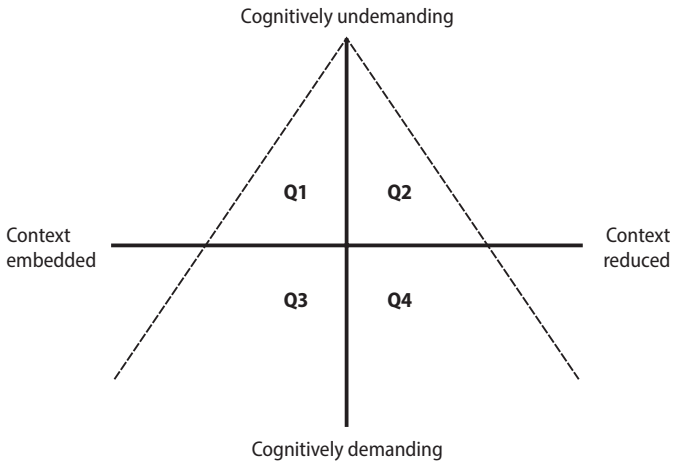
Fig. 1. Two-phase Cummins matrix: context embedded learning (ESP)
and context reduced learning (CLIL)
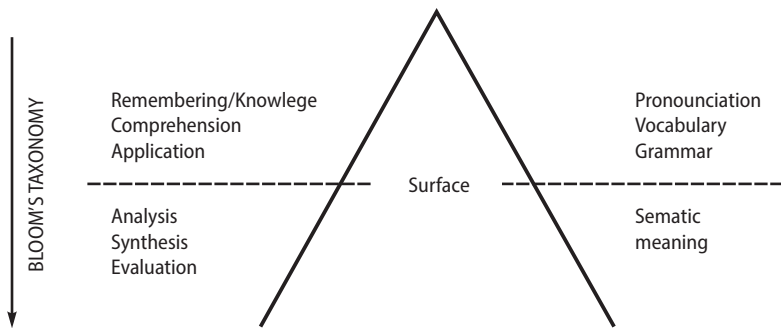
Fig. 2. Bloom's Taxonomy

2.3.2 Assessment tools

The success of a learning process should be evaluated against clear and measurable criteria of a desired outcome. Obviously, they will be strongly correlated with learning objectives. Some researchers use the following indicators as diagnostic tools: correctness, consistency and appropriateness of the use of subject knowledge in speech, including in the native language; knowledge of the minimum of professional terminology; knowledge of language clichés; ability to extract information from non-native language professional sources; ability to explain, evaluate and interpret professional phenomena and facts, etc. [Salehova, 2008].

Self-evaluation is also important in the implementation of CLIL courses as communication in interaction, understanding own contribution in common processes and self-reflection are the leading learning principles in CLIL pedagogy. For this purpose the statements "I know / I can" can be used.

3. Findings and Results

The transmission to CLIL-based teaching in Russian universities was not so easy. The table below gives the succinct specification of the CLIL practices at TPU and presents the types of learning activities to be used and the important "quality parameters" as *Lesson pace* and *Student engagement*.

The data is split into separate practices under the numbers (1–4) and contain:

a) the name of a course to be observed with a degree level and year of study in brackets;

b) a place of this course in a general education program;

c) the language level of participants (teacher and students);

d) the frequency of a native language use;

e) the objective of a course;

f) what teaching methods were used and what lesson pace and students' engagement they helped to achieve (Table 1) .

Let us give the clarification to each case presented.

Practice 1. The objective of the course was to develop general academic skills and was not focused on professional content directly. The students were taught to translate technical texts, specifics of English phrases and terminology. Although the place of the discipline is defined in the programme, its content seems inconsistent and disagrees with programme objectives. It is not clear how the skills of analysing, searching and processing data are integrated into the whole course. Observation showed that insufficient linguistic preparedness of a teacher additionally increased complexity of the course. The language level of students was also different and sometimes exceeded that of the teacher. As a result, the native language was constantly used and the foreign language failed as a communication tool; cognitive processes ran in Russian as well. This negatively influenced students' motivation and engagement.

Practice 2. The purpose of the lesson was to get acquainted with the basic concepts of the subject area, which fully corresponds to the CLIL format. At the same time, it should be noted that the volume of knowledge has been significantly reduced and the pace of training dropped as compared with a similar discipline implemented in Russian. The level of proficiency in the teacher's knowledge is much higher than the language level of the students. Active methods are used; this ensures high involvement of students in the process, interaction with one another, high concentration and interest. This practice can be considered successful.

Table 1

CLIL practice at Tomsk Polytechnic University

	Practice 1	Practice 2	Practice 3	Practice 4
Course	Computer Aided Analysis (B3)	Powerful Gas Lasers (M1)	Algorithms and Data Structures (B3)	Introduction to Databases (B3)
Integration into programme	Extension to a previously taught course	New course	Extension to a Russian-mediated co-requisite	Extension to a previously taught course
Proficiency in English (professor/students)	–/–	B2 / A1–B1	B2 / B1	B2 / B1
Use of Russian	100%	No	Bilingual textbook	To explain difficult concepts
Teaching objective	To teach how to operate information in English	To teach professional concepts in English	To teach professional concepts in English	To teach professional concepts in English
Teaching methods	Translation of an article into Russian	Gaming, lecturing, discussion, reading, peer teaching	Assistance students in preparing a lab report	Active learning techniques
Lesson pace	Low	Low	Low	Low
Student engagement	Low	High	Moderate	High

Методика

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Practice 3. The educational objective is not clearly formulated. In part, it touches upon the terminology. The course is not clearly placed in the programme. Ambiguous objectives lead to the lack of motivation among students. Pedagogical methods obscure. Communication observed during the lesson did not lead to any learning outcomes.

Practice 4. The lesson objective corresponds to the CLIL model; the level of language proficiency of a teacher and students is adequate. The students are actively involved, although the linguistic materials have not been methodologically normalized. The teacher conducts the lesson in English. Russian is sometimes used to explain difficult or key terms. Active teaching methods requiring students' participation in are used.

3. Conclusion

Global challenges of cross-border education remain relevant and require quick solutions. The understanding that integration of content and language is needed is growing every day. English-mediated higher education has the potential to overcome the passivity of the Russian labor market over time due to opening educational boundaries through academic mobility programs.

CLIL is an approach to learning oriented towards achievement of a dual objective – a language and content. Therefore, CLIL is implemented in many higher educational institutions of Russia as innovative approach able to advance the readiness of students and teachers to global communication and to building new technology enhanced knowledge.

No doubt left that a relatively new CLIL methodology imposes additional requirements to university teachers and implies additional workload, thus provoking rejection. To be successful, the reform should be supported by university management and reflected in national educational standards. At the same time, universities should have flexibility and resources to attract foreign specialists and increase incoming mobility, thereby creating prerequisites for a natural language environment.

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