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Challenges of English Teaching in Engineering Courses

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Abstract

The purpose of this experimental study was to investigate English teaching and its impact on students from the engineering faculty in bilingual CLIL (Content and Language Integrated Learning) application. It was conducted in a public Higher Education Institution (HEI) in Kosovo, at the Faculty of Mechanical Engineering and Computing in which data were collected from 180 students. There were 56 students involved in the experimental group, whereas the control groups comprised of 68 students following conventional Technical Drawing with Descriptive Geometry class in native /Albanian language, and 56 students followed conventional English for Specific Purposes (ESP) classes as the second control group. Two teachers, one in engineering field, and one ESP teacher were involved in this study throughout the semester, i.e. fifteen weeks. The study incorporated parallel teaching, the same content in two different languages in the experimental group: Albanian/native language by the engineering practitioner, and English by the ESP teacher. The results of three test terms for all the three groups were analyzed by applying SPSS statistical package, and revealed that the experimental group achieved higher success in learning. The study concluded that if there is no teacher available to offer CLIL to future engineers, then teaching engineering courses with the engineering practitioner can be conducted in parallel fashion with the ESP teacher, who can contribute to positive effect in terms of certain engineering subcategories and English professional vocabulary. As such, this study may be considered as a potential example in offering new professional engineering courses which include bilingual paired teaching, of English and a professional course.

***Keywords*:** CLIL, Collaboration, Engineering Students, Paired Teaching

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1. Introduction

The 21st century´ global developments include different fields characterized by competitiveness, innovation and challenges (Beutner, 2017; Ramirez et al., 2018; Spence & Liu, 2013). This global competitiveness is probable to happen with the use of English, as a major medium for communication in global aspect (Cheremissina & Riemer, 2001). Because of the crucial importance in global aspect, English Language Teaching (ELT) has become a common feature of European Higher Education Institutions (HEIs) (Dash, 2015; Wächter & Maiworm, 2008) which needs "functionalist" approach, by using appropriate tools to teach (Ramirez et al., 2018; Williams, 2014), not as general English only.

The growing higher educational demand of this global language is integrated in every field of study and has triggered innovation and creativity as an English for specific, special, specialized course of HEI, in line with the curriculum features, depends largely on the positive attitude towards learning a foreign language, as well as, the teaching material, i.e. authentic material and methodology applied in classrooms (Ramirez et al., 2018; Wolff, 2003).

When discussing courses taught in English in European area Wolf (2003) stated that

> In Europe, the subject area in which English-taught programmes are most frequently offered is engineering (27%), followed by business and management studies (24%), and the social sciences (21% Specific Purposes (ESP) course in HEIs, or English is offered simultaneously within the specific subject as CLIL, because "Integrated Content and Language Teaching saves time within the overall curriculum. (p.2)

When it comes to engineering filed, English helps the future engineers to be globally wanted due to English speaking skills, followed by other 21st century´s needed skills (Ramirez et al., 2018). According to Crosier and Parveva (2013), there is a protocol for each HEI to optimally retain global teaching experiences including the quality of teaching skills, quality teaching environment, and learning from quality teaching materials. Each of these parameters has a set of specific criteria for further learning about the suitability of specific/professional English vocabulary. Generally, the effectiveness of the ESP is considered as: special, specific, specialized (Williams, 2014). In relation to this, in Kosovar HEIs, English (or German) is offered as a mandatory course in every department. In addition, in engineering faculties in Kosovo, English is offered as an ESP course following the pattern of learner-centered approach, whereas CLIL as an approach is not applicable. In cases when ESP is taught, it focuses "on developing communicative competence in a specific discipline" (William,

2014 p.1) and deals with ´modal affordance concept´ which includes material, physical and environmental modes (Jewitt, 2008). In this context, the English teacher plays a crucial role when he/she is involved in the engineering field, including engineering teaching materials and engineering communicative skills. As such, it is significant to discuss the importance of novice teaching approaches at HEIs, precisely the imperative of English teaching in specific engineering fields and the introduction of the bilingual CLIL, as an approach which is not applied at HEIs in Kosovo.

2. Literature Review

For the reason that language is applied to talk not only about the society and individuals, but also to "talk about talk" (Farzannia & Farnia, 2016), it is the ESP teacher´s role to apply all this ´talk` through ´talk´ in professional courses in a foreign language. As "modal affordance refers to what is possible to express and represent easily" (Jewitt, 2008, p.247), then by itself, ESP easy teaching includes different ESP teacher´s roles, akin the various engineering teacher´s roles (Bojović, 2006; Richards & Rodgers, 2014) as a teacher, a course designer, a researcher, a collaborator and an evaluator, also as "a mediator between the knowledge and the real world" (Ramirez et al., 2018, p.151).

If ESP practitioner is a planner, a designer (Dorney, 1994; Ellis, 2005), then the ESP teacher works hard to act as knower of the content of the material (Ramirez et al., 2018). Moreover, in cases when the teacher, ESP practitioner, has a long experience working with the same teaching content, then this role for knowing the content applies more because the teacher knows how to optimally organize the learning environment.

According to Bojović (2006), the ESP practitioner as collaborator is far more needed and wanted, as the growing need for English in all fields of study has become a necessity of promoting their values, promoting self – learning and collaborative work (Ramirez et al., 2018; Uemura, 2017). Collaborative work and cooperative language learning (Richards & Rodgers, 2014) add the imperative value to the teacher´s role, resulting in a more complexed, yet, useful collaboration between the ESP teacher and the professional teacher, for example the engineering teacher. They learn to know themselves, and "present balanced views in the classroom when facilitating dialogues, and pedagogical relationships that enable the students to learn and to get to know themselves better" (Taysum, 2020, p.31). Precisely, this balance goes for the ESP teachers and the professional teacher, as well as the students.

Books are still considered the main working 'tool' (Dash, 2015; Hurst & Bekteshi, 2018). Naturally, this applies in cases when the ESP practitioner is considered as a course designer and material provider (Bojović, 2006;

Ramirez et al., 2018; Richards & Rodgers, 2014). The ESP teachers need to adapt and modify the teaching materials based on the students´ needs, wishes and lacks as well as, take decisions about changeovers of the teaching/learning materials. Because "teachers are learners who learn about language, methodology, peoples' life" (Scrivener 2011, p.393), then the role of the ESP practitioner is also a researcher (Bojović, 2006; Ramirez et al., 2018; Richards & Rodgers, 2014). The concept of teachers´ 'life-long learning' is a must. The ESP practitioner is capable of conducting various researches (Ramirez et al., 2018) and open up interesting ESP issues for the purpose of teaching and learning enhancement, i.e. be sensitive to both foreign language and learning issues (Taillefer, 2013) which does not include the ESP teacher only. In a nutshell, all the upper named teacher´s roles impact the professional practitioners. If there is an effort to challenge the 21st century´s needs, especially in new classes and develop new teaching approaches at HEIs, then the ESP teacher, the professional practitioner and the students are the factors that allow modification and flexibility within dual focused teaching and learning.

Since all teachers are supposed to be flexible and great listeners, and "learning often involves adopting a specialist language" (Jewitt, 2008, p. 260), in English teaching context, particular issues need to be borne in mind dealing with English teaching flexibility in engineering classes: ESP teaching and Content and Language Integrated Learning (CLIL) which are best described by Williams (2014), and Ardeo (2013). Precisely, Williams (2014) claims that

> The underlying philosophy of teaching (Content and Language Integrated Learning) CLIL is rather different from that of teaching languages for specific purposes insofar as the former is principally concerned with conveying the content of a non-language subject, such as mathematics or history, in a foreign language whereas ESP courses will tend to be taught by teachers of English who have graduated in language studies and have, in most cases, only subsequently acquired a content-based knowledge of, say, medicine, finance or law. (p. 8).

Although CLIL and ESP have similar features, the difference of these two approaches is that CLIL clearly states that "content-learning objectives are more important than language-learning objectives, whereas ESP is language-led and the focus is on language learning" (Ardeo, 2013, p. 29). On the other hand, when discussing about students' special needs and appropriateness of the teaching content, Taillefer (2013) gives a more general definition about the language teachers

Language teachers, in many cultural contexts, and almost regardless of the nature of CLIL implemented in their institution must also be able to move

beyond "traditional" interpretations of their work to understand the role that language and communication play in learning and knowledge construction. (p. 6)

The upper mentioned different teacher´s roles and their importance in the 21st century's needs, trigger the need to involve English at HEIs either as an ESP course, or as CLIL. Or even a blended course, when the institution lacks professional engineering practitioner who is able to speak English and teach the professional engineering course as CLIL. Although many scholars tend to believe that CLIL helps to "improve the students' foreign language competence", Wolf (2003, p. 3) disagrees with other scholars´ claim, as "this is not the intention of CLIL approach, because it is geared towards content learning as much as towards language learning" (Wolf, 2003, p. 3). He (Wolff, 2003), tried to clarify the meaning of CLIL by questioning "the way how language is learnt in a CLIL classroom although teaching/learning does not focus on language?" (Wolff, 2003, p.6)

Taking the role of the teacher, the practitioner and of the researcher (Banegas, 2012; Bojović, 2006; Ramirez et al., 2018), this experimental study was interested in investigating new teaching methodologies in engineering classes when there is no teacher available to apply CLIL, but the students are interested to learn a specific professional course/engineering course in English. To be more precise, if the ESP teacher can teach in the engineering vein by copying the engineering practitioner. The initiation of this study was triggered by Uemura's (2017) experiential study conducted in Japan, allocating the possibility of application of CLIL variations to engineering education by utilizing experiential learning classes (Uemura, 2017). Or, the case initiated in Toulouse, France in 2012-2013, in which the language department could be of service to Toulouse School of Economics (TSE) (Taillefer, 2013), that is professional field, engineering field, in our context.

When discussing CLIL and its variations, Uemura (2017) adapts Ikeda's (2011) variations of CLIL: Soft CLIL, Light CLIL, Partial CLIL, and Bilingual CLIL. Based on the purpose, frequency, ratio and language, these variations can shift to Hard CLIL, Heavy CLIL, Total CLIL and Monolingual CLIL, (Ikeida, 2011, as cited in Uemura, 2017, p. 15). Correspondingly to Uemura's (2017) model, the study was also stimulated by concrete examples of CLIL implementation in French HE for ESP professionals, augmenting research-based effective practice of CLIL models (Taillefer, 2013). "With potential pitfalls in mind, the ESP community can hopefully encourage informed quality enhancement of CLIL in the French context" (Taillefer, 2013, p. 38). Regarding CLIL, Wolff (2003) mentions at least three essential points in the context of CLIL's general definition: 1) CLIL must not simply be regarded as an approach to language teaching and learning but that it is

concerned both with content and language, 2) "within a CLIL framework content and language are learnt in integration, i.e. two subjects are related to each other and dealt with as a whole" Wolff (2003, p. 3), and 3). "in the CLIL classroom language is not taught in the same way as in a traditional classroom – it is focused upon when it is necessary and important for the understanding of a specific aspect of the content subject" Wolff (2003, p.4). Adding the importance of the environment, i.e. classroom, Coe, Aloisi, Higgins& Major, (2014) point out that "sustained professional learning is most likely to result if the environment of professional learning and support is promoted by the school's leadership" Coe et al. (2014, p. 5). Then eventually these new intended methodologies in engineering field may simultaneously ensure learning challenges and adaption to global changes i.e. apply cross-border educational standards (Beutner, 2017) in engineering and English.

Naturally, both courses offered (English and the engineering course) can also be blended, and practice a co-use of both languages, students´ first language (Albanian) and second language (English) to accomplish tasks and understand and convey meaning (Uemura, 2017). Moreover, based on the teaching experience, we may voice that the ESP teachers and professional practitioners can make efforts to become researchers in these kinds of educational spheres of HE. Both parties can challenge the application of the Bilingual CLIL (Uemura, 2017), as a new teaching appropriate approach at HEIs. And when discussing about the teaching materials, the same pattern is followed: the teachers are planners, researchers, material designers who need to adopt new or different pedagogical practices (Taillefer, 2013). This is based on Wolff's idea (2003), who suggests the use of both authentic and textbook materials, i.e. "adapt authentic or other materials to the linguistic level of their students or write their own materials" Wolff (2003, p.5). All for the purpose of preparing the students for their future life perspectives. Additionally, based on Banegas (2012, p. 32) who "intended to be a teacher-researcher facilitating the generation of knowledge for and from the classrooms", this study also intended to incorporate HE teachers in this study by focusing on teaching English to engineering students in an engineering class.

The study followed Uemura's (2017) experimental study, which tried to apply CLIL to undergraduates engineering students, and as such it attempted to answer three particular study questions:

1. To what extend do context-responsive pedagogies of conventional ESP and conventional Technical Drawing course differ from a blended Technical Drawing course taught in native and foreign language i.e. Albanian and English?

2. Do engineering students prefer engineering courses offered in both languages (native/Albanian and foreign/English) or native/Albanian only?
3. Do the students who attend the conventional ESP course perform better than those who attend bilingual CLIL engineering course?

Since teachers and researchers intend to facilitate the engineering generation for and from the classrooms (Banegas, 2012), and based on the upper mentioned facts, this study will seek new ways of teaching. We hope to provide information about the issues of teaching English in higher education in a non-English-speaking country. As such, it aims to find out the effect of the provision of more English in engineering classes, compared to conventional regular classes i.e. the study is interested in investigating students´ reflections about sharing new engineering discoveries and ideas in their classroom in English.

3. Methodology

3.1. Participants

The study targeted engineering students from the Faculty of Mechanical Engineering and Computing at the University of Mitrovica, in Kosovo. The overall number of students who participated in the study was 180*. The data of this study was based on the students' formative assessment test (Taysum, 2020) results from the undergraduates (1st year students), who were attending an English class as a compulsory requirement, and those who were attending German as a compulsory foreign language instead, but who volunteered to attend Technical Drawing with Descriptive Geometry in a bilingual (Albanian and English) class of their 1st year of the three years' program (2018-2021). The students were asked to choose one of the following course categories:

1. Conventional Technical Drawing with Descriptive Geometry course, taught in mother tongue /Albanian –Control Group,
2. Experimental Group -Technical Drawing with Descriptive Geometry course, taught in English and mother tongue /Albanian (paired bilingual teaching).
3. Conventional ESP teaching course – Control Group

*In Kosovar context, the students who enter HE have already had English for ten years. Therefore, it is expected that 1st year engineering students are intermediate or upper intermediate level and have relevant knowledge of general English. The future engineers need to be taught (and are offered) a foreign language for a specific field of study in order to perform the 21st century´s job/professional-related functions.

After the offer, 56 students chose group 1: Conventional ESP teaching course (n=56 students), 2) 68 students chose conventional Technical Drawing with Descriptive Geometry course, taught in mother tongue /Albanian, (n=68 students), and the third group consisted of 56 students. i.e. 3) experimental Technical Drawing with Descriptive Geometry course, taught in English and mother tongue /Albanian, (n=56 students), (see Table 1). In the experimental group the students were also informed that they would be assessed in English and engineering learning outcome.

Table 1

Number of Participants in Each Group, Test Terms and Languages Taught

Nr	Groups	November test/Nr of students	January test/number of students	Final test/number of students	Langages taught
1	Control Group - Technical Drawing with Descriptive Geometry	68	54	58	Albanian
2	Experimental Group - Technical Drawing with Descriptive Geometry and English	56	56	55	Albanian and English
3	Control Group - ESP	56	56	55	English

3.2. Procedures

Since the concept of this study is unique, that is, introducing an engineering course (Technical Drawing with Descriptive Geometry) in two languages at HEIs in Kosovo, it followed others researchers´ procedures on similar studies. Precisely, it followed Taillefer (2013), Uemura (2017), Wolff (2003), and Banegas (2012). Starting with Taillefer's (2013) phases: firstly, both teachers (EL teacher and the engineering teacher) needed to familiarize themselves with literature to link theory to effective practice in this experimental teaching, secondly trust and confidence of both specialists and decision makers (the Faculty Council and the Dean), and finally the preparation for the teaching practice. As the application of the bilingual CLIL /paired CLIL teaching could be addressed objectively by means of a SWOT analysis (strengths, weaknesses, opportunities, threats), the teachers/researchers took into consideration the upper named factors prior to the study.

The procedure of the study was adapted in that way to explain a "situation which involves two differing things in the same context" (Dash, 2015, p. 389). That is, learning a professional course by being exposed to English at the same time i.e. the implementation of bilingual CLIL (Uemura, 2017). In addition to the teaching context, the focus was kept clearly on improving student outcomes (Coe et al., 2014), in both fields: engineering

knowledge and English communication i.e. "will generate high – impact results" (Ramirez et al., 2018, p. 152). Furthermore, taking into consideration professional and linguistic demands of the future engineers, this study was based on Uemura's (2017) study, who posed three essential ideas:

1. implementing light CLIL following and followed by the associated lecture utilizing the mother tongue,
2. relating the small experiment using realia to the resulting phenomenon described in graphs, and
3. gradual removal of linguistic and cognitive support in the sequence of the tasks (Uemura, 2017, p.13-14).

Uemura´s (2017) essential ideas were all implemented in 15 weeks´ teaching (in scheduled weekly 90-minute lessons). Additionally, the study followed Wolff's (2003) typical methodological features of CLIL, what learners and teachers did in a CLIL classroom, i.e. all the students, participants of the study and future engineers "read academic texts, made notes about their content, presented the results of their reading processes and listened to both teacher or other students presenting their results" (Wolff, 2003, p. 6) throughout the semester. In our case, both languages (native Albanian and foreign language, English) were the medium of instruction.

Bearing in mind the challenges faced by the students, this study comprised of twofold objectives: it focused in particular on English teaching and an engineering course -Technical Drawing with Descriptive Geometry. Following Banegas' (2012) opinion about teachers and researchers who "start to mean a concept", it was sought to analyze English language and its engineering professional creativity demonstrated by the students, future engineers. The study examined how these students experienced learning creativity of English teaching bidirectionally with the engineering practitioner throughout the semester, 90 minutes each week. And what professional language creativity could be achieved from a qualitative teaching perspective, when the integration of English is used to explain professional vocabulary. It is twofold learning: CLIL is content related and is taught in English by the professional practitioner but in this experimental study, the content was taught by both teachers-bilingually.

The analysis was carried out in all three groups in the academic year 2018/2019 in three conventional test terms based on the curriculum: week 8, week 14, and the final exam at the end of the semester. Besides the two courses, the experimental group/course also followed this schemata´s test schedule (see Table 1). The test about English learning in this experimental group used the same frame as the tests in the regular ESP course, except that this group´s test included specific engineering vocabulary. i.e. the layout of

the experimental group was similar to the conventional ESP class, however, vocabulary/instructions differed.

3.3. Data Analysis

The data from three different results (i.e. November Test -Test in week 8 test, January Test– Test in week 14, and the results of the final test at the end of the semester) were analyzed. These data were collected in order to answer the upper mentioned study questions, and were analyzed by applying SPSS statistical package, namely Mean and Standard Deviation. Additionally, for the sake of more reliable data, another university teacher, advised us on the teaching techniques, methods and approaches to use during the paired teaching classes in 15 weeks´ teaching course. This paired teaching in bilingual class included sharing of responsibilities, i.e. preparation of the material content, instruction, and classroom management. She (the third teacher) also took part in preparing the tests based on the syllabuses and topics taught, and helped in checking up the English tests. In general, our teaching included experimental teaching in engineering classes" by locating the analysis of classroom talk (and instruction) in the broader context" (Jewitt, 2008, p. 247), in our perspective, it was broader engineering context in English.

4. Results and Discussion

4.1. Results

The detailed results of this study are presented in the following tables (Table 2, Table 3, Table 4, Table 5, Table 6, and Table 7). These tables provide a description of students` achievement (test results), i.e. the distinction between each term, and the distinction between the Control groups and the experimental group.

As the tables show (Table 2 and Table 3), test results in November, i.e. week 8 of the semester, in all three groups are somehow similar. Naturally, it is the students´ first test in these courses and the tests cover the beginning parts of the courses taught.

Following the HEI´s syllabuses in Kosovo, and as commented above, week 8 is usually a test week. Table 2 and Table 3 show the test results in all three groups during the test week: The Control Group in English (as ESP class), the Control Group with students who attended regular Technical Drawing with Descriptive Geometry with the engineering teacher, and the experimental group - Technical Drawing with Descriptive Geometry founded by the students who agreed to attend Experimental Group - Technical Drawing with Descriptive Geometry in both languages: Albanian and English with both teachers. As shown in Table 2, dealing with English language learning, the results reveal higher test results. Surprisingly, the students of the

Experimental Group - Technical Drawing with Descriptive Geometry have shown distinctive higher results (*M*=7.3) comparing to the Control Group-Technical Drawing with Descriptive Geometry in Test 1 (*M*=6.9), in Table 3, akin the English tests results in both groups (Table 2). Furthermore, the large number of students (*N*=56) who volunteered to attend this course taught in two languages respond to the second study question that students prefer to be taught bilingually.

Table 2

November Test 1 Results in English

	N	Min	Max	Mean	Std. Deviation
Control Group - English Test 1	68	5	10	7.1324	1.66531
Experimental Group - English Test 1 for Technical Drawing with Descriptive Geometry	56	5	10	8.1071	1.70218

Table 3

November Test 1 Results in Technical Drawing

	N	Min	Max	Mean
Control Group - Technical Drawing with Descriptive Geometry Test 1	51	5	10	6.913
Experimental Group - Technical Drawing with Descriptive Geometry Test 1	56	5	10	7.322

Table 4

January Test 2 results in English

	N	Minimum	Maximum	Mean	Std. Deviation
Control Group - English Test 2	54	5	10	7.4259	1.60896
Experimental Group - English Test 2 for Technical Drawing with Descriptive Geometry	56	5	10	7.6786	1.63047

Tables 4 and 5 show that there is a distinction between all test results conducted in January. The Experimental Group shows better results

comparing to both Control Groups, the ESP Group and the Technical Drawing with Descriptive Geometry.

Table 5

January Test 2 Results in Technical Drawing

	N	Min	Max	Mean	Std. Deviation
Control Group - Technical Drawing with Descriptive Geometry Test 2	54	5	10	7.537	1.56269
Experimental Group - Technical Drawing with Descriptive Geometry Test 2	56	5	10	8.5179	1.71614

The results from Table 4 and Table 5 clearly show that frequent English in Technical Drawing with Descriptive Geometry allows greater understanding in both fields. Test 1 in the ESP Control Group shows M = 7.43, whereas in the Experimental Group M = 7.7. Akin the Control group with students who were taught in Albanian in Technical Drawing with Descriptive Geometry M = 7.53, while the Experimental Group - Technical Drawing with Descriptive Geometry who were taught in both languages Albanian and English, the results show M = 8.5. This reveals that this bilingual class enables the students to connect what they are learning and demonstrate it practically in Technical Drawing via English. These results clarify the students´ need for more knowledge that constitutes multifaceted roles.

Table 6

Final Test Results in English

	N	Min	Max	Mean	Std. Deviation
Control Group - English Final Test	68	5	10	7.6471	1.4534
Experimental Group - English Final Test for Technical Drawing with Descriptive Geometry	55	5	10	7.9545	1.54642

In general, all tables (Table 2, table 3, Table 4, Table 5, Table 6, Table 7) show comparative analysis of the findings obtained from all test results from the three groups bidirectionally. The findings point to slightly different positive results regarding the experimental Group, (taught in English and Albanian).

Table 7

Final Test Results in Technical Drawing

	N	Min	Max	Mean	Std. Deviation
Control Group - Technical Drawing with Descriptive Geometry Final Test	68	5	10	7.6765	1.61561
Experimental Group - Technical Drawing with Descriptive Geometry Final Test	55	5.5	10	8.2273	1.56589

Results point to better L2 achievements with English teaching in the engineering course. This higher ranking might suggest greater language confidence and the use of more professional communication and more accessible FL. Test 1 and Test 2 results of all three groups, also respond to the first study question: the results show positive learning outcomes and there is straightforward positive outcome in the final test, as well. Wherein the findings of the final test results (Table 6 and Table 7), prove that experimental group's test results increased almost linearly in time. As the test results within 15 weeks' time frame have gone upward, it is conveyed that paired teaching in engineering classes when EFL is applied (by the ESP teacher), is a combination of several productive procedures that switch native speaking (Albanian) into foreign language -professional English. The findings show higher marks in the experimental group, which is in line with Wolff´s (2003) opinion about CLIL who is "not able to fully explain why learners in a CLIL classroom learn language, and especially why they learn language better than in an ordinary classroom" Wolff (2003, p. 8).

The results of the experimental group, in tables: Table 6 and Table 7, i.e. Technical Drawing with Descriptive Geometry taught in two languages, show positive outcomes when dealing with what was taught and how it was taught throughout the semester. The study reported on students' regular assessment tests in English as ESP, and on the demonstration of future engineers´ creativity in Technical Drawing with Descriptive Geometry when taught in two languages (native and English). The context-responsive pedagogies applied within the experimental group seem to have impact on learning outcomes on both fields: English and engineering.

The results of this experimental study, shown in tables above, respond to the last study question: the ESP source book has slightly failed to keep up the language development in regular engineering ESP classes, compared to the paired teaching classes conducted with the Experimental Group in Technical Drawing with Descriptive Geometry.

Based on the "modal affordance concept" which includes material, physical, and environmental modes (Jewitt, 2008), the findings reveal that the integrated teaching materials modes include a new course taught in a bilingual class, i.e. mix of English and the native (Albanian) language (engineering material presented in a foreign Language-English). Additionally, this engineering experimental learning is also based on the samples of materials developed by collaboration of teachers of the specific field (Uemura, 2017). As such it links the second" modal affordance concept": physical mode: collaborative partnership between HEI teachers, sharing common aims (Banegas, 2012), and the third concept: environmental mode- working in the same classroom environment. The findings retrieved from the tests, proceed Wolff ´s (2003) essential points of CLIL´s general definition. It is obvious that in such classes CLIL is not simply regarded as an approach to language teaching and learning but that it is concerned both with content and language, CLIL integrates two subjects as a whole, and in this experimental study bilingual classroom language is not taught in the same way as in a traditional classroom. On the whole, Uemura's (2017) concept of "The 4Cs framework" is evident within the findings: culture, content, communication, and cognition: There is a positive attitude towards language learning. We may conclude that it is because of the content of the teaching materials which are developed in collaboration with the ESP teacher and the engineering practitioner. It is clear that there is communication, since it is a drawing course and instructions are part of the course therefore cognition of both fields is needed.

4.2. Discussion

The collection of data ended in February 2020 and the findings for each question posed are as follow:

> **Study Question 1**. To what extend do context-responsive pedagogies of conventional ESP and conventional Technical Drawing course differ from a blended Technical Drawing course taught in native and foreign language i.e. Albanian and English?

Based on the results of all three groups, it is shown that there is a slight distinction of positive learning outcomes within the experimental group which have increased linearly in time. The test results within the semester i.e.15 weeks' time frame have gone upward. Definitely, these findings of the experimental group support Wolff's (2003, p. 8) opinion about CLIL who is "not able to fully explain why learners in a CLIL classroom learn language, and especially why they learn language better than in an ordinary classroom".

> **Study Question 2.** Do engineering students prefer engineering courses offered in both languages (native/Albanian and foreign/English), or native/Albanian only?

The large number of students (*N*=56) who volunteered to attend this experimental course taught in two languages (native Albanian and foreign/English), respond to the second study question that students prefer to be taught bilingually. However, 68 students (*N*=68) who chose the engineering course to be taught in their native language only, shows that there is some doubt about the burden of learning upon students, if the course is taught bilingually.

> **Study Question 3**. Do the students who attend the conventional ESP course perform better than those who attend bilingual CLIL engineering course?

Based on the students´ tests in week 8, week 14 and the final test which was conducted at the end of the semester, which are also shown in tables (Table2, Table 4, and Table 6), the results show that there is a slight difference among these groups. The control group, i.e. taught in the conventional ESP course is somehow left behind comparing to the bilingual CLIL engineering course. These responses only confirm that students like multitasking: learning a language and engineering. Though, the conventional ESP course is also optimistically viewed.

The findings indicate that this team (paired) teaching approach relates to 'back-to-basics' approach (Hurst & Bekteshi, 2018), relying on the relationships and interaction established between both teachers and the engineering students (Taillefer, 2013; Uemura, 2017). The findings from the ESP group do not deny the fact that ESP teaching does provide insights into professional engineering vocabulary. However, it is more perceived in collaboration with the experienced professional practitioner of Technical Drawing with Descriptive Geometry, the course taught as bilingual CLIL. This is also supported by Williams (2014, p.5), who agrees that "linguists contribute to language development that would probably go unnoticed even by experienced professional practitioners". This reciprocal teacher-teacher-student involvement leads to successful course execution, as the topics are conveyed through the sequence of the lesson design and plenty of examples (Dash, 2015; Ramirez et al., 2018; Uemura, 2017), with the application of lecture-cum methods. It is also supported by Taillefer (2013 p.11), who mentions, "the impetus for pedagogical and didactic reflection can only come from Lansad professionals, particularly in ESP, who understand both the "virtuous" and "vicious" challenges of CLIL, and who are willing and able to act as advocates". The findings reveal that the content of engineering CLIL classroom is more significant than the content of the traditional classroom, which is also supported by Wolff (2003).

Apart from the twofold students' engagement to learn English and the professional course, the results also reveal that future engineers and teachers

are stimulated and motivated to learn. Since "the concept of modal affordance refers to what is possible to express and represent easily" (Jawitt, 2008, p. 247), this study reveals that paired teaching in engineering classes, with professional practitioner and the English teacher, is beneficial for all three parties. The student's L2 language results show improvements akin the engineering course Technical Drawing with Descriptive Geometry. In a brief utterance, this kind of paired teaching refers to the aspects of technical vocabulary and structure which goes beyond the subject matter as it promotes collaboration of the students, language usage, cognition, communication of new ideas, and the academic discourse i.e. engineering students internalize the language, and involving engineering elements (Ramirez et al., 2018; Taillefer, 2013; Uemura, 2017). Additionally, comparison with groups of effective teaching practice and the exam results presented in the tables clearly work in bilingual CLIL favor.

Based on the results, the findings highlight creative engineering communicative skills and positive attitudes of future engineers underlying successful professional learning and the types of creative professional English applied in Technical Drawing with Descriptive Geometry classes. They also suggest that students´ creativity manifests best by fostering the application of various group work activities and directing their task developments by integrating English. i.e. both courses: Technical Drawing with Descriptive Geometry and English apply modern teaching approaches, let if these two courses are combined. The findings also support Uemura´s (2017, p.13-14) consideration of professional and linguistic demands of the future engineers, "the ideas of implementing CLIL following and followed by the associated lecture utilizing the mother tongue, relating the small experiment using realia to the resulting phenomenon described in graphs" (in our case it was Technical Drawing instructions in bilingual classes) "and gradual removal of linguistic and cognitive support in the sequence of the tasks". As seen from the tables, the experimental group test results were higher.

Nevertheless, this teaching approach nurtures the future engineers to become talented in both their engineering and English abilities needed in industries and companies of the 21st century (Spence & Liu, 2013; Ramirez et al., 2018). This kind of paired teaching can draw on both teachers´ available modal resources, in our case English language and professional engineering field, Technical Drawing with Descriptive Geometry course to make meaning in this specific context (Jewitt, 2008), i.e. to understand this field´s specific English vocabulary, and discus by using this specific vocabulary in engineering, supported also by Uemura (2017). Precisely, the study has trumpeted the core elements of great teaching (Coe et al., 2014) explained as: 1. Pedagogical content knowledge - in this case ESP and

professional course are blended in one; 2. Quality of instructions-responsibility sharing; 3. Classroom climate-paired teaching and dual language; 4. Classroom management, understanding, patience, collaboration; 5. Teacher beliefs, the students gain more; 6. Professional behaviors-experienced teachers are strongly interconnected with teacher´s roles.

5. Conclusion and Implications

From the findings of this study, it can be concluded that learning English at HEIs via engineering courses is wanted. Based on William´s (2014) "inside knowledge",we may conclude that the inside engineering knowledge can come from both,the professional/engineering practitioners operating in engineering field, and by the English teacher, who introduces this engineering course in English. Moreover, the results reveal that this professional/engineering knowledge is enhanced with the help of the English teacher.

"The more languages our students know in their professional field the better they will be qualified for their profession" (Wolf, 2003, p.12). As such, this experimental one-semester study has provoked more questions, rather than providing distinctive answers to our study. However, the findings provoked much collaboration among engineering students who want to have classes in English and it has also provoked more investigation on teaching engineering topics based on the HEI´s program. It provides justifications why team/paired teaching merits a particular place at HEIs, particularly including English in engineering courses.

If CLIL cannot be applied, collaborative partnership between the professional engineering practitioner and the ESP teacher can promote and effect the changes in teaching and learning engineering at HEIs. Preliminary, future engineers´ awareness – rising is on the English teaching role and its function among these future engineers. When considering English learning at HEIs, the study fully supports the idea that professional practitioners are the key factors of the students´ professional development. However English is a ´must´ and this kind of bilingual CLIL organizing includes many factors, therefore, this study recommends: Encouraging English teachers/ESP teachers and professional practitioners to explore professional literature and to make the connection between teachers, the teaching/learning material and students (Banegas, 2012; Uemura, 2017), the adaptation of teaching the engineering course to fit Uemura's (2017) "The 4Cs framework": English and engineering cognition, communication, culture to learn by applying bilingual CLIL and content-supplementary teaching materials modified in both languages, i.e. the utilization of appropriately applicable authentic topics and materials.

This kind of English language teaching provision seems to encourage engineering students to improve and enrich their English. In addition, as this study involved teachers and researchers in the teaching process i.e. who have tried to facilitate the Kosovar engineering generation, as pointed out by Banegas (2012) to learn for and from the classrooms. In this respect, we may also conclude that this kind of paired teaching has definitely reinforced both teachers´ professional vocabularies (English for the engineering teacher and professional engineering Albanian vocabulary for the ESP teacher) by instructing each other, and other students. This is also supported by Uemura (2017) who highlights flexibility allowed by CLIL, that is bilingual application of engineering. As Coe *et al*. (2014, p. 5) point out, "sustained professional learning is most likely to result if the environment of professional learning and support is promoted by the school's leadership", then we may also conclude that this is applicable in our context: it is supported by the institution, by the teachers, and by the students.

In addition to the upper named positive occurrences of the study, we may add few limitations. Although SWOT analysis (Taillefer, 2013), i.e. strengths, weaknesses, opportunities, threats were taken into consideration prior to conducting the study, unforeseen difficulties emerged. Large number of students in classes (Table 1) and timing were evident limitations. Sharing responsibility was taken seriously by the teachers/researchers, which also took a lot of time to prepare the teaching material and to discuss about the next lesson. Both of us (teachers/researchers) seemed not to have autonomy as we were co-teachers and were restricted to full autonomy in class, although collaboration in and out of the classroom was more than evident.

The imperative need of English in every field of study seeks innovative teaching approaches. This kind of teaching, as presented in the study, can be applicable in every HEI if there is the preference of implementing English teaching in specific field of study, and if a teacher who can offer CLIL is not available. Furthermore, the study recommends the application of CLIL, as an appropriate teaching and learning approach at HEIs. It is considered as the potential benefit of future engineers who are eager to learn in parallel way: their field of study and professional English.

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