Autonomous and Collaborative e-Learning in English for Specific Purposes

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Abstract. The paper deals with the process of acquiring professional vocabulary and grammar in English for Specific Purposes (ESP) in pre-service teacher preparation. The main objective of the research was to (1) discover how much students learn in the ICT-enhanced process of instruction, where autonomous work and collaborative learning are applied so that to build preconcepts and reconstruct misconceptions in ESP; (2) detect the sources students exploited towards acquiring the learning content. The research was conducted at the Faculty of Education, University of Jan Evangelista Purkyne, Usti nad Labem, Czech Republic. Research sample consists of 62 probands enrolled in bachelor and master study programmes English Language and Literature and Teaching English Language and Literature. The research process is structured into three phases, and didactic tests are applied after each of them. Moreover, types of sources students used for acquiring the learning content were monitored and analyzed. Six hypotheses were tested and results showed statistically significant increase in knowledge after each phase.

Keywords: Higher Education, ESP, English for Specific Purposes, English Grammar, Professional Vocabulary, e-Learning, Pre-service Teacher.

1 Introduction

Fast technical and technological development produces outcomes which accelerate changes in sustainable societies. All fields of life are impacted, including education. Teaching and learning methods, roles of teachers and learners, competencies required from them, educational environment and other factors are continuously under the process of development. Since their very beginning, information and communication technologies (ICT) have been contributing to this process. They provide tremendous opportunities for revising current approaches and practices in the field of education and implementing appropriate methodologies in the teacher education, i.e. both in the pre-service teacher preparation and in-service teacher training, which consequently changes ways how learners acquire new knowledge.

In the Czech Republic, the master degree in pedagogy and one subject as minimum is required from teachers at all school levels. Moreover, as the role of English language as lingua franca is more and more important in the current globalized world, teaching English as a foreign language has a key role in education. And, to acquire

English for Specific Purposes, i.e. the language of profession, is highly required. In compliance with these demands, the pre-service teacher preparation needs to be efficient both in the field of methodology and English language. Considering these requirements, autonomous and collaborative learning (instead of others) can be applied to reach this objective, and ICT have the potential to enhance the process.

Reflecting the above mentioned, the main objective of this article is to present, analyze and discuss results of research focused on acquiring English professional vocabulary and grammar within English for Specific Purposes (ESP) with pre-service teachers at the Faculty of Education (FE), University of Jan Evangelista Purkyne (UJEP), Usti nad Labem, Czech Republic.

2 Theoretical Background

The process of acquiring English professional vocabulary and grammar within English for Specific Purposes (ESP) with pre-service teachers applies autonomous work, collaborative learning, ICT support towards *building preconcepts and re-constructing misconceptions.*

Before the research started, all participants reached a similar level of general English knowledge and hardly any experience in ESP. As stated by Comenius in the 17th century [1], the chance of remembering information which comes to the brain is much higher, if it is subjectively considered important and emotionally supported by the learner, if it is sensed by more than one sense at the same time, if it is associated with anything known before, as well as discovered by the learners themselves. As continuously adjusted to the newly developed knowledge and learner´s experience, the more frequently the information is recalled, the more it differs from the primary preconcept [2]. Learner´s memory can be improved by exploiting efficient learning strategies which reflect individual strengths and arrange the information to be acquired in appropriate order [3]. Moreover, other factors may impact the process of learning, e.g. stressful environment, learner´s tiredness, boredom – extremely high levels decrease learner´s quality of remembering, whereas mild levels support this process [4]; feelings of success and/or failure [5]; personal goals, and also the quality of sleep, when each information in memory network is predisposed to interfere, and the key consolidation comes when sleeping [6].

Irrespective the previous length of institutional education, learners´ preconcepts may not be correct. However, learners consider them valid until enough evidence is collected to change their understanding. This phase may take a long period, in some cases till the adult age [7]. The exploitation of mixed-method approach (autonomous work, collaborative learning, ICT support application and others) in the pre-service teacher preparation is expected to assist the di10dactic modification of preconcepts and misconceptions which were developed within learner´s previous studies of English language.

The benefit of working together is fairly obvious and *collaborative learning* approach works to provide students opportunities to engage with each other in thoughtful learning through peer interaction. This strategy addresses both the professional

and social skills simultaneously. It is reported to be highly successful because of its need for interdependence in all levels, providing students with the tools to effectively learn from each other. And, it is a team approach where the success of the group depends on activities in which students team together to explore a significant question as well as upon everyone pulling his or her weight. Collaborative learning can be synonymous with social constructivism where collaboration leads to co-constructing new knowledge and meaning [8].

Learner´s *autonomous work* is part of the process of autonomous, also called self-directed, learning. This is defined as an approach, in which individuals take responsibility for their learning; constructivist approach is applied in which students actively participate in the process of understanding within the learning context; learners focus on and control of learning rather than a teacher, and they also regulate and control their own learning activities [9]. In other words, it is the learner who takes responsibility for his/her own learning, sets goals, chooses language learning strategies, monitors progress, and evaluates his/her successful acquisition.

Generally, *information and communication technologies* (ICT) work as a supportive tool in all learner´s activities, including the search for sources (study materials), as applied in this research.

To sum up, the main contribution of the research is that the autonomous work and collaborative learning supported by ICT are exploited simultaneously within learning ESP. Similar, but not identical approaches were applied by e.g. Huang et al. [10] who researched the autonomy in English language teaching of novice secondary school teachers, by Zao [11] who focused on the ability of autonomous learning with college students, or Chen and Yu [12] who conducted a longitudinal case study of changes in students attitudes and participation in collaborative learning.

3 Methodology

3.1 Research Objective

The main objective was to (1) discover how much students learn in the ICT-enhanced process of instruction which includes autonomous work and collaborative learning towards building preconcepts and re-constructing misconceptions in ESP, particularly in acquiring professional vocabulary and grammar; (2) detect the sources students exploited towards acquiring the learning content.

3.2 Research Sample

Totally 62 probands participated in the research. They all were enrolled in study programmes of English and literature, and teaching English and literature. Nearly half of them (29) were males (46 %), the age of 40 students (65 %) was in the range of 19 – 23 years, the age of 22 students (35 %) was in the range of 24 – 36 years. Their level of general English was defined by the results of entrance exam as B2 of Common European Framework of Reference for Languages (CEFR) level as minimum [13]. Within CEFR, six levels are distinguished: Basic user: A1 (breakthrough, or beginner), A2 (waystage, or elementary); Independent user: B1 (threshold, or inter-

mediate), B2 (wantage, or upper intermediate); Proficient user: C1 (effective operational proficiency, or advanced), C2 (mastery, or proficiency).

At the Faculty of Education (FE), University of Jan Evangelista Purkyne (UJEP), Usti nad Labem, Czech Republic, the amount of applicants exceeds the amount of those who can enroll the above mentioned study programmes. Therefore, the process of entrance exams is very competitive and only the best applicants succeed, reaching the B2 level as minimum. English general vocabulary and grammar are developed through all subjects, as they all are taught in English. Moreover, students attend six courses of Practical Language (PL) during the bachelor study programme, where all language skills are under the focus and particularly direct communication activities are conducted. During the semester (14 weeks long) students attend two face-to-face lessons per week (45 minutes each). So that to support the level of professional language (ESP), professional vocabulary and grammar from the field of linguistics and literature are acquired. Students also have online courses for each subject available in the LMS Moodle providing them with additional materials for reading, practising and testing their knowledge through autonomous learning. For the bachelor the exam the C1 level of CEFR is required.

3.3 Research Process, Methods and Tools

Reflecting their previous experience in learning English, participants had their preconcepts built for general English whereas their knowledge of ESP (i.e. professional vocabulary, grammar, professional stylistics etc.) was being developed step-by-step since the beginning of their bachelor studies. So as to avoid forming misconceptions, authentic sources are exploited as study materials to help construct their knowledge in the ESP field as well. As the theory of constructivism claims knowledge (preconcept) is not passively accepted but actively built in the process of cognition [14] and learning activities intentionally change learners´ preconcepts and correct potential misconceptions [7]. Therefore, in this research, students´task was to actively search for the sources (professional texts) through autonomous work; however, they could collaborate/cooperate during this process, and ICT were expected to support students´activities.

The research process was structured into three phases.

Within the first phase, when *learners preconcepts were monitored*, when the pretest was administered on the first face-to-face lesson of PL before the process of acquiring new learning content started. Students received a list of 44 grammar phenomena in the electronic form. They were to write a simple sentence containing each phenomenon in appropriate context. The choice of grammar phenomena reflected the required starting level of English knowledge at the beginning of the first year of university study which is B2 of CEFR. The terminology of phenomena was both in English and Czech language. Reflecting the minimum required starting level of English knowledge for the students in the research sample, the phenomena were divided in two groups which followed the CEFR requirements for A2 (elementary level) and B1 (intermediate level) groups:

On A2 level, 20 phenomena were listed (G1-20): Irregular Noun in plural; Uncountable Noun; Comparative or Superlative form of Adverb; Present Simple tense; Present Continuous; Past Simple Past Continuous; Future action expressed by Will, Going to, Present Continuous; Present Perfect Simple; Present Perfect Continuous; Past Perfect; Past Perfect Continuous; Modal verbs; There is/There are; Would rather; Had better.

On B1 level, other 24 phenomena were included (G21-44): three types of Conditional sentences; Future Perfect Simple; Future Perfect Continuous; Wish clauses for the Present and Past; expressing the Purpose; Time clause for future actions; Relative clause; word order in Indirect speech; Sequence of tenses; Subject with Infinitive structure; Object with Infinitive structure; Modal verb with Past Infinitive; Gerund or Infinitive form; Have Something Done structure; Used to with Infinitive; Used to with -ing form; Make/Do sentences; Who/What question; Question tags; So am I/Neither am I. Time for completing the appropriate sentences was 70 minutes. After the lesson, the list was submitted to the Learning Management System (LMS) Moodle. Each sentence was assessed by the teacher (one point per correct sentence; maximum test score was 20 points for G1-20 part, and 24 points for G21-44 part). These results are called the pretest scores further on.

Within the second phase, after receiving teacher´s feedback on pretest results towards *rebuilding misconceptions*, autonomous learning was applied: students searched for, found, and read sources (professional texts) relating to their field of study and work, i.e. professional books, articles in journals, manuals, novels, stories etc. Based on student´s decision and equipment, the search for sources could be supported by latest technologies and devices. The reading focused on the 44 listed grammar phenomena, and when one was found, the whole sentence containing the appropriate grammar phenomenon and professional vocabulary was added to the list, including the reference to the source. So as to create as good as possible list of sentences, students were allowed (or even encouraged) to use both printed and e-sources for reading and to exploit various learning aids, e.g. a presentation created by the teacher which provided the summary with comments on all required grammar phenomena and few samples, any grammar book or student´s book with exercises and the key, web pages relating to learning English, printed and e-dictionaries etc. Moreover, students were allowed (and encouraged) to conduct discussions, both in the LMS or on social networks, to consider the appropriateness (in/correctness) of single sentences, to share sources and methods of searching for single phenomena. Thus the misconceptions could have been corrected (re-constructed) and new concepts built.

The total time for completing the list was six weeks; then, it was submitted through the LMS and assessed by the teacher as post-test1. Identically to the pretest, one point per correct sentence was scored (maximum score was 20, resp. 24 points). The teacher provided feedback to each student – correct and incorrect sentences were distinguished and links to study materials with further explanations were provided to the student. As the amount of sentences was high, the feedback was sent within two weeks, one month before the end of semester as minimum. Advanced students completed the list of sentences in the time shorter than six weeks, so the "first come first served" principle in providing the feedback was applied by the teacher. Then, stu-

dent´s task was to study the feedback and continue the process of acquiring the grammar; and if needed, to contact the teacher for further support. As the online courses in LMSs were available through computers, notebooks, smartphones and other mobile devices, the blended learning approach was applied combining face-to-face lessons and autonomous work supported by latest devices and technologies.

W*ithin the third phase,* after autonomous learning and receiving teacher´s feedback on post-test1 results towards *rebuilding misconceptions*, student´s final knowledge was tested at the end of semester in the form of face-to-face post-test2. The task was to write simple sentences using professional vocabulary and showing each grammar phenomenon in the context. This task was rather difficult because not only the knowledge of grammar phenomena, their structure and spelling, but also the context and professional vocabulary were required. No didactic aids were allowed during the testing. Identically to the pretest and post-test1, one point per correct sample was scored (maximum score was 20, resp. 24 points). This result is called the post-test2 score [15].

3.4 Hypotheses

Reflecting the above described theory, research process and objective, six hypotheses were set, considering the learning content in three categories: G1-44, G1-20, G21-44:

H1: A statistical significant difference between pretest and post-test1 scores in the category of grammar phenomena G1-44 exists.

H2: A statistical significant difference between pretest and post-test1 scores in the category of grammar phenomena G1-20 exists.

H3: A statistical significant difference between pretest and post-test1 scores in the category of grammar phenomena G21-44 exists.

H4: A statistical significant difference between post-test1 and posttest2 scores in the category of grammar phenomena G1-44 exists.

H5: A statistical significant difference between post-test1 and posttest2 scores in the category of grammar phenomena G1-20 exists.

H6: A statistical significant difference between post-test1 and posttest2 scores in the category of grammar phenomena G21-44 exists.

4   Results

Totally, 2,728 sentences should have been provided, however, four sentences were missing. In fact, 2,724 sentences were submitted. Data were structured according to the tests they were collected from, i.e. pretest, post-test1 and post-test2, and the categories, i.e. G1-44 (all phenomena), G1-20 (A2 level according to CEFR) and G21-44 (B1 level according to CEFR) phenomena. The Wilcoxon Signed Rank test was applied to calculate the paired differences between the tests; Z-values were exploited to verify/falsify each hypothesis on significance level $\alpha = 0.05$. Results are structured into two parts: (1) descriptive statistics and (2) testing hypotheses.

4.1 Descriptive Statistics

Results of descriptive statistics are displayed in Table 1. They present the values of total amount of respondents (N), Mean, Standard Deviation (SD), Minimum and Maximum score, Score range, Median, Mode and results of two tests of normality data distribution (Shapiro-Wilk W test and Kolmogorov-Smirnov test).

As clearly seen mainly from the Mean values, the increase in test scores was detected in all three categories of grammar phenomena (G1-44, G1-20, G21-44) when comparing pretest to posttest1 scores as well as posttest1 to posttest2 scores.

Table 1. Descriptive statistics G1-44, G1-20, G21-44.

	G1-44			G1-20			G21-44		
	Pretest	Post1	Post2	Pretest	Post1	Post2	Pretest	Post1	Post2
N	62	62	62	62	62	62	62	62	62
Mean	29.34	35.60	36.14	14.66	18.06	18.24	11.03	16.11	16.75
SD	8.5496	6.5352	8.8352	3.7326	2.3738	2.2881	6.0434	5.0085	4.5075
Min	4	18	7	6	6	6	2	5	7
Max	42	44	43	20	20	20	22	23	23
Range	38	26	36	14	14	14	20	18	16
Median	32	37	31	15	19	19	11	17	18
Mode	-	37	30	15	19	19	3	22	18
Shap.-Wilk.	0.9203 (R)	0.9287 (R)	0.9445 (R)	0.9340 (R)	0.7208 (R)	0.6770 (R)	0.9331 (R)	0.9440 (R)	0.937 (R)
Kolm.-Smir.	0.1699 (R)	0.1581 (R)	0.1162 (R)	0.1054 (CNR)	0.2661 (R)	0.2749 (R)	0.1361 (R)	0.1145 (R)	0.1246 (R)

Shap.-Wilk.: Shapiro-Wilk W test; Kolm.-Smir.: Kolmogorov-Smirnov test; R: Reject normality; CNR: Cannot reject normality; (Source: own)

4.2 Testing Hypotheses

Hypotheses were tested in two steps: (1) the results of hypotheses H1, H2 and H3 comparing the differences between pretest and post-test1 scores are presented; (2) the results of hypotheses H4, H5 and H6 considering the differences between post-test2 and post-test2 scores are displayed.

Grammar phenomena G1-44. First, the paired difference for pretest score and post-test1 score was calculated for grammar phenomena G1-44 by Wilcoxon Signed Rank test. Reaching the Z-value = 6.7541, the hypothesis *H1 was verified* (α = 0.05; probability level = 0.000000). This result means that statistically significant difference was discovered between the pretest and post-test1 scores.

Second, the paired difference for post-test1 and post-test2 score was calculated for grammar phenomena G1-44 by Wilcoxon Signed Rank test. Reaching the Z-value = 3.8248, the hypothesis *H4 was verified* (α = 0.05; probability level = 0.000131). This

result means that statistically significant difference was discovered between the post-test1 and post-test2 scores.

Grammar phenomena G1-20. First, the paired difference for pretest score and post-test1 score was calculated for grammar phenomena G1-20 by Wilcoxon Signed Rank test. Reaching the Z-value = 6.6667, the hypothesis *H2 was verified* (α = 0.05; probability level = 0.000000). This result means that statistically significant difference was discovered between the pretest and post-test1 scores.

Second, the paired difference for post-test1 and post-test2 score for the FE group was calculated for grammar phenomena G1-20 by Wilcoxon Signed Rank test. Reaching the Z-value = 2.6381, the hypothesis H5 *was verified* (α = 0.05; probability level = 0.008337). This result means that statistically significant difference was discovered between the post-test1 and post-test2 scores.

Grammar phenomena G21-44. First, the paired difference for pretest score and post-test1 score was calculated for grammar phenomena G21-44 by Wilcoxon Signed Rank test. Reaching the Z-value = 6.2706, the hypothesis *H3 was verified* (α = 0.05; probability level = 0.000000). This result means that statistically significant difference was discovered between the pretest and post-test1 scores.

Second, the paired difference for post-test1 score and post-test2 score was calculated for grammar phenomena G21-44 by Wilcoxon Signed Rank test. Reaching the Z-value = 3.7282, the hypothesis *H6 was verified* (α = 0.05; probability level = 0.000193). This result means that statistically significant difference was discovered between the post-test1 and post-test2 scores. Z-values and p-values are displayed in Table 2.

Table 2. Z-values and p-values. (Source: own).

	G1-44		G1-20		G21-44	
	Dif.	Dif.	Dif.	Dif.	Dif.	Dif.
	pre-post1	post1-post2	pre-post1	post1-post2	pre-post1	post1-post2
z-score	6.7541	3.8248	6.6667	2.6381	6.2706	3.7282
p-score	0.000000	0.000131	0.000000	0.008337	0.000000	0.000193
hypothesis	H1 verified	H4 verified	H2 verified	H5 verified	H3 verified	H6 verified

Paired difference: Dif.

To sum up, in G1-44 category the results show the statistically significant increase in post-test1 score compared to pretest (+6.26); and further significant increase was detected in post-test2 score compared to post-test1 (+0.54). In G1-20 category the results show the statistically significant increase in post-test1 score compared to pretest (+3.40); and further significant increase was detected in post-test2 score compared to post-test1 (+0.18). In G21-44 category the statistically significant increase was even higher in post-test1 compared to pretest (+5.08); and further significant increase was discovered in post-test2 score compared to post-test1 (+0.64). When

total differences between pretest and post-test2 scores are compared, the increase of +6.80 was calculated in G1-44 category, the increase of +3.580 was detected in G1-20 category, and the increase of +5.725 in G21-44 category. Test scores are displayed in Figure 1.
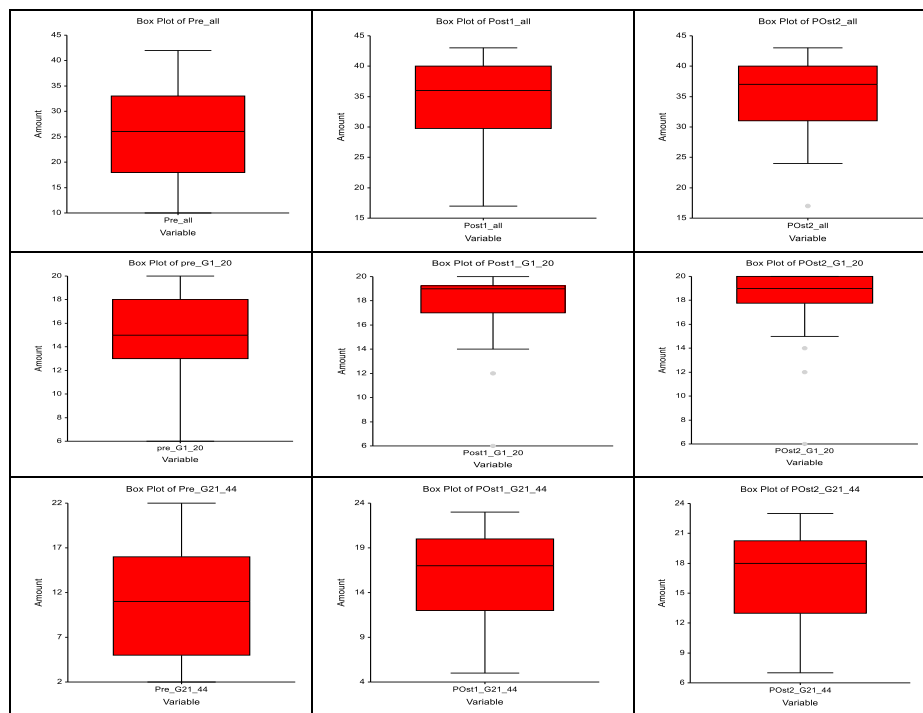

Fig. 1. Test scores in pretest, post-test1, post-test2 in categories G1-44 (All), G1-20, G21-44 (Source: own).

4.3 Types of authentic sources

Another feature under the focus was the type of source students exploited for searching sentences. Sources were structured according to two main types (electronic, or printed) and ten sub-types (Table 3).

Table 3. Types of sources exploited for searching for sentences (Source: own).

Electronic sources	Printed sources
Type 1: Electronic book dealing with the professional topic reflecting student´s field of education, or work.	**Type 6:** Printed book dealing with the professional topic reflecting student´s field of education, or work.
Type 2: Electronic book – fiction, long, e.g. novels.	**Type 7:** Printed book – fiction, long, e.g. novels.
Type 3: Electronic book – fiction, short, e.g. stories.	**Type 8:** Printed book – fiction, short, e.g. stories.

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Type 4: Electronic article dealing with the professional topic reflecting student´s field of education, or work.	**Type 9:** Printed article dealing with the professional topic reflecting student´s field of education, or work.
Type 5: Electronic sources not listed above.	**Type 10:** Printed sources not listed above.

In total, out of 2,724 sentences submitted by all students; 70.34 % of sentences were collected from fine literature – fiction (long novels); 49.69 % of sentences were collected from printed sources and 20.65 % from electronic ones. From the above listed ten types of sources (see Table 3), no occurrences of types 5 and 10 were detected (Figure 2).
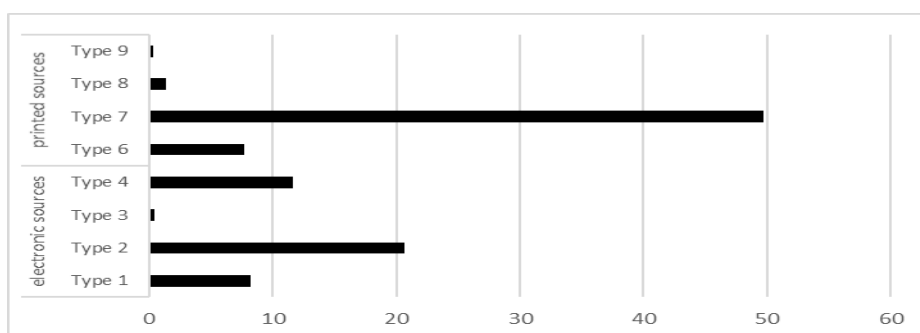

Fig. 2. Frequency of sources used in the research (Source: own).

5   Discussions and Conclusions

To sum up, all hypotheses were verified proving statistically significant differences in test scores. When briefly considering this result, it is obvious the applied approach works efficiently in teaching/learning English professional vocabulary and grammar through autonomous work, collaborative learning enhanced by ICT and exploiting authentic sources.

There may be several reasons supporting the result, none of them working separately – they are interconnected, each of them contributing to reaching the learning objective.

First of all, when considering the types of sources used for collecting appropriate samples, out of 2,724 sentences submitted by all students more than 70 % of sentences were collected from fine literature – fiction (long novels), 50 % of them from electronic sources and 20 % from printed books. These statistics clearly reflect the fact the probands are students of study programmes English language and literature and Teaching English language and literature – despite being members of Y generation, living in the e-society and exploiting ICT in a large extent as the whole generation does, they still read printed books.

Second, starting B2 level is appropriate for working with authentic sources in ESP – students can ground in the preconcepts built within general English and develop them further on.

Third, students´ previous experience in using ICT for educational purposes, which naturally differs according to the field studied [15], was reflected in the preference of printed sources.

Fourth, irrespective of the starting level of English knowledge, some students had problems with terminology, i.e. they did not know the names of single grammar phenomena, neither in Czech, nor in English.

Fifth, student´s motivation to learning English language and individual ability to learn autonomously produce strong impact on the whole process.

Last but not least, being aware of the fact that the task required in post-test2 was difficult, as the application of new knowledge always is, the low(er) test scores in post-tests2 in all categories is not so surprising.

As summarized by Uskov et al. [16], student´s personal characteristics, particularly motivation to learn but also learning style preferences, effort to learn, level of starting knowledge, appropriateness of didactic means used in the process of (blended) teaching/learning, are the main criteria which play substantial role, whatever type of learning we have in mind. Carey et al. [17] evaluated the validity of teaching English grammar to pre-service teachers and proved the positive contribution of ICT for this purpose. Identical approach was demonstrated by Pinto-Llorente et al. [18] who conducted a quantitative study (N=358 students aged 29 – 58 years) focused on the process of improving grammatical competence. Students mainly highlighted the learning autonomy in learning ESL (English as Second Language) – pace, time, and exercises for practising single phenomena in authentic context. Authors also proved that students´ knowledge of English grammar, including theoretical rules, improved. Additionally, according to Liu et al. [19] a new learning pattern based mainly on the collaborative learning in the flipped environment can be (instead of others) applied in English classes on the higher education level.

Even though the main didactic principles are identical for centuries [20], new methodological approaches and fast development of latest technologies offer both the teachers and learners new ways how to reach learning contents. Reflecting this state, teachers are to master new skills and their role is changing. However, teachers will always work as an important factor in the process of acquiring the new knowledge, irrespective of the extent the technologies will take within the process of instruction. And, for every learner, irrespective their year of birth, the interest, motivation, engagement in any activity within the process of learning will play the crucial role.

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