THEORY AND METHODOLOGY OF TEACHING FOREIGN LANGUAGES

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INTEGRATIVE TEACHING FOREIGN LANGUAGE FOR ENGINEERING GRADUATES IN CONTEXT OF SPECIALTY

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Abstract. The paper discusses the integrative method of teaching workplace English. The focus group is master students of engineering specialties. The method is based on ideas of the activity and student-centered approaches. A feature of the method is the organization of in-depth students activity based on the significant professional foreign language information, the introduction of a special foreign language lexicon in the context of its professional use, the study of the principles of reading and writing scientific texts, the use of study and quasi professional problems, and intensive discussions concerning master thesis researches. The results of two years of testing the proposed method are suggested. The assessment of the effectiveness of integrative teaching was conducted in several aspects in accordance with the objectives that were set when designing the educational process. Following types of assessment were implored: comprehensive testing conducted in English and based on professionally important problems; assessment of professional foreign language discourse in the course of analysis of oral utterances of learners; and the analysis of changes in the field of a master students motivational-value sphere based on surveys.

Keywords: graduates; integrative teaching; foreign language scientific literacy, assessment; criterion.

Introduction

If the effective teaching foreign language for engineering graduates (master students) is considered as a cognitive process, then it should not be reduced to the linguistic aspects only. If we actually want to reveal, what and how to teach, then we, obviously, find it necessary to understand the peculiarities of a modern engineering / research activity and relate language skills to the professional ones. The experimental course of workplace English for master students was held in Izhevsk State Technical University for two academic years. The innovative method suggests specially designed curriculum with its focus on “proper context” of terms, principles of reading / writing a

scientific paper, solving training and semiprofessional problems, and discussing highly specified professional topics [1].

Method

The core ideas of the experimental teaching course of English for special purposes are seen as, first, actualization of latent language skills and, second, motivation of the students to improve these skills. A psychological aspect of mastering a foreign language is not less (and maybe more) important than knowing special grammar rules. Frequently the engineering graduates express the opinion that mastering foreign language is of no value for them, and, hence, it doesn't worth wasting time for such tiresome matter as learning the language. Follow this way of reasoning we can find the due motivation as the first step in learning. Introducing actual foreign language (L2) professional information related to an easy-to - use engineering knowledge creates a situation of recognition, recollection, and success. It's important that popular language structures and phrases should be incorporated to the lessons and be repeated continuously.

But what is it, an easy-to - use engineering knowledge? Maybe this is presented by the descriptive topics looking into the devices and inventions, which one can find in almost every textbook of Engineering English? Indeed, these provide L2 up to date engineering information, and provide a base for discussions, dialogs, and even role plays. Unfortunately these textbooks are addressed to undergraduate students and designed for a large number of teaching hours. By perforce, the topics above are also, of a general type and hardly addressed to a leaner trying to use them in short time schedule for getting some competence in his / her area of expertise.

Considering the particular qualities of engineering as a type of human activity and a type of professional knowledge we see among them Math knowledge, mastering special information about an object to work with, and some operational skills. So, some Math topics are good for the first step of teaching / learning. Of course, these topics should not be descriptive only. We should achieve an active use of L2 by solving Math problems. This will result in the memorizing necessary words and phrases like: *it follows from this, this is equal to this, draw a line, divide the numerator by a factor, collect the factors, make an angle, to turn through, interpret the findings*, and so on. What branch of Math will do for the course depends on the audience. It's recommended to use rather simple branches to create the atmosphere of success in the class.

So, at the ***first step*** we find a good deal of L2 activity related to the description of the process of making simple mathematical models, doing calculations, and drawing sketches. Large texts should be avoided. The ***second step*** can bring more textual information, yet concentrated about Math.

As an example, some topics of the theory of probability, statistics, and theory of engineering experiment could be pointed out. Here the strong need in text comprehension arises.

When teaching professionally focused reading one should choose coherent texts of sizes minimally sufficient to trace the development of the author's predicates and rhemes, and provide information for understanding and comprehension. Working with texts is particularly effective if they are accompanied by the exercises, involving perception and construction of a lexical-semantic model, perception and comprehension of hierarchy of themes, subthemes, rhemes enclosed in text [2]. Exercises are useful for extracting information from each sentence in the form of a chain of keywords, phrases which expresses denotations [3].

To keep practice in oral skills we need to study problems once more. The terms of reasoning extends a vocabulary. A schedule should be discussed with the learners. The relative distribution of class hours between the first step and the second depends strongly on the L2 skills of the learners.

The third step brings examining the area of the future specialist's expertise. Actually it starts in parallel with the first step with seeking papers, patents, other information available in the library and the Internet. Very often, the learners have difficulties even with the statement of their problem at hand, and the formulation of a question in an Internet search engine. Translating the papers, learners fill up their own thesaurus. The learners open the active stage of the third step with presentations of their fields of interest. A necessary discussion could be stimulated with the questions handed out to the audience before the class. The examples of such "talking clips": *encourage participation, express a doubt, give an idea, ask for clarification, respond to idea, say something positive about someone's idea, express agreement, express disagreement, summarize* and so on.

Graduate students do both engineering and research work. It is important for them to able to read L2 scientific papers effectively as well as to write readable texts. Special efforts should be made to grant this.

What do we see as a possible result of two-semester, 100 - hour course of engineering English? The main and absolutely necessary achievement should be the positive change in a self-assessment of a student as L2 individuality: "I am able to use a foreign language in proper situations, and I accept that it is necessary for me". The next expected achievement is getting some linguistic skills by a learner. Also, the learner is believed to gain a habit and pleasure to get L2 professional information from different sources.

Practical results

An experimental course for engineering graduates (master students) was held in Izhevsk State Technical University (ISTU) in the 2010-2012

(two ears each of two terms long) for teaching professional English in the integrated form. Because of this form studying English was carried out in the process of investigating the below special topics in details.

The curriculum of the experimental course [1] is presented below. The course was taught to students in English only by E. Krylov, Ph.D. in mechanics, an associate professor in Mechanical Engineering Department. The content was based on authentic texts and problems and coordinated with English teachers.

1. First term.

1.1. Review of grammar rules (every lesson for 1/5 of total time).

1.2. Geometry of simple shapes (definitions, properties, calculations).

1.3. Trigonometry (basic functions, identities, theorems).

1.4. Algebra (equations, functions).

1.5. Collection and analysis of experimental data.

1.6. Elements of probability and statistics.

2. Second term.

2.1. How to read an engineering research paper.

2.2. How to write an abstract.

2.3. Principles of operation of simple machines.

2.4. Gears (nomenclature, principles of operation, manufacturing technology).

2.5. Metal rolling processes and equipment.

2.6. Training for student's scientific conference.

The experimental groups included 17 master students (2010-2011) and 12 master students (2011-2012) of "Technology, equipment and automation of engineering processes" specialty. In 2010-2011 there was also a reference group of 26 master students. For this reference group a teaching methodology based on Tempus Project JEP-26093-2005 "Communicative approach in teaching languages (CATCH)" was used. Both groups had 51 academic hours in the first term, and 34 academic hours in the second one.

In the experimental groups a complex evaluation of both English and engineering proficiency was carried out in the mid-term examination, see the results presented in Fig. 1, 2. Up to 82% of students from the first group (see Fig. 1) showed satisfactory results, with more or equal to 50% of points offered in each exam card. For the second group (Fig. 2) the results were not such good but yet remained satisfactory ones, up to 75% of students had 50% of points.

By the authors' opinion, the low difference between English and engineering points indicates the progress in a good processed English proficiency in the given discourse. The second semester classes focused on the English literacy in the student's research areas.

To establish an objective criterion of acquired literacy a criterion was established [4], based on the change in a spoken language patterns produc-

tivity during a switch from prepared to spontaneous speech. The calculated values of the words per second recorded during a spontaneous speech (dialogue) are related to these during a prepared speech (monologue).

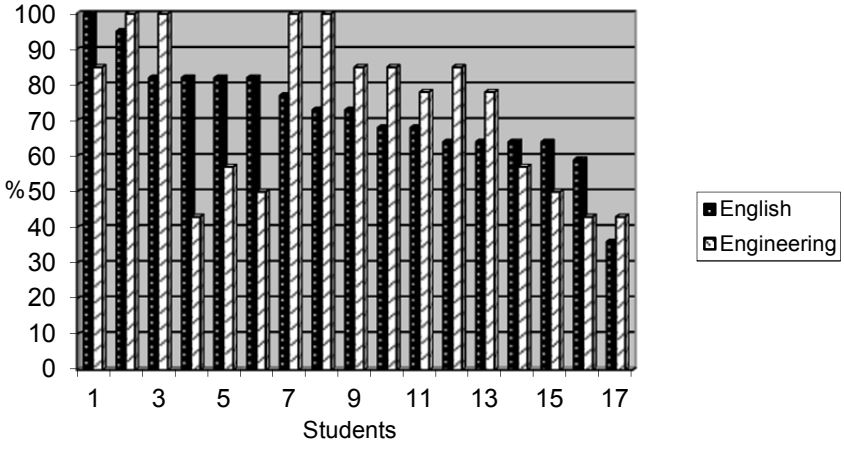

Fig. 1. Results of the mid-course test for English and Engineering skills, year 2011

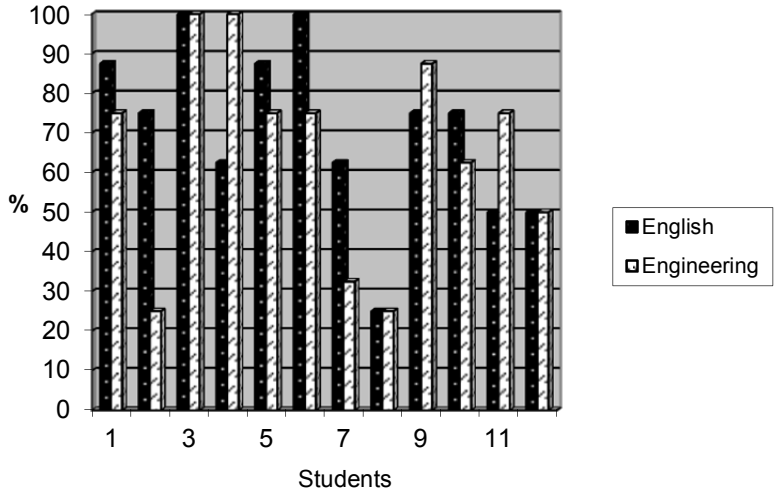

Fig. 2. Results of the mid-course test for English and Engineering skills, year 2012

Table 1 illustrates the criterion values obtained in the course of a research conference conducted every two years. Five students from the test group and five students from the reference group which contributed in the

conference, had good academic achievements, and were specially trained for taking part in this event. It is seen from Table 1 that the students from the test group demonstrated better values of the ratio WPS(S) / WPS(P).

At 2011-2012 academic year the analysis of a spoken language was carried out for of all 12 students from new test group. The criterion WPS(S) / WPS(P) was calculated for dialogues / monologues recorded in the course of the final examination. Good average values of the criterion indicate that English professional discourse had been well understood and learned. Yet, rather low average values for both WPS(P) and WPS(S) points out for a poor general English proficiency.

Table 1

Average WPS values for test and reference groups, year 2010-2011

	WPS(P), prepared speech	WPS(S), spontaneous speech	$\frac{WPS(S)}{WPS(P)}$
Test group	1.625	1.216	0.748
Reference group	1.482	0.766	0.517

Table 2

Average WPS values for test groups, year 2011-2012

	WPS(P), prepared speech	WPS(S), spontaneous speech	$\frac{WPS(S)}{WPS(P)}$
Test group	0.637	0.565	0.887

Table 3

Results of self-assessment survey, year 2011-2012

Student	Self-assessment of ***ability*** for written English workplace communication, %		Self-assessment of ***ability*** for oral English workplace communication, %		Self-assessment of ***readiness*** for both written and oral English workplace communication, %		Use of the English-language Internet recourses	
	before course	after course	before course	after course	before course	after course	before course	after course
A	50	70	25	30	40	50	no	yes
B	40	60	20	30	30	40	yes	yes
C	20	25	15	35	10	30	yes	yes
D	20	30	20	30	20	60	no	yes
E	45	45	20	20	30	40	no	no
F	40	50	20	30	50	50	yes	yes
G	60	70	50	50	50	50	yes	yes
H	20	20	25	25	20	20	yes	yes
I	50	60	50	60	60	80	no	yes
J	50	55	49	60	50	80	yes	yes
K	65	60	50	60	40	40	yes	yes
L	60	60	25	70	20	90	yes	yes

Learning English for special purposes after years of learning general English (often without a marked progress) is sometimes considered by master students as the formal and tiresome activity. This contradicts with the demand of high motivation of the learning process as a condition of good academic achievements. What's why a positive change in the students' motivation towards learning (and using) English is seen by the author as one of the main objectives of the experimental course. A survey of 12 master students (see Table 3) was conducted before the beginning of classes and just after the classes ended. For near every student all characteristics concerning self-assessment of ability, readiness, and individual perspectives of English communication raised up (see Tables 1, 2). This positive trend can be regarded as an improvement in the students' motivation towards learning English.

Table 4

Change in the average values of the survey parameters, year 2012-2011

Parameter	Self-assessment of ***ability*** for written English workplace communication, %		Self-assessment of ***ability*** for oral English workplace communication, %		Self-assessment of ***readiness*** for both written and oral English workplace communication, %		Use of the English-language Internet recourses, %	
	before course	after course	before course	after course	before course	after course	before course	after course
Average value	43.33	50.42	30.75	44.58	35.00	52.50	66.77	91.77
Change in average value	16.36% up		44.58% up		50.00% up		37.50% up	

The typical students' faults found at the final examination were: bad spelling, switch into native language, omission of verbs in speech, poor harmonization of parts of speech. Possibly these faults could be reduced in case of a longer teaching course.

Conclusion

The integrative method of teaching workplace English for engineering graduates through discussing highly specified professional topics can be classified as an alternative promising method of teaching. The experimental research above shows that it is not less effective than general around-science discussions.

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