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ESP TEAM TEACHING AT TECHNICAL UNIVERSITIES: EXPERIENCE AND PERSPECTIVES

Abstract. The primary objectives of this paper are as follows: 1) to describe the experience of implementing interdisciplinary and single-subject team teaching into the educational process at Kalashnikov Izhevsk State Technical University while teaching English for Specific Purposes; 2) to assess the efficacy of the pedagogy through qualitative and quantitative students' outcomes; 3) to discuss our experience and give recommendations for those interested in team-teaching.

Methods. To evaluate the efficacy of team-based integrative teaching, we used quantitative and qualitative assessment. A set of quantitative pre- and post-surveys were administered in experimental team-taught group and a non-team-taught «control» group. Students' motivation and attitudes were evaluated through questionnaires, interviews and discussions.

Results. The conducted experiment has showed that students in the experimental group considerably improved their level of mastering foreign language lexicon compared to the students in the «control» group. They also reinforced their motivation for learning English. Based on the results of the questionnaire analysis

and discussion, the authors have formulated recommendations for implementing team-teaching technology in educational process.

Scientific novelty. The article contributes to the theory of developing the foreign language lexicon under integrative ESP and professional course instruction. The theory is based on combining ESP and professional discipline components at all stages of educational process. In addition, the authors have formulated the main challenges and advantages of single-subject team-teaching variations as well as the application where it brought the best results.

Practical significance. The authors suggested some valuable recommendations on planning and implementing the educational process with ESP team-teaching at a technical university.

Key words: team-teaching, integrative teaching ESP and professionally-oriented course, interdisciplinary and intradisciplinary integration, native English speaking teacher assistant.

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ПЕДАГОГИЧЕСКОЕ СОТРУДНИЧЕСТВО ПРИ ОБУЧЕНИИ АНГЛИЙСКОМУ ЯЗЫКУ В ПРОФЕССИОНАЛЬНОЙ СФЕРЕ В ТЕХНИЧЕСКОМ ВУЗЕ: ОПЫТ И ПЕРСПЕКТИВЫ

Аннотация. *Цели* статьи – проанализировать опыт и перспективы педагогического сотрудничества как технологии обучения иностранному языку (ИЯ) в профессиональной сфере в интегративных форматах «преподаватель иностранного языка – преподаватель дисциплины профессионального цикла (ДПЦ)» и «преподаватель ИЯ – преподаватель-стажер, носитель языка»; оценить эффективность моделей такого сотрудничества и дать рекомендации по их внедрению в практику учебного процесса технического вуза.

Методы. Для оценки эффективности технологии обучения, основанной на педагогическом сотрудничестве, на всех этапах исследования применялись качественные и количественные методы анализа. Динамика владения студентами иноязычным лексиконом, сформированным в ходе интегративного обучения ИЯ и ДПЦ, измерялась по специальным выделенным параметрам в контрольной и экспериментальной группах. Влияние использованной технологии на отношение студентов к изучению ИЯ оценивалось посредством анкетирования, интервью, дискуссий и работ, представленных на контрольном мероприятии – студенческой конференции.

Результаты педагогического эксперимента подтвердили целесообразность моделей технологии педагогического сотрудничества и в плане улучшения знаний будущих специалистов, и в отношении повышения их мотивации к изучению ИЯ.

Научная новизна. Создана теоретическая база для формирования иноязычного лексикона студентов технических специальностей, основанная на совмещении предметного и языкового компонентов во всех звеньях образовательного процесса. Подробно проанализированы и описаны характеристики различных моделей педагогического сотрудничества преподавателей ИЯ и ДПЦ в условиях межпредметного взаимодействия.

Практическая значимость. С опорой на экспериментальные данные, а также итоги анкетирования и интервью разработаны и сформулированы рекомендации по планированию и реализации технологии педагогического сотрудничества при обучении ИЯ в профессиональной сфере.

Ключевые слова: педагогическое сотрудничество, интегративное обучение английскому языку в профессиональной сфере и дисциплине профессионального цикла, межпредметная и внутрипредметная интеграция, преподаватель-стажер, носитель языка.

Introduction

The increased interest in team teaching arose in the middle of the 1990s [19]. In the literature one can find various terms regarding the shared responsibility and delivery of instruction in classrooms: *collaborative teaching* (Angle, 1996), *team teaching* (Welch, Sheridan, 1995), *co-teaching* (Dicker, Barnett, 1996; Nowacek, 1992), *cooperative teaching* (Bauwens, Hourcade,1995) [19]. These terms are used as synonyms to describe pedagogical framework based on interaction of two or a group of teachers aimed at increased efficiency of teaching.

Team teaching is believed to have a positive impact on students' learning experience as it provides the development of dynamic curriculum, interactive learning environments, and critical internal and interdisciplinary thinking [14]. At the same time, the students are not the only ones who benefit from collaborative teaching. It also provides the opportunity for teachers to learn from each other about both content and teaching [16], to introduce

modifications into the curriculum or educational program so as to enhance the quality of scholarship and teaching [13].

Along with its obvious advantages team teaching has serious challenges that need thorough consideration. They include increased preparation time, difficulty of grading, dispersed authority in the classroom, administrative problems with fiscal accountability, etc. [16]. Besides, some findings suggest that team teaching doesn't significantly affect students' learning outcomes (Dugan & Letterman, 2008; Wadkins, Miller, & Wozniak, 2006). The factors mentioned above show that effective use of this pedagogical technology in the educational process requires further experiments and research.

In Russia the number of publications and research results on the problems in question is limited. Most publications are devoted to pedagogical collaboration [6] and describe teacher-student interaction or student-to-student interaction [9]; some publications concern interdisciplinary team teaching and relate mainly to bilingual teaching or content-based instruction at high schools [4, 5, 8]. It is stated that bilingual teaching here provides an individual approach to gaining knowledge, facilitates lifelong learning and increased competitive edge [4, 5]. Teaching English for Specific Purposes (ESP) involving integration of English Language and professional curriculum at Universities is represented in a small way. Speaking about single-subject team teaching, for instance, there is an obvious lack of information on teaching English with a native teacher assistant, which may be explained by relatively little experience with native English teacher assistants in Russia.

The primary objectives of this paper are as follows:

to describe the experience of implementing interdisciplinary and single-subject team teaching into the educational process at Kalashnikov Izhevsk State Technical University while teaching English Language for general use or ESP;

to assess the efficacy of the pedagogy through qualitative and quantitative student outcomes;

to discuss our experience and recommendations for those considering team-teaching in the future.

Interdisciplinary Team Teaching Background

There are three basic team teaching models: participant-observer interaction, interactive and rotational models (White, Henley and Brabston, 1998). The *rotational* model encompasses each lecturer teaching course sections separately; the *participant-observer* model involves both teachers being present for all classes, but with little interference while one professor is teaching; in the *interactive* model both teachers participate fully with all lectures and activities, engaging student dialogue and interaction one at a time [18].

The analysis of publications concerning interdisciplinary ESP team teaching to university students (Arkhipova, Fomenko, Galskova, Makaev, Maletina, Maksimova, Ter-Minasova, Zvereva) allowed us to elicit the following basic statements that should be taken into consideration:

1. The underlying philosophy of team teaching requires continued collaboration between the language teacher and the teacher of the professional courses at all stages throughout the instructional period: planning integrative classes and activities; developing language teaching materials and tasks based on the professional course content; selecting activity-based educational techniques that are useful for students' future careers; implementing integrative ESP and content course teaching; monitoring and assessing the learning outcomes.

2. The language teacher and the professional course teacher should build up common bilingual conceptual and categorical framework of the two disciplines, i.e. a professionally relevant lexicon in English and Russian as a lexical base to develop communicative competence in ESP. With that in mind, the professional team should design and didactically organize a bilingual thesaurus dictionary objectified by expert evaluation method [1].

3. The team teaching under integrative ESP and professional course instruction may result in the acquired foreign language lexicon which should be considered a cognitive and communicative component of professional training; it represents lexical-semantic competence of a future professional and is directly related to speaker performance regarding ESP and professional courses integration [2].

4. Acquiring foreign language lexicon in integrative teaching of ESP and professionally-oriented courses is possible with two models [3]:

– intradisciplinary integration that encompasses learning vocabulary for professional communications through integrated teaching of language skills in subject-subject communications at ESP lessons;

– interdisciplinary integration that incorporates didactical synthesis of ESP and professional courses with respect to their content, activities, organization and speaker's performance, while teaching ESP and professional courses independently.

Experiment Description

The experiment that was carried out at Kalashnikov Izhevsk State Technical University involved 153 second- and third-year students of Management and Marketing. The team of instructors consisted of teachers from two departments: The English Language Department and The Management and Marketing Department.

The experiment combined the elements of *interactive* and *rotational* models. As shown in Fig.1, the learning space was divided into three areas: the professional course area (PCA), the ESP area (ESPA) and the interdiscipli-

nary integrative area. Teaching starts with a team-taught lecture in a professional course, which provides primary semantization of professional terms. Later, team-taught summarizing classes and workshops are introduced for lexical units' consolidation and assessment. At the end of the course both teachers participate in a conference jury which evaluates students' use of terms in professional communication.

Independent ESP teaching and professional course is carried out in the middle of the learning process, while ESP classes and workshops are designed to follow professional course classes with a delay of two or three days using the *parallel content teaching approach.*
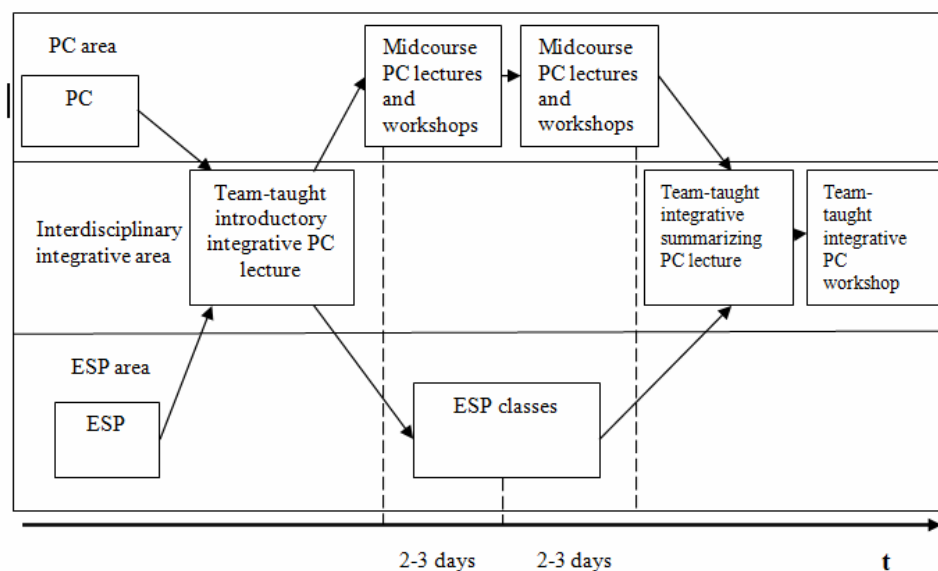

Fig. 1. ESP and PC integrative teaching model

Methods

To evaluate the efficacy of team-based integrative teaching we used quantitative and qualitative assessment. A set of quantitative pre- and post-surveys were administered at the beginning and end of the semester in combination with questionnaires in the post-survey. Quantitative assessment addressed students' language skills and included lingo-didactic tests. Questionnaires were developed to study students' impressions of the learning process.

To better evaluate the contribution of integrative team-teaching to students' learning outcomes we compared an experimental team-taught group to a non-team-taught "control" group. To evaluate the development of language skills we used the criteria that are shown in Table 1.

Table 1

The criteria for assessing foreign language lexicon acquisition

№	Parameters for assessing language skill	Points (score)
1.	Identifying contextualized and non-contextualized lexical unit with and without context when listening or reading with further reproduction as a word combination, sentence or phrase (receptive and reproductive level)	
	1) Addressing valuable information on the given problem in the text (key words (KW), denotative word combinations (DWC) on the problem, topic-comment units (TCU)	0,1 for aKW / DWC/ TCU
	2) the number of KW not related to given problem	–0,1 for aKW / DWC/ TCU
2.	Lexical unit (LU) semantization, defining the concept in English (Russian)	
	1) number of correctly found concept definitions	0–1
	2) number of correctly articulated concept definitions	0–1
3.	Contextual choice and usage of lexical units in speaking and writing while solving professionally-oriented problems (productive using of lexicon)	
	1) number of sentences containing word-concepts	0, 1 for a sentence
	2) number of correctly used terms and key words	0, 1 for a correctly used LU
4.	Using categories and concepts links	
	1) Number of correctly used lexical units in a meaningful text	0,1 for a correctly used LU
	2) Number of LU, defining general concept (associative paradigmatic and syntagmatic logical and semantical relations in lexical concept definitions)	0,1 for a correctly used LU
	3) Number of correctly found key words and related specific concepts (topic-comment units) in written and oral professionally-oriented message, in logic and semantic text structure	0, 1 for a correctly used KW related specific concept
5.	Information representation and interpretation in various symbol systems (graph, diagram, log frame, table, equations, Cyrillic, Latin) – presentation skills	
	1) Total number of symbol system used	0,1 for a symbol system
	2) Number of symbol systems which are relevant to given topic and problem in written assignments	0,1 for a relevant symbol system
	3) Correct information interpretation in oral statements and written works	0–1

We defined the following levels for assessment of mastering foreign language lexicon: **high level** assumes productive use of a wide vocabulary (80–90%); **intermediate level** assumes productive using of professional terms in the range of 50–70%; **low level** is detected by receptive and reproductive use of a narrow professional vocabulary (about 30–40%).

The learning outcomes were assessed by both the ESP teacher and the professional course teacher at integrative lectures and workshops where students had to prepare presentations and discuss case studies, and at the students' scientific conference.

The students' scientific conference devoted to research of organization managerial systems was an event that contributed to students' professional lexicon and communication skills assessment; students' presentations were evaluated by the jury consisting of both the English Department and the Management Department faculty using such criteria as *contents*, *performance*, *visual aids*, *participation in a question-answer session.* Much of the conference's success was thanks to a foreign guest – a Master Student from Germany who submitted his report on the subject of the conference in English, shared his ideas with the students and took part in the students' speech assessment.

Results and discussion

The midcourse data analysis of students' foreign lexicon showed that students in experimental group learned 1.5–2 times more words and concepts in Russian, and that was due to speaking English at team-taught lectures and seminars. They also developed a better ability to define categories and concept links compared to students who were in the control group taking traditional professional classes in Russian and traditional ESP classes.

The analysis of the final evaluation (summative survey) indicated that students in the experimental group could elicit about 82,3% of key words and denotative word combinations from the original text used in evaluation and could freely use lexical units in sentences. Professionally-oriented writing and speaking products were enriched with logical structure elements. In general, the size of a spoken utterance increased from 3–5 to 16 sentences within two minutes. The quantitative results are shown in Fig. 2.

The effectiveness of this technology was also proven by qualitative results such as questionnaires, interviews and observation findings, which allowed us to make the following conclusions:

1. The students have changed their attitude toward reading specialists' references as a result of integrative ESP team-teaching and professional courses. Reading professional literature turned out to be personally-motivated and meaningful, instead of being simply practice training.

2. The students developed their ability for professional communication and improved their communication culture.

3. The students reinforced motivation for learning English, which was evidenced by increased attendance and using creative ideas in the learning process.
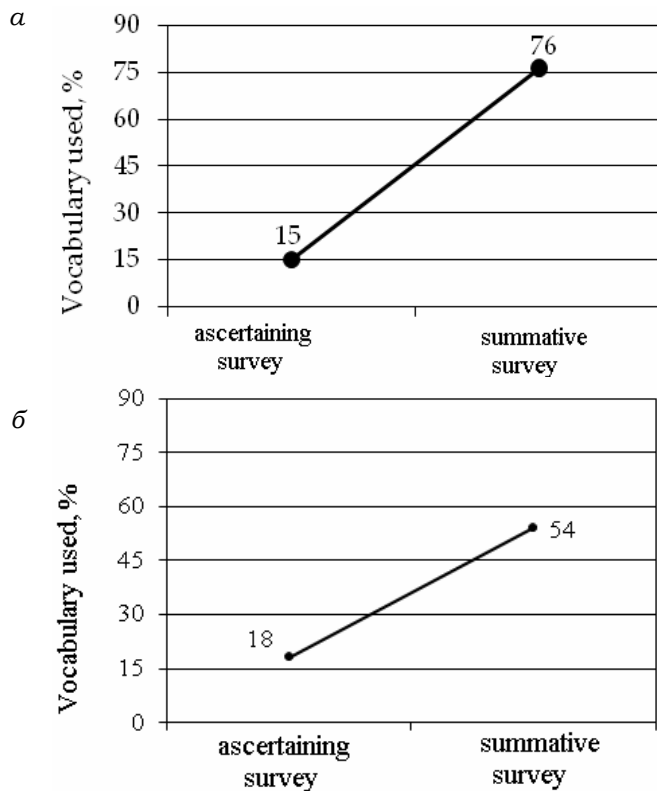

Fig. 2. Dynamics of using professional vocabulary:
a – experimental group; *б* –control group

Most students agreed that integrative team-taught lectures and work-shops as well as professional course content-based English classes are effective and efficient.

Single Subject Team Teaching
Background

The single-subject team-teaching method seems relevant when we deal with a large number of students in one class or want to teach them a variety of skills during the same class. It may also become especially interesting if applied when teaching English with native English speaking assistant teachers. In Russia most university syllabi include compulsory foreign language course, and English is the most popular foreign language to be taught [12]. Although in Russia there is no national-level pro-

gram for employing native English speaking teacher assistant (ESTA), there is still a variety of exchange and English teaching assistant programs that facilitates the practice of ESTA employment in Russian universities. Although ESTA employment contributes to students' pronunciation, communication skills and cultural awareness [15], some problems may arise, as most ESTAs often have neither teaching qualifications nor comprehensive knowledge of the students' linguistics abilities [17]. Usually English-speaking teacher assistants do not have teaching experience, and they need time to realise how native English skills can be best put to use. From experience at Kalashnikov Izhevsk State Technical University, the greatest successes have been achieved when ESTAs worked closely with the university's teaching staff or used some variations of the team-teaching method.

Cook and Friend (1996) described several variations of co-teaching:

– *one teaching/one assisting* (a model where one teacher leads instruction while the co-teacher moves around the classroom providing help as needed);

– *one teaching/one observing* (where one teacher is responsible for planning and teaching with the other teacher in class observing particular behaviours);

– *station teaching* (where classroom is divided into various teaching centers, and students are moving from one center to another);

– *parallel teaching* (where classroom is split in half to teach the same information at the same time);

– *alternative teaching* (where one teacher manages most of the class while the other works with the small group);

– *team teaching* (both teachers are responsible for planning and they share the instructions of all students).

The aim of our experiment was to obtain information on different team-teaching models at a university, find out the best combination of these variations in the educational process and provide some implementation guidelines regarding lesson objectives and requirements.

Experiment Description

The experiment that was carried out at Kalashnikov Izhevsk State Technical University involved 19 second-year students – future teachers of general technical subjects. The team of instructors consisted of a Russian teacher from the English Language Department and a native English speaking teacher assistant from Britain. Team-teaching was introduced in teaching English for Specific Purposes (ESP). We believed that apart from improving students' English skills, experimenting with different teaching methods and its further discussion would also contribute to professional competence of future teachers [7, 10]. The experiment started with the introductory class where teachers used the co-teaching technology and explained the essence of team-teaching and its variations as well as defined the ESP course objectives and experiment details. Later during the

course, teachers were always present at all classes together using combinations of different team-teaching variations depending on the lesson objectives. At the end of each class students and teachers had to answer questions about the class. At the end of the course teachers set up a group discussion about their experience with the team-teaching method.

Method

Quality research was implemented through developing questionnaires for students and teachers concerning class atmosphere, clarity of information, knowledge gained during a lesson and their emotional experience at the lesson [11]. Teacher observations and interviewing students also helped us understand advantages of team-teaching methods and find solutions for the problems that had arisen.

Results and discussion

Based on the results of the questionnaire analysis and discussion, we formulated the main challenges and advantages of team-teaching variations as well as the application where it brought the best results (Table 2).

Table 2

Team teaching variations and their characteristics

Team-teaching variation	Advantages		Challenges		Possible application in ESP teaching
	Students' perspective	Teachers' perspective	Students' perspective	Teachers' perspective	
1	2	3	4	5	6
One teaching/ one assisting	Improved behavior, students are involved and get more individual attention	No particular cooperative planning and preparing needed, help is provided without interruption	No special comments	Dispersed authority in the class	– Teaching multilevel groups, especially with elementary level students; – Teaching and explaining grammar in English
One teaching/ one observing	Improved behavior	No particular cooperative planning and preparing, promotes professional development	Students are not very comfortable with being obviously monitored	Dispersed authority in the class	– Collecting data about students behavior and understanding; – Planning the group split

1	2	3	4	5	6
Station teaching	Exciting experience, increased collaboration in small groups	Possibility to work with every student; Possibility to use teachers' special strengths	No special comments	Increased preparation time; Increased noise level; Strict time management	– Teaching reading, writing and speaking skills at different stations (here speaking skills station is guided by ESTA); – Applying multiple intelligence theory for teaching information about English-speaking countries, abstract ideas, etc.
Parallel teaching	Student-to-teacher ratio is low, students receive instruction adequate to their level	No particular cooperative planning and preparing; Both teachers contribute to class;	Students may be distracted and feel confused;	Increased noise level; A spacious class required;	Different tasks for teaching multilevel groups (reading and grammar skills)
Alternative teaching	Student-to-teacher ratio is low; Better understanding and participation	Both teachers contribute to class;	Students sometimes question group split	Increased noise level; Need a spacious class	– Re-teaching or pre-teaching grammar skills and vocabulary
Team-teaching	An exciting experience; Increased involvement; better understanding	Exciting atmosphere; Facilitates professional development	No special comments	Increased preparation time; Difficulties with making equal contribution	– Introductory and final classes; – Discussions; – Introducing controversial topics

Our experience showed that using a strategy that supposes increasing ESTA involvement in the educational process brings the best result. Taking this into consideration, the following educational planning was suggested:

1. Introductory stage: 2–3 classes of team-teaching, one teaches /one observes.

2. First stage: 3–4 classes of station teaching, parallel teaching, alternative teaching.

3. Second stage: 5 – 6 classes of alternative teaching – one teaches/one assists, one teaches/one observes.

4. Final stage: 1 class of team-teaching.

Most students (100%) described the team-teaching experience as a positive, interesting and motivating way of ESP learning. However, quantity

research about how team-teaching affects students' learning outcomes compared to traditional teaching still needs to be done.

Perspectives

In any academic situation team teaching should be regarded as a specific educational technology that requires a creative approach to implement and holds great promise as a viable pedagogical framework that might yield multiplied synergetic educational effect and contribute to increased learners' motivation.

Future trends of enhancing team teaching at technical universities might be as follows:

1. Introducing and maintaining systematic and regular measures to develop interdisciplinary cooperation – currently-operating pedagogical teams, in-service training, excursions to the enterprises and laboratories, participating in international educational projects, etc.

2. Designing stable three-party co-teaching models based on interaction of the English staff, the teaching staff of the professional courses and native English speaking assistant teachers.

Conclusions

Team-teaching may become an inspiring experience, and those who consider this method in teaching ESP may find the following recommendations useful:

1. Successful ESP learning is based on adequate lexicon usage in professional communicative situations and occurs when students are exposed to content material presented in meaningful, contextualized form, with the focus on acquiring information in a natural academic and scientific setting both at lectures and seminars on the professional course and at ESP practical classes.

2. It is vitally important to create basic concepts foundation for successful professional communication in future. For instance, a thesaurus-dictionary can be created, which will include systematized language materials relevant to professional course content.

3. Speaking, reading, listening and writing skills should be regarded as integral elements of didactical content for interdisciplinary team-teaching.

4. Interdisciplinary integrative team-teaching should be viewed as mutually synchronized teaching which is based on the principle of parallel content teaching, where ESP classes and workshops are designed to follow professional course classes with a delay of two or three days.

5. Teamwork needs cooperation and mutual understanding; the co-teaching instructors should discuss their successes and problems weekly; it is not recommended to change the teams during the course.

With two voices already in close coordination, team teaching aims to prompt freer discussion amongst teachers and students. Students are no longer sitting and listening, but drawn into a dialogue. In both interdisciplinary and intradisciplinary team-teaching, through watching the interaction and cooperation between teachers, students can see how the 'real world' works; they are able to get involved in professional communication and, thus, be better prepared for their future profession.

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