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Камила Мурадовна ЯХЬЯЕВА, кандидат педагогических наук, старший преподаватель кафедры № 7 «Языковой подготовки», ФГБОУ ВО «Санкт-Петербургский государственный университет гражданской авиации» г. Санкт-Петербург; e-mail: yakm94@gmail.com

Наталья Александровна СУХОВА, кандидат педагогических наук, доцент кафедры № 7 «Языковой подготовки», ФГБОУ ВО «Санкт-Петербургский государственный университет гражданской авиации» г. Санкт-Петербург; e-mail: natasuchova@yandex.ru

Марина Анатольевна ГЛАЗУН, кандидат педагогических наук, доцент кафедры № 7 «Языковой подготовки», ФГБОУ ВО «Санкт-Петербургский государственный университет гражданской авиации», г. Санкт-Петербург; e-mail: glazun_marina@mail.ru

Предметно-языковое интегрированное обучение иноязычному чтению в рамках дисциплины «Технический авиационный английский язык»: специфика, задачи и основные сложности

Рассматриваемая статья посвящена вопросам иноязычной подготовки студентов технического университета — будущих авиационных специалистов, в частности, развитию в её рамках речевых умений иноязычного чтения. Согласно анализу научной литературы в области методики преподавания иностранных языков, лингвистики, педагогики, сравнению и сопоставлению как зарубежного, так и отечественного опыта преподавания иностранных языков интенсификация и совершенствование этого процесса представляются чрезвычайно актуальными в рамках современной парадигмы высшего образования, в том числе в связи с широким распространением английского языка в авиационной отрасли. В статье также исследуются концептуальные идеи и элементы предметно-языкового интегрированного обучения (CLIL), реализованные в рамках дисциплины «Технический и авиационный английский», они могут помочь сформировать у студентов устойчивые речевые умения иноязычного чтения, которые впоследствии смогут стать основой для дальнейшего развития их профессиональных знаний. Проведенное в Санкт-Петербургском государственном университете гражданской авиации экспериментальное обучение и его результаты подтвердили, что CLIL может быть важной частью для последующего развития и формирования у студентов умений иноязычного чтения технической документации, что в первую очередь влияет на успешное выполнение их профессиональных обязанностей по эксплуатации воздушных судов.

Ключевые слова: предметно-языковое интегрированное обучение, CLIL, речевые умения чтения, иноязычное чтение, подготовка авиационного персонала.

Camila M. YAKHYAEVA, candidate of sciences in Pedagogy, senior teacher at the department of Language training (№ 7), Saint-Petersburg state university of civil aviation, Saint-Petersburg; e-mail: yakm94@gmail.com

Natalia A. SUKHOVA, candidate of sciences in Pedagogy, associate professor at the department of Language training (№ 7), Saint-Petersburg state university of civil aviation, Saint-Petersburg; e-mail: natasuchova@yandex.ru

Marina A. GLAZUN, candidate of Sciences in Pedagogy, associate professor at the department of Language training (№ 7), Saint-Petersburg state university of civil aviation, Saint-Petersburg; e-mail: glazun_marina@mail.ru

Content and Language Integrated Reading Training in the “Technical And Aviation English” Course: Specifics, Main Goals, And Challenges

The paper under consideration is devoted to the issues of foreign language training of the technical university students — future aviation specialists, as well as the foreign reading skills development. According to the analysis of the scientific literature and comparing both foreign and domestic teaching experience, the intensification and improvement of this

process has proved to be extremely relevant within the modern paradigm of higher education, due to the common use of English in the aviation industry. The paper also studies how the conceptual ideas and elements of Content and Language Integrated Learning (CLIL) implemented in the "Technical and aviation English" course can help to form the students' consistent foreign language reading skills which may supposedly be a basis for the further professional knowledge development. Experiment training conducted at the Saint Petersburg state university of civil aviation and its results confirmed that CLIL may be an essential part for the subsequent development of the students' foreign language reading skills to some degree that primarily affect successful performance of their professional duties for aircraft operation.

Keywords: CLIL, reading skills, technical and aviation English, foreign language reading, aviation personnel training.

1. Introduction

Teaching foreign language reading is one of the problems that have received sufficient coverage at all stages of the development of methodological science. The importance and its general relevance for language training and the implementation of professional activities can hardly be overestimated; in modern conditions the search, adequate perception, and analysis of a large amount of information, including in English, speech reading skills are an indisputable advantage of a qualified specialist. In our research this type of speech activity is considered as the primary one due to its role as an integral part of the technical universities students' professional activities its engagement into the text work with technical and operational documentation (manuals, handbooks, checklists, etc.) and its specific «aviation» types (route and radio navigation maps, NOTAMs, etc.), related to the professional and research tasks of air traffic management and aircraft operation.

However, in our opinion, both foreign language and reading can act not only as a tool for obtaining professionally relevant information, but also for creating a full-fledged information basis for professional activity. This statement is correlated with the provisions of the Manual on the Implementation of ICAO Language Proficiency Requirements (doc 9835) which serves as certification basis for the Aviation English training throughout the world. According to the Doc 9835, «The content integrated within language training fully meets the needs of aviation specialists, since language becomes a means of learning a professionally significant and relevant content. In this case language training is also perceived not as an auxiliary activity in relation to other types of aviation training, but as an integral part of it» [18]. Thus, we can conclude that despite the priority of oral speech in the future graduates training, reading foreign language texts and documents remains quite significant for their professional activities.

From our point of view, the aforementioned practical points are similar to the educational goals of the «Technical and Aviation English» course studied in the aircraft operation training of the students of the Saint-Petersburg state university of civil aviation. According to the syllabus of the subject, the following formed skills can be outlined [8]:

- to identify specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation;

- to define specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation;
- to identify the verbs describing the list of standard operational procedures;
- to define the verbs describing the list of standard operational procedures;
- to obtain and process a professionally relevant information in the documentation given;
- to evaluate the aviation-related information obtained from the documents critically and professionally;
- to analyze the aviation-related information obtained from the documents for the professional purposes;
- to summarize the aviation-related information obtained from the documents for the professional purposes;
- to present aviation-related information extracted from the text in the form of a project presentation (oral) or an abstract (written).

As it can be seen by the major skills listed, the «Technical and Aviation English» course is mostly focused on the professional content and a limited number of language and speech activities which can generally help to form and improve the vocabulary range of the students.

2. Literature review

Currently, quite a lot of studies devoted to the analysis of speech activities closely related to the vocabulary range and its improvement have been successfully carried out. According to Suvorina K.M., vocabulary range and its enlarging should be a task of primary concern [16], as the multicomponent word combinations are widely spread in the language of the aviation industry to ensure the accuracy of information and to represent objects, phenomena and processes in a detailed way [15]. However, this aspect makes Technical and Aviation English more complicated to learn and to teach than any other «professional» language. The following study [3] suggests a practical approach to the issue of Technical and Aviation English teaching, regarding the vocabulary range development as a stage for forming professional communicative competence by means of language activities with supplementary workpapers (glossaries, professional language dictionaries, etc.) included. Having analyzed a scope of scientific works and articles outlined above, it can be concluded that language of the aviation industry conventionally serves as a productive way of developing vocabulary range only excluding the foreign language reading skills and professional

knowledge of the technical university students. Therefore, it can be stated that the issue of foreign language reading training as a key type of speech activity and a means of obtaining professionally significant knowledge in the «Technical and Aviation English» course remains insufficiently studied.

Thus, the following scientific goals of the study can be outlined: to analyze the scope of works, related to the technical and aviation English training and its management, CLIL and reading skills formation; to define foreign language reading as an individual speech activity, to select the types of professionally oriented reading and their cognitive strategies necessary for the efficient reading skills development and improvement, to develop, implement and experimentally test the effectiveness of the brand new foreign language reading training pattern based on the Content and Language Integrated learning and its principles.

In order to meet one of the above mentioned scientific goals we addressed a general definition of foreign language reading as a speech activity, studied the link between professional and language content and the role of foreign language reading in their synthesis as well as in the process of «Technical and Aviation English» course training.

2.2. Foreign language reading: definitions and approaches to its classification

According to Rogova's definition, reading is a speech activity «aimed at visual perception and understanding of written speech» and implies the presence of processes related to the perception of graphic signs and their correlation with certain meanings, as well as semantic processing of the text and its understanding for its successful implementation [9]. A similar concept is also considered by Klychnikova Z. I. The study suggests that reading can be considered as «the process of perception and semantic processing of information which is graphically encoded according to the particular language system» [5]. Thus, reading as a speech activity can be characterized by the aims and reading results orientation of a particular student, as well as the processes underlying it — the analysis and synthesis of the information received.

In this regard we can distinguish a number of studies dealing with the professionally oriented reading, as one of the business communications forms and the possibility for language and profession content combination [13], conducted and further developed by the researchers of the Perm Polytechnic university under the scientific supervision of Serova T. S. The author explains the specifics of the professionally oriented reading with its results (an operational orientation, search, perception, assignment and subsequent targeted application of the experience within some professional and scientific spheres) and their use as «the basis for the formation of a critical assessment of the author's idea and the development of their own position, hypotheses, and creation of a new product of intellectual activity» [same, 13].

According to the classification suggested in [12, 14], the types of professionally oriented foreign language reading are distinguished based on «goal and result» dichotomy and its implementation in oral/written forms. In accordance with this criterion, the classification includes referent and informative reading, each of which is logically subdivided into 3 types. The referent reading can be split into the orientation-referent, search-referent, generalizing and referent forms, whereas the informative one is presented by evaluating-informative, attributing — informative, and creative and informative types.

In the process of referent reading, a text work with a professionally oriented documentation implies not only referring to key concepts (words, phrases) — so-called «referents», that reflect both the object or phenomenon of non-linguistic reality [11] and the specific subject area with which the text can be correlated. At the same time, speaking of reference reading, the role of graphic material accompanying the text (diagrams, graphs, tables, figures, etc.) contributes to a better orientation and search for referent words should be noted. According to this research, this statement was realized by the example of a concept mind chart (CMC), a graphical systematization tool, introduced and successfully implemented in the study of Vdovina E.K. [20].

Informative reading suggests that the semantic content of the text should be evaluated, selected, assigned, processed, and further used as a basis for creating reader's personal judgments, conclusions both in oral and written forms. The key idea of the informative reading is not only focusing on understanding and selecting the specific text information, but also on its subsequent processing and translation in oral and written forms for the professional and educational purposes.

Considering the goals and objectives specific to our research, we addressed the foreign language reading skills formation based on both the referent and informative types of professionally oriented reading and their features due to its relevance for the goals and objectives of the «Technical and Aviation English» course as well as for the text structure of professional literature studied — manuals, checklists, and handbooks. It should be noted that the above mentioned types of professionally oriented reading correspond not only to the structural and substantive features of professional literature, but the specifics of the future professional activity of graduates of an aviation technical university. In this matter we also agree with Krylov E.G., who notes the exceptional role of these types of professionally oriented reading as an informational basis for «the formation of a professional lexicon of a specialist, as well as the accumulation of speech experience and problem solving» [7].

As a preliminary result, orientation-referent, search-referent, creative and informative types of professionally oriented reading can be selected as the major ones. Afterwards, they were combined with the Content and

Language Integrated Learning (CLIL) components, as this pedagogical approach became the leading one in the formation of not only the professional knowledge, but also the language and cognitive abilities of the technical university students.

For a full understanding of the content and language integrated reading training and its way to be introduced in the educational process, it seems necessary to mention a few words about the CLIL theoretical concepts and the studies related.

2.3. Content and language integrated learning: greater opportunities for the foreign language reading training

Taking into account the specifics of the technical (aviation) university, the goals and planned studying results, the principles of Content and Language Integrated Learning (CLIL), which differs from the traditional approaches to the language for specific purposes training were addressed due to the target setting and the planned learning outcomes and the increasing the role of the students' cognitive activity in the process of professional content acquisition [17, 19, 21]. A standard CLIL lesson is planned in accordance with the «4C» methodology, in which these letters stand for «content», «communication», «cognition», «culture» — the components on which the integration of the language and professional content is based. Each of them represents the informative, communicative, cognitive and culturological elements of CLIL.

The same concept can be traced in a range of studies, contributing to CLIL general studies. This approach is successfully implemented in the model of the professional discipline teaching [10], within the model of content and language integrated learning by means of Russian and English [4], bilingual model of integrative teaching of engineering students [6], and models the formation of foreign language competence based on the future engineers professional communication [2]. The CLIL features are also present in a form of the language scaffolding in the system of professional training aimed at the linguistic and academic communicative competence of the students majoring in economics [1].

In a number of works mentioned above, it's apparent that foreign language reading is considered as a basis for the formation of complex professional and language competencies in accordance with the «4C» methodology. However, there is still no clear description of the principles of the underlying skills formation, which is associated with the orientation to the «content» component of CLIL methodology and the goals specific to each of the studies mentioned. Considering the professional specifics of a technical university, the goals and objectives of the study, the foreign language reading skills training process was complemented with informative, communicative and cognitive elements, respectively.

The informative element is represented by the content of the professional operation documents, such as manu-

als, handbooks, checklists — the sources of aviation-related information crucial for the further flight operation activities.

The communicative element is determined by the lexical units contained in these documents in a form of aviation terminology, abbreviations, acronyms, verbs and adverbs denoting specific actions or operations, i.e. a generalized language unity reflecting both professionally relevant context and content.

The cognitive element includes a set of foreign language skills necessary for further development, as well as so-called «cognitive strategies», i. e. the actions that determine the success of understanding the content, searching and selecting information from authentic sources determining the specifics of the text and the necessary set of means to achieve the goals of foreign language reading. In accordance with the selected types of foreign language reading, the following cognitive strategies were identified for:

- **orientation-referent reading** (definition of the goals and objectives of this type of reading; activation of background knowledge; definition of basic and secondary information; allocation of key professionally significant information; contextualization of the «professional» lexical units; establishing the major links within the text by means of graphical systematization);

- **search-referent reading** (definition of the goals and objectives of this type of reading; creation of a CMC to highlight key author's ideas; compilation of a preliminary list of keywords and terms necessary for the selection; primary analysis of unknown words, concepts, terms; selection of keywords, concepts, terms; contextualization of the «professional» lexical units);

- **creative and informative reading** (definition of the goals and objectives of this type of reading; correlation of textual information with the knowledge/experience of students; definition of basic and secondary information; establishing the major links within the text; presentation of key results in the form of judgments, summaries, comments; reproduction of the «professional» lexical units).

3. Methods and Results

3.1 Participants

The efficiency of the developed Content and language integrated reading training methodology was tested and evaluated during an experimental training. The target group consisted of the 3rd year students of the Flight Operation faculty majoring in civil aircraft operation. The general number of students involved in the study equals 40.

3.2 Procedure and results.

Prior to the initial testing, it's important to determine how correctly the participants of the experiment will be able to work with great scopes of professional and language information and systemize it graphically.

In pursuit of the goals outlined above, it was decided to introduce the participants the goals and objectives of the study as well as to give some preliminary instructions on the CMC designing, since it may help to detect and eliminate potential difficulties while working with the sug-

gested graphical form. At the initial stage of experimental training, an entrance test was conducted to determine a current level of foreign language reading skills mentioned in the syllabus of «Technical and Aviation English» among students of the control (CG) and experimental (EG) groups. Within the test the current level of students' language proficiency implying their foreign language reading skills was evaluated, offering them a professionally oriented text and formulating the main tasks as follows:

Task 1. Read the title of the text and define its topic. What do you know about it?

Task 2. Read the following text and find its key topic and idea. What problem does the author want to show and solve?

Task 3. Read the text and identify the following terms and word combinations in the list. Are these the key words or not?

Task 4. Read the text again and find the words and collocations denoting its key ideas.

Task 5. Read the text and share your thoughts and ideas on the topic described. How important is it for your further professional life?

Task 6. Read the text and make up a short summary of it (up to 10 sentences) sharing your thoughts, ideas, agreement/disagreement with the author.

It should be also noted that the formation of the foreign language reading skills is initially expressed as the number of correct answers given to the questions when choosing the correct statements to the total number of questions and statements asked, as well as the the number of correctly translated terminological units. The foreign language reading skills were assessed and calculated according to the tested criteria and points to match each of the following levels: minimum, average, maximum (Tables 1–2).

Table 1

Points and criteria for reading skills and vocabulary range assessment

Point	Criteria for reading skills assessment
	Minimum level
0	Foreign language reading skills are underdeveloped.
1	The student shows a clear understanding of only individual words and phrases, therefore, the selection and search of keywords, concepts, terms reflecting the professional activities of students cannot be carried out. It is impossible to determine the specifics of using the selected keywords, concepts, and terms, even though it's based on the minimal context and professional language. The selection of text fragments from the point of view of professional significance, as well as the selection of a key idea or problem of the text.
2	The meanings of many words and phrases are not defined, therefore, the selection and search of keywords, concepts, terms reflecting the professional activities of students cannot be carried out. Determining the specifics of using the selected keywords, concepts, and terms is difficult, even though it's based on the minimal context and professional language. The selection of the text fragments from the point of view of professional significance and target orientation is difficult, from which the selection of the key idea or problem of the text cannot be carried out.
	Average level
3	The meanings of many words and phrases are defined, however, the selection and search of keywords, concepts, terms reflecting the professional activities of students are difficult. The definition of the specifics of the use of selected keywords, concepts, terms, based on the minimum context and professional language, is carried out partially. The selection of text fragments from the point of view of professional significance and target orientation is difficult, which is why the selection of the key idea or problem of the text is not carried out wholly.
	Maximum level
4	The student demonstrates an unambiguous definition of many words and phrases, performs a decent selection and search for keywords, concepts, terms reflecting the professional activities of students. Determination of the specifics of the use of the selected keywords, concepts, terms, based on the minimum context and professional language, is carried out wholly. There are minor difficulties in selecting text fragments from the point of view of professional significance and target orientation, the selection of the key idea or problem of the text is also carried out without significant errors. If necessary, the missing information is filled with compensatory skills and minimal context.
5	The student demonstrates a clear definition of many words and phrases, performs an unproblematic selection and search for keywords, concepts, terms reflecting the professional activities of students. Determination of the specifics of the use of the selected keywords, concepts, terms, based on the minimum context and professional language, is carried out wholly. The selection of text fragments from the point of view of professional significance and target orientation is carried out wholly, as is the selection of the key idea or problem of the text. If necessary, the missing information is filled with compensatory skills and minimal context.

Table 2

The levels of foreign language reading skills formation

Foreign language reading skills formation levels	Points
Minimum	0–1 p.
Average	2–3 p.
Maximum	4–5 p.

Table 3

The initial testing results for the control and experimental groups

	Tested criterion (foreign language reading skills)	CG (points)	EG (points)
1	to identify specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation	2	1
2	to define specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation	3	2
3	to identify the verbs describing the list of standard operational procedures	2	2
4	to define the verbs describing the list of standard operational procedures	3	3
5	to obtain and process a professionally relevant information in the documentation given	1	2
6	to evaluate the aviation-related information obtained from the documents critically and professionally	3	3
7	to analyze the aviation-related information obtained from the documents for the professional purposes	1	1
8	to summarize the aviation-related information obtained from the documents for the professional purposes	1	1
9	to present aviation-related information extracted from the text in the form of a project presentation (oral) or an abstract (written)	3	2

Considering the results of the pre-experimental test (Table 3), the participants were asked to do several exercises at the stage of experimental training aimed at the development of their speech skills representing the selected types (orientation-referent, search-referent, creative and informative reading) of foreign language reading.

Before reading, students were suggested to refer to the keywords and terms listed, and complete exercises related to the orientation-referent reading activities, such as:

– *Predict the meaning of the vocabulary words below before reading the text. Create the «vocabulary prediction» charts (before/after reading).*

– *Guess the English equivalents of the words below making a dual-language vocabulary prediction chart (RUS/ENG) before reading the text*

– *Look at the title and schemes of the text. Define the theme of the text. What problem does the author want to show and solve?*

Making these tasks helps the students not only use any reference materials, like dictionaries and glossaries effectively, but also search and select necessary professional information.

The next «after reading» part contained the list of exercises aimed at the use of search-referent reading activities including the following examples:

– *Read the following paragraph (taken from the B-737 FCOM) and find the words and collocations denoting the functional characteristics of landing gear. Make a CMC to represent your ideas.*

– Look at the list of the following sentences. Which procedures do they describe? Which key lexis gave you the idea? Put the sentences into correct order to find out the details.

– Read the text «Jet Engine». Visualize the key idea of its functioning in a form of CMC.

The exercises reflecting the creative and informative reading activities were given as the last stage of the experimental training due to the relative complexity of this type of foreign language reading and the great number of cognitive strategies used and performed. Its complexity can be much observed in the tasks given in the following exercises:

– Look at the following CMC and explain the difference in the terms meaning in *italics* by your own words. Then check your understanding of their meaning using the dictionary.

– Look at the following CMC. What kind of equipment operation is illustrated here? Make up a brief summary including the words/word combinations mentioned in CMC.

– Skim the following paragraph (taken from the B-737 FCOM) looking for main ideas and some details. Present them in a graphic form of CMC.

The final testing stage was correlated with the determination of the level of formation of foreign language reading skills based on the results of the experimental training. To assess the level of reading skills formed within the CLIL studying pattern, the final test was held for both control and experimental groups. During the test, students gave their interpretation of the text content and expressed their own thoughts and ideas, discussed them, and defined the terminological units, abbreviations, and acronyms typical for technical and aviation discourse. The results of the final test are presented in the table below (Table 4).

– Thus, based on the results of the conducted research we can conclude the achievement of its primary goals — the development and improvement of foreign language reading skills by means of referring to the ideas of CLIL and including its elements into the experimental training process.

4. Conclusion

The results obtained from the experimental training within the CLIL methodology allow to claim qualitative improvements in foreign language skills development throughout the entire period of the experiment training. During the experimental work by the example of «Technical and Aviation English» course, its main stages were consistently implemented, during which the necessary requirements for identifying and evaluating the source data, implementing the authors' ideas, monitoring the data obtained and their visual presentation were met. As for the skills formation in the studied form of speech activity (foreign language reading) the qualitative improvements were indicated in such criteria, as searching and obtaining aviation-related information, identifying and defining the lexical units and verbs describing the list of standard operational procedures, summarizing the aviation-related information extracted from the documents for the professional purposes and presenting the aviation-related information extracted from the text in a form of a project presentation (oral) or an abstract (written). The conducted research and its outcomes can be also helpful and effective for the future studies, dedicated to Aviation English/ Technical and Aviation English training as well as for foreign language reading activities management.

Table 4

The final testing results for the control and experimental groups

	Tested criterion (the level of foreign language reading skills formation)	CG (points)	EG (points)
1	to identify specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation	2	4
2	to define specific lexical units, such as terms, abbreviations, and acronyms related to the aircraft operation	4	4
3	to identify the verbs describing the list of standard operational procedures	3	5
4	to define the verbs describing the list of standard operational procedures	3	5
5	to obtain and process a professionally relevant information in the documentation given	1	3
6	to evaluate the aviation-related information obtained from the documents critically and professionally	3	5
7	to analyze the aviation-related information obtained from the documents for the professional purposes	4	5
8	to summarize the aviation-related information obtained from the documents for the professional purposes	3	5
9	to present aviation-related information extracted from the text in the form of a project presentation (oral) or an abstract (written)	2	4

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АФОИЗМ НОМЕРА

К педагогическому делу надо призывать, как к делу морскому, медицинскому или тому подобным, не тех, которые стремятся только обеспечить свою жизнь, а тех, которые чувствуют к этому делу и к науке сознательное призвание и предчувствуют в нем свое удовлетворение, понимая общую народную надобность.

Д. И. Менделеев