

TEACHING AVIATION ENGLISH: ENHANCING TRANSLATION SKILLS THROUGH THE CONTENT AND LANGUAGE INTEGRATED LEARNING METHOD APPLICATION

*ENSINAR INGLÊS PARA AVIAÇÃO: AUMENTANDO AS
HABILIDADES DE TRADUÇÃO ATRAVÉS DA APLICAÇÃO DO
MÉTODO DE APRENDIZAGEM INTEGRADA DE CONTEÚDO E
LÍNGUA*

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ABSTRACT

Teaching aviation translators involves the simultaneous provision of broad branch competence and narrow specialization. This study is aimed to test whether the application of the Content and Language Integrated Learning Method (CLIM) is effective while teaching Aviation English and enhancing translation skills at the aviation university. The experimental study was conducted within the framework of an elective course designed as an English language program with a professional focus on "Translation in the Aviation Industry" for future graduates majoring in Translation. The experiment involved 95 students, with one academic group designated as the experimental group (n = 44) and the second as the control group (n = 51). The study followed a pretest-posttest experimental design. In the pretest stage, the homogeneity of CLIM and non-CLIM groups was statistically proved by the χ^2 Pearson Correlation Coefficient. The experimental group received the CLIM methodology, while the control group was taught by a traditional approach. The post-test took into account both linguistic and content-related learning outcomes aimed at improving English proficiency in the aviation-oriented and translation direction within the CLIM and non-CLIM research groups. The research findings demonstrated that experimental group had significantly outperformed the control group during the final test. Teaching Aviation English and enhancing translation skills through the application of the CLIM method which encompassed aviation podcasts, subject matter videos, professional literature overview, stakeholders' involvement, and engagement in the aviation environment, are effective.

Keywords: Aviation English, Content and language integrated learning, Experimental methodology, Subject matter knowledge, Translation students.

RESUMO

Ensinar tradutores de aviação envolve o fornecimento simultâneo de ampla competência no ramo e especialização restrita. Este estudo tem como objetivo testar se a aplicação do Método de Aprendizagem Integrada de Conteúdo e Idioma (CLIM) é eficaz no ensino de Inglês para Aviação e no aprimoramento das habilidades de tradução na universidade de aviação. O estudo experimental foi realizado no âmbito de uma disciplina eletiva concebida como um programa de língua inglesa com foco profissional em "Tradução na Indústria da Aviação" para futuros graduados com especialização em Tradução. O experimento envolveu 95 alunos, sendo um grupo acadêmico designado como grupo experimental (n = 44) e o segundo como grupo de controle (n = 51). O estudo seguiu um desenho experimental pré-teste-pós-teste. Na etapa de pré-teste, a homogeneidade dos grupos CLIM e não CLIM foi comprovada estatisticamente pelo Coeficiente de Correlação χ^2 de Pearson. O grupo experimental recebeu a metodologia CLIM, enquanto o grupo de controle foi ensinado pela abordagem tradicional. O pós-teste levou em consideração os resultados de aprendizagem linguísticos e relacionados ao conteúdo, destinados a melhorar a proficiência em inglês na direção orientada para a aviação e na tradução dentro dos grupos de pesquisa CLIM e não-CLIM. Os resultados da pesquisa demonstraram que o grupo experimental superou significativamente o grupo de controle durante o teste final. Ensinar inglês para aviação e aprimorar habilidades de tradução por meio da aplicação do método CLIM, que abrange podcasts de aviação, vídeos sobre assuntos, visão geral da literatura profissional, envolvimento das partes interessadas e envolvimento no ambiente da aviação, são eficazes.

Palavras-chave: Inglês para Aviação, Aprendizagem integrada de conteúdo e idioma, Metodologia experimental, Conhecimento do assunto, Estudantes de tradução.

Introduction

The realities of globalization in the first decades of the 21st century are synchronous with updating the content of most educational phenomena, including foreign language for specific purposes (LSP). The special mission entrusted by humanity to foreign languages as the basis for intercultural interaction has actualized the integration of language and subject approaches in professional education and activities, in particular in the aviation industry. Indeed, aviation is a specialized, high-tech industry that covers a wide range of activities related to communication, the use of various terminologies and their correct interpretation, etc. (Ragan, 1996).

The problem of teaching English for Specific Purposes, in particular the aviation terminology, has been systematically studied from different perspectives (Gollin-Kies et al., 2015; Estival, 2016). Kovtun et al. (2021) studied aviation subject matter competence as the basis for the successful professional activity of a translator in aviation. Achieving this competence is realized through modelling typology of activities for teaching subject matter in the course of aviation translation. Student motivation, practice-oriented learning methods, and communicative and informational learning tools have been recognized as the key components of educational activity modelling under this approach. The authors have proved the effectiveness of the synthesis of traditional and interactive exercises, illustrative audiovisual material, etc.

The strong civilizational development of the countries of the world and the strengthening of integration interactions in the field of aviation actualize the well-known thesis of Crawford (1993) about the growing need for both broad branch competence and narrow specialization. It is not the first time that the philosophical contradiction of the antonymous pair “broad-narrow” becomes the basis of promising scientific research in general, and educational methods in particular. This study is concerned with introducing effective methods into the educational process to achieve an integrated result required by employers in the aviation industry and by students. This method is based on the interconnection between English, which is

the basis of broad professional translation competence, and aviation content, which is a component of narrow professional competence in the relevant field.

The urgency of the problem allowed us to put forward a hypothesis that teaching Aviation English and enhancing translation skills will be effectively implemented at the aviation university through the application of the Content and Language Integrated Learning Method – CLIL. The basis of the hypothesis test is the theoretical principles of teaching aviation translation to university students and the practical experience of ensuring the appropriate educational process, a specially developed experimental CLIM teaching method, which affects the effectiveness of learning Aviation English by translation students to form a terminological corpus and the content of professional activities in aviation.

The need to introduce the advanced CLIM technology into the educational process of universities is reinforced by the argumentation of Krashen (1988) and Swan (1995₁; 1995₂) monitor model. They believe that the language evolves when there is a genuine conversation centered around communication skills rather than fixating on the precision of words and grammar. In addition, it is important to create a positive learning environment using this technology, to promote the awareness of those who learn that the language can be mastered only by having motivation and being an active subject of the learning process. Such a view can be taken as the basis for integrating both subject and language approaches (Dalton-Puffer & Nikula, 2006).

In the theoretical study of the Ukrainian scientist Potapenko (2014), the main definitions of the CLIM Method are analyzed, its key concepts are examined, and the advantages and difficulties of its implementation are distinguished. From the point of view of practical aspects of implementing the CLIM Method, the article by Karimi et al. (2019) is important. In this article, the scientists describe the experience of implementing such technology to improve the learning of aviation English by Iranian students of aviation specialties, as well as their attitude and motivation to learn highly specialized features of English for aviation. It is noted that the technology contributed to the deepening of the aviation content knowledge of students, provided that they integrated thinking and cognitive awareness during the

learning process. Notably, the results of this study demonstrated how CLIM methodology significantly improved students' motivation. It also led to an improvement in language and subject learning among the students of aviation specialties (Karimi et al., 2019, p. 764). The conclusion that CLIM is an effective modern technology is also considered valid in terms of the methodology on which the educational phenomenon “English for Specific Purposes” is based. A study by Dib and Addou (n.d.) integrated methodological principles and practical implementation. The scientists conducted pre and post-testing of one group of Zenata airport's air traffic controllers, which tested the effectiveness of their CLIM training. A significant contribution was made to the theory of technology and its practical implementation in the training of specialists in the aviation industry by one of the “practical reviews,” which was devoted to experiments, methods, and data analysis (Dib & Addou).

The specified diversity of researched aspects of CLIM technology proves its relevance and determines the need for case studies of the method of complex (integrated) learning of content and language, and variations of its implementation in the educational process of translators and potential employees of the aviation industry.

The study aims to test the hypothesis that aviation university students will effectively teach Aviation English and enhance translation skills by applying CLIM and the experimental methodology in a real university educational process.

Research tasks: to investigate the real state of the problem under study; to develop the research methodology and the procedure for its implementation; to select the content and to apply it in classes; to develop special accompanying exercises; to test the suggested structure.

The authors consider that Aviation Subject Matter Competence as a component of the translator's professional competence is the basis of successful professional activity in the aviation industry and is formed in the educational process of the university based on the application of CLIL; the English language is classified as a “language for specific purposes”.

Methodology

The research was conducted at the National Aviation University in Kyiv (Ukraine) as part of the "Translation in the Aviation Industry" course for students majoring in Philology (Germanic Languages and Literature (including the "Translation" specialization). "Translation in the aviation industry" is the authors' elective academic discipline designed as an English for Specific Purposes (ESP) course for the third-year Bachelor translation students. The course is aimed at mastering aviation English-Ukrainian translation.

Participants

A total of 95 student majoring in translation took part in the pedagogical experiment. One academic group was chosen as an experimental group (a total of 44 students) and the other one as a control group (a total of 51 students). As part of the experiment, the study included a control and a final evaluation. The experimental group (EG) followed the CLIM methodology. The control group (CG) was practicing according to the traditional methodology.

Research Design

The researchers started to collect data after the participants began their "Translation in the aviation industry" course. In the first lesson of the course, the pretest was administered to the translation students to examine their general expertise in technical aviation discourse and translation. In the pretest stage, the homogeneity of CLIM and non-CLIM groups was statistically proved using Pearson's χ^2 Correlation Coefficient (Social Science Statistics).

The next stage of the research was designing and piloting the experimental CLIM methodology for experimental studies. Both groups (EG and CG) underwent 5 intermediate tests designed to monitor the progress of acquiring Aviation English and mastering translation skills of aviation subject matter (ASM) texts selected according to the course syllabus. Two groups worked independently. While the EG

students were constantly engaged in CLIL, the CG students only worked on traditional exercises from their textbooks.

In the last lesson of the “Translation in the aviation industry” course, the posttest with the same task as the pretest was administered to check aviation language and content learning outcomes. The teachers graded the students’ performance on different aspects: vocabulary, grammar, semantics and pragmatics. According to the translation performed at pre and post-task, three quality levels were determined (low, satisfactory and high). The results’ reliability was checked by the χ^2 Pearson Correlation Coefficient (Social Science Statistics, n.d.).

The pedagogical experiment lasted during one academic term (4 ECTS credits) in the framework of the course.

Data Collection and Analyzing

In this study, 3 instruments were employed for data collection (pretest, intermediate tests, and posttest).

The first instrument, the pretest, was related to students’ language and content knowledge of the ASM text and translation. It was a specialized text on avionics called “Cockpit” that students had to translate from English into Ukrainian. The outcomes of students’ translations were evaluated under 2 criteria: aviation language (terminology-oriented) and aviation content (subject matter-oriented).

Monitoring the ongoing process of the pedagogical experiment, researchers systematically collected and analyzed data through the second instrument, intermediate tests. The intermediate results were placed into the register books of both EG and CG.

The third method, post-testing, focused on language and content related learning results. These outcomes were related to the improvement of aviation-related English proficiency and interpretation with or without CLIM practice in the monitored groups. The test revealed participants’ achievements in Aviation English and subject matter knowledge. Students were suggested to translate the text “Flight deck” adopted to the pretest “Cockpit”. It was done to assess the language and content knowledge before and after the experimental teaching. Additionally, on the

same day, students underwent an oral examination where they were required to discuss topics related to aviation.

Results

Pretest Evaluation

The authors systematized the data obtained during the preliminary testing. Teachers evaluated students' English-Ukrainian translations of the aviation text by two criteria: aviation language (terminology-oriented) and aviation content (subject matter-oriented). As a result, they have defined three levels of quality.

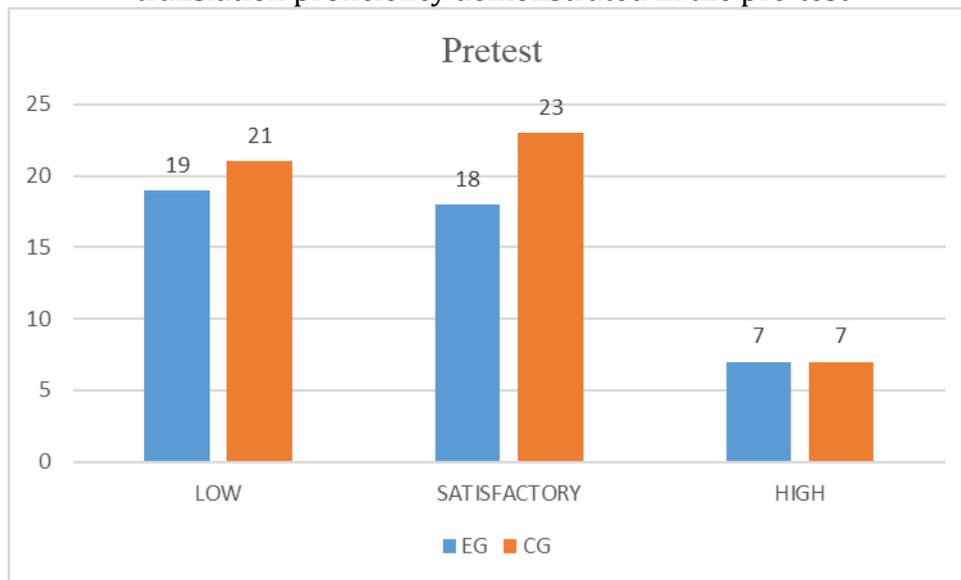
The high-quality level of performing translation indicated using correct aviation terminology in translation (aviation terms, abbreviations and notions), rendering aviation realia and slang that assumes extra-linguistic knowledge as well as following grammar and stylistic rules of Aviation English.

The translation was performed at a satisfactory quality level. However, there were some inaccuracies in the terminology due to lack of experience in the aviation sector. Nevertheless, its meaning remained clear to an aviation expert.

In the translation with a low-quality standard, the specialized terminology was inaccurately rendered, and subject matter information was not detected. Therefore, the sense of professionally oriented situations was distorted.

The information presented in Figure 1 illustrates the advancement of both EG and CG students and the improvement of their translation performance in the three quality levels at the initial stage of testing.

Figure 1 – The advancement of EG and CG students and the enhancement of their translation proficiency demonstrated in the pre-test



The results showed that both groups lacked a sufficient level of aviation-related English proficiency as well as the knowledge in this discipline. The experimental CLIM methodology was introduced in the EG to improve their results. Meanwhile, a conventional instructional approach was employed in the CG.

Homogenizing Groups on the Pretest

The uniformity of the samples was verified through an examination of the Pearson's χ^2 Correlation Coefficient between the two empirical data indicators (Social Science Statistics, n.d.). Following the pre-test outcomes, the statistical hypothesis H_0 was affirmed, indicating that the two variables do not exhibit a significant difference from a normal distribution. Table 1 displays the results of the χ^2 -criterion, which compares the empirical distributions in the experimental group (EG) and control group (CG). Critical and empirical values are presented in Table 2.

Table 1 – χ^2 -criterion calculation of the empirical distributions in the Experimental Group and Control Group after the pre-test

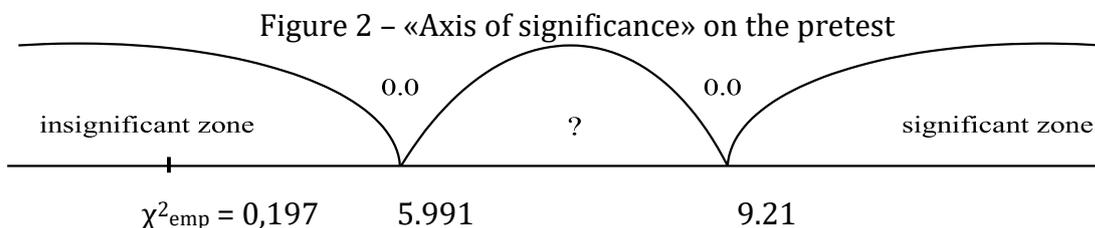
Nº	Empirical frequency	Theoretical frequency	(fe - ft)	(fe - ft) ²	(fe - ft) ² /ft
1	19	18.53	0.47	0.22	0.012
2	21	21.47	-0.47	0.22	0.01
3	18	18.99	-0.99	0.98	0.052
4	23	22.01	0.99	0.98	0.045
5	7	6.48	0.52	0.27	0.042
6	7	7.52	-0.52	0.27	0.036
Totals	95	95	-	-	0.197

Result: $\chi^2_{emp} = 0.197$.

Table 2 – Critical and empirical values of χ^2 at V 2

χ^2_{emp}	χ^2_{cr}	
	$p \leq 0,05$	$p \leq 0,01$
0.197	5.991	9.21

Following the calculations, we obtaine $\chi^2_{cr} = 5.991$ (at $p \leq 0.05$) and $\chi^2_{cr} = 9.21$ (with $p \leq 0.01$). The “Axis of significance” results of the pre-test (Figure 2):



Pearson’s χ^2 criterion was calculated using the formula:

$$\chi^2 = \chi_n^2(\theta) = n \sum_{j=1}^k \frac{(q_j - p_j(\theta))^2}{p_j(\theta)}$$

We obtained $\chi^2_{emp} = 0.197$. Therefore, $\chi^2_{cr} > \chi^2_{emp}$, our empirical value confirms the H_0 hypothesis: two variables do not differ significantly from that which is normally distributed.

Intermediate tests

During the course, enrolled CLIM and non-CLIM students underwent 5 intermediate tests. The tests were designed to monitor the progress of acquiring Aviation English and mastering translation skills in EG and CG. Each test was done after finishing a separate subtopic within the course. Tests 1, 4, and 5 were designed to elicit aviation subject matter (to measure content learning). Tests #2 and #3 were designed to assess the quality of translation from aviation English to Ukrainian. The primary goals were to gauge language proficiency and evaluate translation skills.

Test 1. Fundamental Concepts in Aviation. (*Task: listen to the speaker discuss various aircraft types and respond to the questions*).

Test 2. Aircraft structure. (*Task: translate the text on aircraft instruments and systems from English into Ukrainian*).

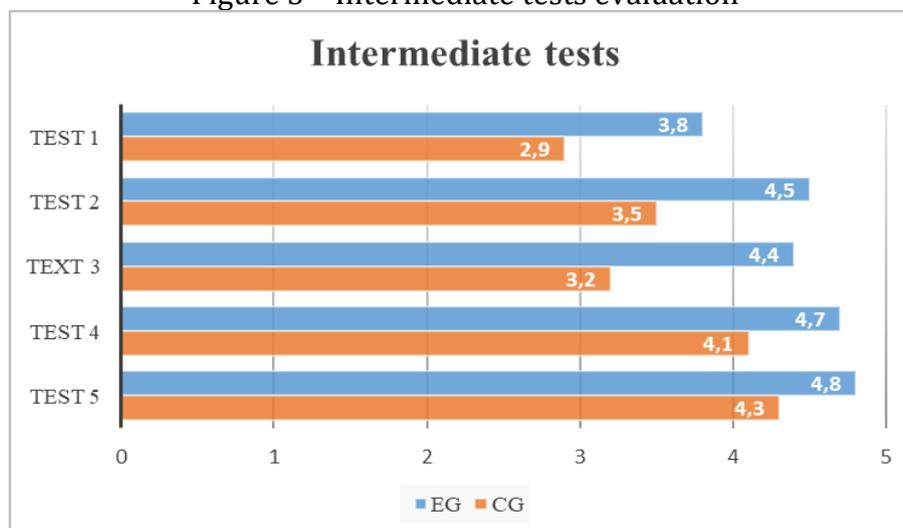
Test 3. Airport operation. (*Task: watch a video about airport layout and make an annotative interpretation from English*).

Test 4. Aviation crashes and accidents. (*Task: make a report about a human factor in make a report about a human factor in aviation*).

Test 5. Aviation safety and security (*Task: discuss the various factors that impact aviation safety, including Controlled Flight Into Terrain (CFIT), bird strikes, volcanic ash, icing, wind shear, hijacking, etc.*).

Figure 3 shows the mean values based on a five-point scale.

Figure 3 – Intermediate tests evaluation

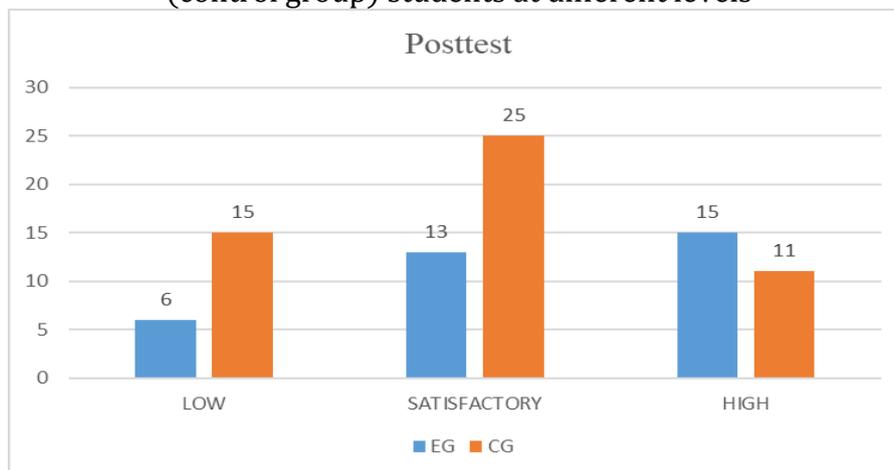


As depicted in Figure 3, students in the experimental group (EG) exhibited greater current learning progress compared to those in the control group (CG), providing evidence for the effectiveness of the experimental CLIM methodology.

Results on Posttest

Figure 4 displays the post-test results, indicating the aviation English proficiency and translation skills levels in both the experimental group (EG) and control group (CG).

Figure 4 – Distribution of posttest scores among EG (experimental group) and CG (control group) students at different levels



Reliability of Results

The independent Pearson's χ^2 test was employed to assess the results of the CLIM and non-CLIM groups at the post-test stage (Table 3).

Table 3 – χ^2 -criterion calculation of the empirical distributions in EG and CG on the posttest

Nº	Empirical frequency	Theoretical frequency	(fe - ft)	(fe - ft) ²	(fe - ft) ² /ft
1	6	9.73	-3.73	13.91	1.43
2	15	11.27	3.73	13.91	1.234
3	13	17.6	-4.6	21.16	1.202
4	25	20.4	4.6	21.16	1.037
5	25	16.67	8.33	69.39	4.163
6	11	19.33	-8.33	69.39	3.59
Totals	95	95	-	-	12.656

Result: $\chi^2_{emp} = 12.656$.

Differences between these distributions can be assumed to be valid if the χ^2_{emp} is equal to or higher than $\chi^2_{0.05} = 5.991$. Such changes can be considered even more reliable if χ^2_{emp} is equal to or higher than $\chi^2_{0.01} = 9.21$. Therefore, χ^2_{emp} exceeds the critical value, and differences between the distributions are statistically significant. Thus the H_0 hypothesis is rejected. The CLIM methodology statistically proves to be effective.

Discussion

The research outcomes showed that CLIM students' performance in tests was higher compared to the other group who took part in the traditional ESP and translation class. Following the CLIL methodology, EG students were more confident in communicating in English on aviation topics. They had professional skills in handling and translating aviation terms and concepts. In addition, EG students were able to translate ASM texts adequately in both linguistic and pragmatic contexts.

The research was based on such scientific categories as communicative, competence and integrative approaches; Aviation English; the experimental CLIM methodology. The developed and tested methodology is reproducible, it develops translation students' listening, reading, speaking and translation skills aimed at professional activities in the aviation industry.

The scientific basis of the study

Communicative, competence and integrative approaches

We consider the interaction of communicative, competence and integrative approaches as a synergy that provides a total effect because when two or more factors interact, their effect significantly outweighs the effect of each component.

Since communication as a concept and action integrates traditional phenomena, i.e. messages, connection, and communication and presents many directions of human interaction in the world, communicative and competence approaches in education are recognized as basic, as stated in numerous studies of international scientists (Brumfit & Johnson, 1979; Grognet & Crandall, 1982). We followed this conclusion when developing CLIM experimental methodology.

An integrative method was recognized as a driving force for advancing education. Specifically, skills that can be transferred and are cultivated according to the criteria of academic standards are considered equivalent to crucial competencies within the higher education framework across Europe (Bennett et al., 1999). They encompass the abilities to locate and analyze information; communicate; interact; make presentations; plan and solve problems; develop socially; analyze; evaluate and find the right way out of a problem situation; see global perspectives; have an active civic position; be aesthetically responsible (Fallows, & Steven, 2000). In our view, the outlined list summarizes the professional characteristics of an aviation translator, and as a result, it was considered in the development of the CLIM experimental methodology.

During our research, we also relied on the thesis by Klein (2005). The author believes that the integrative approach serves as a comprehensive concept encompassing various elements, including structures, tactics, and undertakings that connect different gaps. These may include the transition from high school to college, the integration of general education with the major. This method bridges the gap between introductory and advanced levels, and links experiences within and outside the classroom. It also harmonizes theory with practice, and connects diverse disciplines and fields. (p. 8).

Therefore, without analyzing many other scientific views on these approaches, we note that in the educational process of the university, communicative, competence, and integrative approaches form a kind of triangular umbrella, under the “protection” of which translation students master Aviation English as a professional language.

Aviation English

As a language of professional activity in the translation of aviation terminology, aviation English has been studied in various aspects. Notably, the majority of studies focus on the learning of aviation-related English by future students of aviation specialties as part of their compulsory disciplines. They are vital for the professional activities of future specialists in the aviation sphere. The practical results of these studies proved that the most widespread approaches to Aviation English teaching to aviation translation students are competence, communicative and contextual. The context of the English aviation language is being updated, in particular following the requirements of the International Civil Aviation Organization, which is discussed in articles by Kukovec (2008). The scholar underlines the importance of teaching English for aviation and wireless communication following the requirements for pilots' language proficiency that the International Civil Aviation Organization has recently established. In particular, this refers to new views on the role of specific professional expressions. After all, the ICAO standards are meant to cover many routine scenarios and include some potential emergency or non-standard situations. The authors emphasize that the prescribed phrases cannot cover all possible scenarios and reactions. Thus, it is necessary to have a language that goes beyond the narrow set of ICAO phraseology. There is a need for aviation English based on a proficient knowledge of standard English (p. 129).

After examining the linguistic and psycholinguistic aspects of wireless discourse and considering the factors contributing to communication errors in wireless communication, along with analyzing the psychophysiological aspects of pilots' in-flight activities (such as information overload, time constraints, and

constant stress), Kovtun, Melnyk, Khaidarie, and Harmash (2019) have pinpointed specific exercises for aviation students. These exercises aim to fulfill language criteria for ensuring safety, clarity, and efficiency in communication within the sphere of civil aviation. In particular, they refer to exercises aimed at preparing students to switch from one language to another.

It is well known that translation is a multifaceted phenomenon, where adequacy is considered the key factor. Aviation translation is based on Aviation Subject Matter Competence. A misunderstanding caused by an inadequate translation can lead to unpredictable consequences (Stitt, 2016). We have conducted several studies on improving the methodology of teaching a foreign language to students at the aviation university, tested the content-oriented structure of Aviation Subject Matter Competence of translation students within the framework of the English-Ukrainian language pair, proved that audiovisual material is an important means of visualizing images, with the help of which Aviation Subject Matter Competence of translation students is successfully formed. The positive results obtained in the course of previous studies became the basis for the development of the CLIM experimental methodology. The suggested methodology is based on the previously proven statement that the prerequisite for an adequate English-Ukrainian aviation translation in professional activity is the formed Aviation Subject Matter Competence, which integrates students' terminologically significant aviation knowledge. Thus, Aviation English is both a content and a means of training specialists in the aviation industry, including translators.

CLIL

The hypothesis that Aviation English knowledge and translation skills will be effectively formed in aviation university students through the application of CLIM is based on the results of previous studies: audiovisual material and special exercises contribute to the formation of Aviation Subject Matter Competence of students, which is a prerequisite for their ability to perform adequate English-Ukrainian aviation translation in professional activity. The need for innovative changes in training students under the realities of life (global pandemic, war in Ukraine) led to

the comprehensive mastering by university teachers of distance education resources, particularly Internet content available for educational purposes. According to our approach, such educational tools should be included in the experimental CLIM methodology as mandatory components: aviation podcasts, subject-related videos, professional literature overview, inviting stakeholders, and engaging in the aviation environment.

The developed experimental technology takes into account the opinion of CLIM researchers who study various aspects of its implementation. Researchers from Columbia University, specifically Mcdougald and Pissarello (2020), released findings from their study titled "Content and Language Integrated Learning: In-Service Teachers' Knowledge and Perceptions Before and After a Professional Development Program." The article proves that the mixed-methods' research has led to significant progress in the implementation of CLIM.

The research investigated the views and understanding of in-service teachers regarding content and language-integrated learning (CLIL) and bilingual education. The authors posit that effective teamwork and support from administrators are essential elements for the successful execution of CLIL.

We acknowledge the assertion that CLIM has been employed as an instructional method for teaching foreign languages, where language forms are acquired indirectly through non-linguistic material, seen as constructive (European Commission, 2006; Marsh, 2002). Karimi et al. (2019) conduct a thorough examination of the contributions made by different scholars to the evolution of CLIM theory and its practical application. The author describes how to improve the learning of aviation English by pilots. Two theses were recognized as important for our research. Firstly, all academic aviation programs implemented worldwide offer English as the official and standardized language of aviation communication. In the first place, a significant portion of aircraft and airline manuals, along with pilots' documents, flight plans, and airport control procedures, are typically written in the English language. Secondly, the introduction of CLIM has led to a higher proficiency in foreign languages and enhanced comprehension of aviation-related information. Furthermore, students' motivation has shown an increase compared to

conventional non-CLIM methods, although measuring or verifying this motivation proved challenging during the CLIM implementation.

So, it was found that the scientific basis of CLIM is actively formed by both scientists and pedagogical practice. We conducted experimental testing to evaluate the effectiveness of the CLIM methodology on students' learning of aviation-related English. The modern content, developed through a combination of communicative, competency, and integrative approaches, was implemented through podcasting and video technologies such as aviation podcasts and YouTube videos. Additionally, we utilized a review of professional literature from aviation-related forums and magazines, engaged aircraft stakeholders by inviting experienced pilots and aviation specialists, and immersed students in the aviation environment through visits to exhibitions, museums, and factories. The primary focus of the study was to assess the impact of the CLIM methodology on improving students' comprehension of aviation-related English, including vocabulary, content understanding, and the quality of translation in English-Ukrainian ASM texts. To achieve this, a specially designed CLIM experimental teaching methodology was introduced and tested in the EG.

CLIM – Experimental teaching methodology

The CLIM techniques generated substantial material for educational purposes, facilitating the development of language skills such as listening, reading, speaking, and translation. Learners who embraced the CLIM approach demonstrated proficiency in mastering aviation English and gained the ability to translate aviation terminology and texts. The experimental CLIM method incorporated diverse elements, including aviation podcasts, thematic videos, a review of professional literature, and engaging students in activities related to the aviation field, shaping the content of the methodology.

Podcasts for learning aviation terminology

The Experimental Group students were trained in listening to aviation experts talk about various professional situations and how to deal with them.

We used the most-viewed podcasts to help students master aviation vocabulary and topics through listening:

- Airline Pilot Guy Show (<http://airlinepilotguy.com/podcasts/>);
- Airplane Geeks (<https://www.airplanegeeks.com/>);
- Aviation Careers Podcast (<http://www.aviationcareerspodcast.com/past-episodes/>);
- The Fighter Pilot (<https://www.fighterpilotpodcast.com/>);
- The Finer Points (<https://www.learnthefinerpoints.com/podcast>);
- AOPA Hangar Talk (<https://www.aopa.org/news-and-media/podcasts/podcasts/hangar-talk>);
- Inspired Pilot (<https://podcasts.apple.com/us/podcast/the-inspired-pilot-podcast/id955053039>);
- There I Was... (<https://www.listennotes.com/podcasts/there-i-was-an-aviation-podcast-aopa-air-v9lrw4BkC7/>);
- Pilot to Pilot (<https://podcasts.apple.com/us/podcast/pilot-to-pilot-aviation-podcast/id1208147571>).

To help students to listen, teachers explicit subject-matter vocabulary. Future translators should take notes while listening. Afterwards, they discuss their listening in pairs or with an entire group.

Subject matter videos

Subject-related videos were used in CLIM to develop translation competence on aviation topics. The content-oriented audiovisual material with specially developed training activities enhanced students' skills in translating ASM texts. Specially developed training activities included (Kovtun et al., 2021):

- exercises for practicing aviation terminology and training the translator's memory (vocabulary boost, snow-boll, etc.);

- exercises for developing fluency in aviation oral discourse (“silent video” pre-watching discussion, picture description, etc.);
- exercises aimed at extracting subject matter content out of a video fragment (i.e., gap filling, completing sentences, matching, true/false tasks while watching);
- exercises for mastering aviation translation/interpreting skills (practice in written translation and oral consecutive/simultaneous interpreting).

The tutorial videos were taken from YouTube channels dedicated to aviation like Capitan Joe (https://www.youtube.com/channel/UC88tIMjiS7kf8uhPWyBTn_A), Fluent Pilot (<https://www.youtube.com/channel/UCuABpsbSGRMYo8qFIFrpUjw>), Big Metal Bird (https://www.youtube.com/watch?v=y1Jq46N2NEM&ab_channel=PercoLattePercoLatte), Air Crash Investigation by National Geographic (<https://www.nationalgeographic.com/>).

Professional literature overview

The CLIM students were required to review aviation-related magazines and forums to improve their reading and translating skills. Articles in aviation professional magazines like Airways (<https://airwaysmag.com/>); Skies (<https://skiesmag.com/>); Flying (<https://www.flyingmag.com/>) are often supplemented by clarifying visuals (photographs, pictures, charts, etc.) that help to acquire language and content knowledge. However, professional forums like The Aviation Herald (<https://avherald.com/>) can be formal, have a complex syntactic structure and be rich in aviation terminology and phraseology. Thus, students had to use reference books to search for additional information or surf the Internet. To help with that, teachers provided learners with key vocabulary before reading or translating; elaborated pre and post-reading activities to reduce the reading demands of the text and recap the acquired information.

Stakeholders involvement

Stakeholders play an essential role in the modern educational process. Involving aviation stakeholders can greatly enhance students' learning motivation and improve subject knowledge. In our CLIM experiment, aviation pilots from Windrose Airlines attended special workshops, round tables, internet conferences and thematic webinars.

The decision-making workshop was a brainstorming activity aimed at building strong professional-academic cooperation between pilots and students who study Aviation English. The workshops aimed to search for effective ways to overcome linguistic challenges in the pilot's professional activity like passing ICAO English Test.

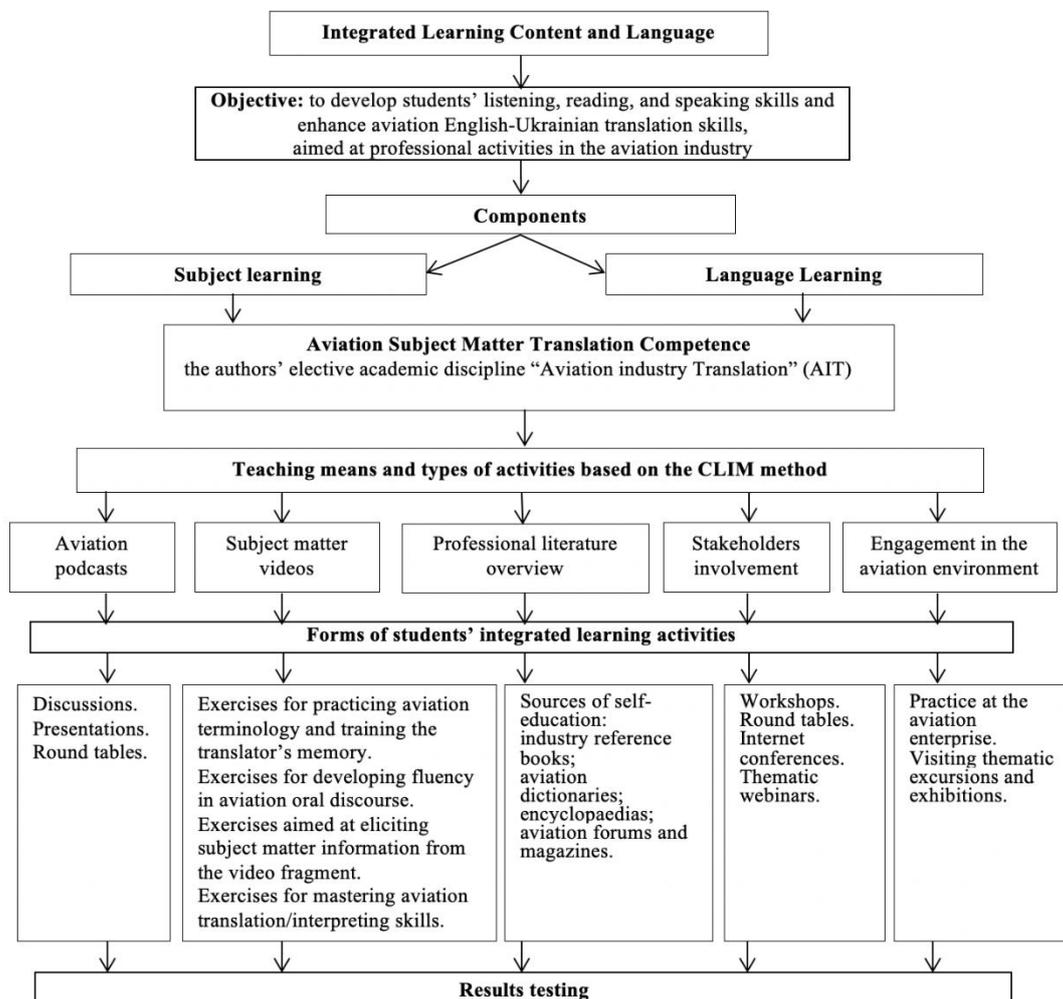
Round tables, internet conferences and thematic webinars were organized to engage students in active discussion with pilots on aviation topics. Pilots shared their professional experiences and eagerly answered students' questions.

Engagement in the aviation environment

In the CLIM methodology, it is very important to acquire knowledge in a professional environment. Going on guided tours to the State Aviation Museum and Kyiv's Oleg Antonov Aviation Museum, visiting Antonov State Enterprise and visiting aviation exhibitions and aviation fests (like Korolev Avia Fest) helped EG students investigate and learn aviation in real life.

The suggested hypothesis that teaching Aviation English and enhancing translation skills are effectively implemented by aviation university students through applying CLIM method is confirmed. The essence of the tested experimental technique is concentrated in Figure 5.

Figure 5 – Modelling of the CLIM experimental methodology



Conclusions

The Content and Language Integrated Learning Method – CLIL, which contributes to the effective teaching of Aviation English and enhancing translation skills, is an urgent pedagogical problem, an educational phenomenon that is actively researched by the community of scientists from universities around the world. The experimental methodology is based on scientific principles, in particular, the synergy of communicative, competence and integrative approaches in education; Aviation English as Aviation Subject Matter Translation Competence; contains the author’s content of means and forms of students’ educational activity within the framework of the approved CLIM methodology, which is reproducible, develops

students' listening, reading, speaking and translation skills aimed at professional activities in the aviation industry. In the course of the study, the effectiveness of the methodology and the author's elective educational course "Translation in the aviation industry", developed as a course of English for specific purposes (ESP) for translation students to master aviation English-Ukrainian translation, has been confirmed. Positive results have been obtained. Students who employed the Content and Language Integrated Learning Method (CLIL) experienced an enhancement in both Aviation English and translation skills. It has been confirmed that teaching Aviation English and enhancing translation skills through the application of the CLIM method is effective.

In light of the findings, it is suggested that university program developers should consider the use of the CLIM methodology in their syllabi. In this way, university teachers are expected to apply it in their language and translation classes. This type of strategy favors the development of meaningful content for meaningful learning and strengthens translation skills. Besides, the use of experimental teaching methods is recommended for future interpreters as well as for future pilots and others involved in the aviation professional community. As far as the teaching experiment was conducted using a blended learning format due to the pandemic and war, the proposed methodology can be applied both in traditional classrooms and within e-learning.

This study was limited in the framework elective academic discipline "Translation in the aviation industry", designed as an English for Specific Purposes (ESP) course for the third-year Bachelor translation students and aimed at mastering aviation English-Ukrainian translation. The elective course is not viewed as final in every detail, but it is going to be further improved based on teaching experience to meet the students' and employers' needs more adequately. In particular, the prospects of further research could include practical tips for designing CLIM activities, suggestions for integrating aviation-specific content into language instruction, and insights into how to effectively measure the students' feedback on CLIL-based courses.

In this way, the researchers who would conduct similar studies can focus on getting students' feedback through a survey, testing new training activities and techniques aimed at teaching Aviation English, including those which can address the specificity of e-learning. They may also investigate the correlation between the CLIM method and students' motivation and apply theoretical CLIM background to other case studies.

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