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Integrated Subject-Language Training of Students of Engineering Specialization Based on Digital Technologies

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Abstract

Modern Federal State Educational Standards, the State Program of the Russian Federation "Development of Education in 2018-2025 years" RF DoD Program "E-University" imposes the higher education system requirements to increase interdisciplinary interaction (Krylov, 2019; Coyle, Hood & Marsh, 2010) on the basis of digital technologies (Titova, 2017; Pearce et al., 2011). The aim of the research is the theoretical justification of the ideas of integrated subject - language training at higher educational institutions in domestic science, as well as the ideas of Language for Special Purposes – LSP, English for Specific Purposes – ESP, General English - GE Content and language integrated learning – CLIL developed by foreign researchers (Gardiner, 1998; March, 2000), the definition of scientific approaches in the process of implementing ideas subject-language training in higher education system of the Russian Federation, experimental verification of the effectiveness of the implementation of the subject-language training on the basis of digital technologies in the educational process of higher school. Research methods: theoretical analysis and systematization of psychological and pedagogical researches of domestic and foreign authors on the study; empirical: quantitative and qualitative analyses of questionnaires among students of senior courses. The study involved 87 students 4th– 5th year of specialist's degree.

The results of the conducted experimental work confirmed effectiveness of the educational process based on integrated subject - language training on the basis of digital technologies, focused on interdisciplinary interaction of professional and foreign language meaningful components. The implementation of integrated subject - language training on the basis of digital technologies in the educational process of the University will help to provide interaction between professional theoretical knowledge and foreign language communicative practices, providing motivation for self-education; rational use of the budget of educational classroom time and time spent on extracurricular self-study, through the realization by students of the practical relevance of the acquired knowledge; variable course content that allows for a differentiated approach to students based on digital technologies. The practical significance of the results of the study is the possibility of their use in the development of curricula, work programs, further research on this issue.

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Keywords: integration, integrated subject-language learning, professionally-oriented training, LSP, ESP, GE, multidisciplinary collaboration.

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Introduction

Providing educational organizations with large opportunities for self-determination of the structure and content of programs pursuant to the requirements of Federal State Educational Standards, as well as the presence in the list of mandatory competences for graduates universal competences (along with professional) attests to the relevancy and timeliness of the development of interdisciplinary educational programs (Krylov, 2019; Popova & Iovleva, 2017) in the context of digitalization of education (Titova, 2017).

The process of digitalization of education, which is understood as the transformation of all types of information sources in the digital language (texts, tables, audio, video, etc.) is currently becoming a global trend. British expert Tim Berners-Lee (developer of the World Wide Web) marked the transition to a digital format as a turning point in the history of education (Kuck, 2004). Adapting to new realities, the member States of the European Union adopted the program of training citizens digital skills, integrating it in the educational process of educational institutions, taking into account the needs of the labor market in the specialist ready to adapt to changes through self-education, which is reflected in the recommendations of the European Commission as "development of key competences for learning throughout life by integration of new IT-technologies in the activity of educational institutions on the territory of the European Union (Brolpito, 2018).

In the national system of higher education requirements of the Federal State Educational Standard (FSSES) (2016) in the context of digitalization of education direct universities to update educational content and search, test and implement adequate in the circumstances methods and tools that meet the modern requirements to quality of preparation of future specialists. In addition, the State Program of the Russian

Federation "Development of Education for 2018-2025 years" the focus is on the development of the project "Modern Digital Educational Environment of the Russian Federation" through the program "Development of an Integrated System of Highly Skilled Personnel" through the introduction of adaptive systems the task of practice-oriented development of competences of students (Komarova, 2001). In other words, focusing on the students' personality, their interests, resources, needs, modern system of higher education is dedicated to providing opportunities to all citizens of the Russian Federation of continuing education, regardless of a student's or specialist's location who is in need of additional information. To this end, the Russian digital educational space is being implemented in phases: distance learning, online courses, blended learning, various digital learning tools, development of electronic textbooks and teaching aids, electronic libraries, etc. In addition, interaction with educational institutions of other states is expected, which emphasizes the continuation of the globalization trend and the integration of education systems in various countries.

The ideas of Content and language integrated learning (CLIL) described in foreign scientific psychological and pedagogical literature (Coyle, Hood & Marsh, 2010) and the theoretical justification of integrated subject-language training and the experience of its practical implementation, proposed in studies of domestic authors (Krylov, 2019; Shirin, 2007; Salekhova, 2008), determined the need to develop a cycle of classes in the framework of integrated subject-language training in non-linguistic universities and to verify their effectiveness in the process of experimental work.

Purpose and objectives of the study

Based on the requirements of the Federal State Educational Standards of Higher Education (2016), the State Program of the Russian Federation "Development of Education for 2018-2025" (2017), the goal of the article is the theoretical justification of integrated subject-language training at the university based on digital technologies, which helps to unleash the potential of subjects of education in interdisciplinary interaction.

In accordance with the designated purpose of the study, the following tasks were identified:

- 1) to conduct a comparative analysis of the theoretical ideas of LSP, ESP, GE, CLIL of foreign authors underlying the integrated subject-language training described in domestic science;
- 2) to determine the scientific approaches in relation to the process of implementing the ideas of subject-language training in the higher education system of the Russian Federation;

3) to confirm experimentally the effectiveness of the implementation of integrated subject-language training based on digital technologies in the university educational process of higher education.

Literature review

One of the most popular areas aimed at improving the quality of higher education is acquiring the subject knowledge in a foreign language. In this case a foreign language is a means of mastering the necessary knowledge in the major discipline. This interaction of special subjects and foreign language in the domestic scientific and pedagogical literature associated with the concept of "integration", under which, in the context of the question under study the possibility of organic unification of the areas, systems, approaches, and content of educational programs of various disciplines that contributes to the quality of training of modern specialists is understood (Halyapina, 2018; Maksimova, 2007). The transition to integrative learning is a natural process (Halyapina, 2018), which is a consequence of the implementation of interdisciplinary approach in the transition in the educational process from theory to practice training. In other words, it is the replacement of educational paradigm focused on the profession, by integrated in a part of foreign language at higher education, which is being actively developed in European countries and finds a positive experience of implementation in domestic universities, responding to the requirements of the competence approach according to FSES (2016).

A large proportion of domestic researches devoted to the integrated teaching of foreign languages and professional disciplines, which is treated as an integrated subject - language learning (Bagramova, 2001; Popova et al., 2018), the implementation of which in practice, involves the joint activity of teachers of major subjects and a foreign language. This kind of "cooperation" teachers of different disciplines are described in the foreign scientific and pedagogical literature and is, on the one hand, integration at the level of joint development work programs (collaboration, cooperation) (Gardiner, 1998; March, 2000), on the other hand, at the level of binary learning (team-working) (Dewey, 1998; Olgren, 1998).

A retrospective analysis of professionally-oriented learning allows to determine its main difference from integrated subject - language learning, with the aim to identify a positive experience and to avoid already known and anticipated challenges in the transition to a new approach at university training.

The foundation of the trend of professionally-oriented foreign language teaching is considered by T. Hutchinson and A. Waters (70-s of XX century). They studied the variability of communicative situations and the application of language units, depending on the context and demonstrated the need for a specific linguistic reservoir in the various acts of communication to achieve educational goals, resulting in a change

of methodology of teaching foreign languages and came to the conclusion that language for specific purposes (LSP) and English for specific purposes (ESP) is based on communication in which they identified several levels: functional, structural and discursive. Basing on the concept of "communicative competence" introduced by Hymes (1972), proved the importance of understanding the situational appropriateness of language, i.e. the ability to use it in practice not only the "linguistic form" (grammar, phonetics), but also "linguistic content" (where, when, what and with whom to speak to) (Gorbunov, 2013). Special attention was paid to the fact that the meaning of the sentence depends on the professional and social context, considering the relationship of communication parties. Mentioning the complexity of the emerging theories, the two main directions of development of LSP / ESP were highlighted: linguistic ("functional variety of language that contributes to the successful and adequate to the communicative act of specialists in various subject areas") and didactic (various means and methods of foreign language teaching within a particular subject area) (Evdokimova, 2007; Elizarova, 2005).

A. Dudley-Evans, exploring ESP, provided the required steps in learning a foreign (English) language, designed to achieve specific professional goals: preparing to teach a major subject; immersion in the major subject; advanced course (Gural, 2009). The main goal in ESP programs is the formation of linguistic competence of students. The main focus was on improving communicative language skills, the assessment of the level of knowledge of special terminology, characteristics of grammar and discourse typical of professional work. Successful professional communication contributed to the skills of General English (GE) and the ability to perform professionally-oriented conversation in a foreign language.

Domestic theory of professionally-oriented learning a foreign language began its development in the 70-s of XX century in the works of Komarova, Serova (Komarova, 2001; Serova, 1989). This period is associated with the development of certain elements of the subject oriented training in teaching foreign languages at university: development of reading skills of professionally oriented literature; the development of skills of oral communication on the basis of specialized texts. In their researches, the authors focused especially on the development of skills of professionally-oriented reading, allowing to expand the horizons of learners in terms of their future careers and increase interest in learning a foreign language. Professionally oriented higher education, from the point of view of Serova (1989), is the primary means of acquiring, deepening and improving students' professional knowledge.

For quite a long period the primary goal of foreign language teaching was the teaching of reading specialized texts for practical use of a foreign language in the professional sphere. However, in the 90-s of XX century, in the period of increase in international contacts of Russia, there was a change in the goals of learning a foreign language at university. At this moment a foreign language was seen as a means of

communication of specialists in different countries. For this purpose, a non-linguistic faculties of universities focus on the development of all kinds of speech activity taking into account specifics of future profession: reading, writing, speaking, listening, following basic requirement of language teaching methodology of the time – relationship of the learning process with real practical communication.

However, changing socio-economic and political situation in the world entails a change in requirements to the modern specialist, and, consequently, the requirements for foreign language education at university. In the scientific literature of the XXI century there is a new interpretation of the notion of "professional orientation" in relation to learning a foreign language. For example, professional orientation of education is not only the content of the training materials, but in the professional orientation of activities (operations and methods of forming the professional skills), i.e. foreign language in this context is both the object of learning and important professional subject with the means of formation of professional skills. Extension of professional orientation of higher education is possible with the integration of the discipline "foreign language" with "major subjects" (Bagramova, 2001). The main objective of a professionally-oriented training is the active introduction of multi-disciplinary relationships in the educational system of the higher school and to use a foreign language as a means of acquiring the necessary knowledge for the formation of professionally significant skills (Bagramova, 2001).

In the new paradigm the subject - language teaching reinforces its positions fundamentally changing the role of "foreign language" in higher education. In this situation, the once isolated interpretation of the concept "teaching a foreign language" is transformed into "integrated subject-language teaching" - a fundamentally new construct designed to solve the problems of the modern system of higher education: parallel study of a foreign language and major subject, contributing to a more successful enrichment of both, and also the simultaneous use of native and foreign languages, which allows for consciously mastering new linguistic and professional knowledge and competences and (Verbitsky, 2016). Bagramova (2001) supplements the concept of foreign-language professional communicative competence with the need for a comprehensive study of the subjects that make up the compulsory and varied part of the professional / special cycle, complemented by professional and scientific research in the process of foreign language education at a university. In practice, this is expressed in the ability to conduct professional and research activities in a foreign language (Anikina, 2011).

The idea of integrated education was successfully developing in foreign pedagogical science in the last decades. Scientists, representatives of European universities who laid the theoretical foundations of subject-language teaching (Content and language integrated learning – CLIL), such as David March (2000), proposed a method "object-language integrated learning", which involves educational content,

focused on two subjects. In other words, the parallel process of language learning (language) and subject (content) (Dewey, 1998; Gardiner, 1998; Coyle, Hood, Marsh, 2010). For teaching within the subject and language integrated learning is characterized by the study of a subject (subject modules) in a foreign language that allows one to simultaneously realize the bilateral trend: the study of language and the study of the major subject.

However, the "integrated learning" in the age of information of the modern society in addition to strengthening interdisciplinary connections also involves the introduction of new digital technologies in the traditional educational process with the aim of increasing the effectiveness of teaching. A number of studies devoted to the problem of the "computerization" of language learning, has allowed Warschauer (Warschauer, 1996) to allocate three stages of the process of introduction of computer technology (Computer Assisted Language Learning) in the educational process, each of which is determined by the level of development available technology at the certain period:

behavioral (1950 – 1970) – automated training systems, the leading didactic function of which was to exercise the main types of speech activity, while the student played the role of the object of study;

communication (1980 – 1990) – didactic function introduced in the educational process of personal computers was to simulate the main types of speech activity and provide a reference, wherein object position of the student in the educational process are preserved;

integration (2000 – till now) – associated with the emergence of the Internet, multimedia software, allowing personal computer and mobile devices to perform authentic language interaction for the learner at a convenient time, at their own pace, taking into account his personal interests and needs. The role of the student in this case is not only shifting towards the subject of educational process at the stage of higher education, but the student becomes the co-author of learning through life as "information availability" required sources shifts educational landmarks "to know what and how" to "know where to find out".

John Knox noted the usefulness of integrating digital technologies into the educational process in the case where the acquisition of knowledge difficult or impossible within only traditional technologies and methods, justifying this by the peculiarities of the media abilities of the individual taking it (Maksimova, 2007): a printed text performs information abstracted from reality, in which the inherent sequence, linearity, and rationality are coherent to it. In this case, the way of thinking of a student is formed similar to the structure of the printed text, mainly focusing on the adoption of information which does not become knowledge without "problem awareness". Digital media, having media capabilities that have a non-linear structure, based on the "model recognition", which allows to realize the potential of a student, based on his

psychological characteristics, for example, given its representational system: auditory learner (perception of information by hearing), visual learner (reliance on image, key words and phrases) or kinesthetic learner (considering sensations, comfort, convenience). Digital learning tools allow you to present information in an animated, graphic, text, video or audio format that increases the motivation to learn and makes it more successful, providing all students with equal opportunities (Davydov, Logunova & Shrikov, 2017). Multimedia means "clothe" training materials in concrete images, copying thus the validity and serve as a model to get an idea of the original.

The presented theoretical foundation for the effectiveness of integration in the university educational process from the point of view of interdisciplinary collaboration and interaction of digital and traditional technologies emphasizes timely treatment to the study, which is also reflected in the requirements for implementation of the program in the universities and colleges sponsored by government agencies (departmental universities) of the Russian Federation "Electronic University". However, it should be noted that the introduction of digital technology in the departmental universities has its own specifics related to the restricted access of the organization. For educational purposes the exchange of information between departments and faculties, teachers and students are possible via the local network: access to electronic textbooks and manuals, materials of conferences, forums, seminars etc. However, the limited access of students to the Internet is forcing educators to look for alternative ways and means of presenting students rapidly updated material on the subject studied. In other words, students of departmental universities are deprived of the opportunity to work independently with the hypertext information in preparation for classes, since the main educational material is provided in printed copies in the library of the university. Since access to the necessary sources on the Internet for students of departmental universities is allowed at a predetermined time (during self-study hours) in computer classes, a mandatory requirement for more efficient use of available additional resources for educational purposes is the rational use of the time for independent work. In this regard, at the initial stage of the implementation of integrated subject-language training, in other words, interconnected or interdisciplinary (Bakleneva, 2018; Evdokimova, 2007; Halyapina, 2018), is not only increasing the motivation of students to learn a foreign language, but also increasing their digital literacy.

Methodology

With the aim of implementing an integrated subject-language training at a university, we used the following methodological approaches: synergetic (Anokhin, 1978; Ignatova, 2001), which studied the process from the point of view of its self-development and self-organization; integrative - personal (Anan'ev, 2001) that takes into account the integrative nature of the student's personality and his complex

of professionally significant qualities, along with the integrative nature of the educational process; contextual (Verbitsky, 2016), which ensures the implementation of integrated subject and language training in modeling professional activities; information technological (Zalesov, 2001) that allows to integrate modern educational technologies and software products.

For the purpose of implementation of integrated subject - language training at university the experiment was conducted. It consisted of three stages: ascertaining, forming, final control. The study involved 89 students 4th – 5th year (44 students – control group, 45 students – experimental group). Since the prospective goal of integrated subject-language training is the ability of the student to self-update his knowledge (Wiesemes, 2009) and independent learning throughout life (Brolpito, 2018), i.e. in other words the willingness of the student to carry out independent activities had been allocated to its components (Bakleneva, 2018): motivational-axiological (positive emotional attitude to the implementation of independent activity; awareness of the value of self-activity for self-realization in the future of the profession); cognitive (knowledge about the logic of implementing independent activities; ability to analyze, to systematize, to structure and summarize information); activity (ability to simulate a professionally-oriented situations; the ability of students to carry out independent activity in the professionally-oriented situations); reflexive-evaluative (ability through reflection to assess its activities; the ability to adjust their activity relative to goals), but also described criteria of independent activity of students and performance level of its formation.

Results

At the initial stage of the experiment questionnaires were conducted among the students participating in the pilot, which allows to draw the following conclusions: 34% of students "do not know how to learn independently and find relevant information from additional sources"; 53% of the students are not interested in learning a foreign language because they do not consider it necessary for further professional activity; only 13% students believe that knowing a foreign language is important for further successful self-realization in the profession. Additionally, students were interviewed to identify the main reasons for the treatment of digital information sources. Interpretation of the obtained data shows that 44% of respondents are turning to digital resources (Internet, electronic textbooks, etc.) for the solution of professionally-oriented tasks, 36% of respondents chose the answer "acquiring new information", which in most cases is also associated with the need to solve professional problems and prove their competency (search the relevant information for the preparation of a report, course work, etc.). It is important to note that a significant number of students (24%), have difficulties when it is necessary to criticize "massive amounts" of information.

For identification of the initial level components of independent activity of students of experimental and control groups the following methods were used: the method "Value Orientations" (Slobodchikov & Isaev, 1995); (motivational-value component); self-assessment of the ability of the learner to self-development and self-education (Larichev, 2002) (the cognitive component); the test for determining organizational skills (Fetiskin, Kozlov & Manujlov, 2008), method of expert estimations (active component); the method of determining the level of reflexivity (Slobodchikov & Isaev, 1995) (reflective and evaluative component).

Analysis of the results of ascertaining stage of the experiment for experimental (13.9%) and control (13.6%) groups showed that the motivational-axiological component of independent activity of students is more developed in comparison with the other ones.

At the forming stage of the experiment, the focused work was carried out to conduct a cycle of practical exercises within the framework of integrated subject-language training while studying of major subjects in a foreign language. The electronic textbook was chosen as the optimal tool for implementing integrated subject-language training, as it allows: to ensure students' interest in the educational process through the management of various types of their activities; adequately combine various types of cadets' activities, taking into account the quality of retention of course content and students' individual characteristics; to provide material variably (diagrams, graphics, video, audio, etc.); to conduct classes using communication technologies (discussion, virtual dialogue) using network organization of the educational process (Bakleneva, 2018).

From the point of view of concept of the subjects taught in the framework of the integrated subject-language training the principle of linguistic minimalism is mentioned, namely that the grammatical material is used in the framework of an integrative exercises to study majors, requires students' knowledge of basic grammar of a foreign language (i.e. basic groups of times, active and passive voices, degrees of comparison of adverbs and adjectives, etc.), which corresponds to the course of general and business English, however, the time limit provides a brief explanation and some examples which are further actualized by means of professionally-oriented material both by translation and non-translation semantics. For integrated classes, as well as in the process of self-preparation, development of research skills of students was provided through assignments, orienting students to appeal to additional sources of relevant information (within the framework of the present study it is an electronic textbook, educational editions, available in the University library, materials of conferences in a foreign language) and seeking for advisory support of teachers in majors. An example of this kind of cycle of classes within the framework of integrated subject - language training can be "The Future of Manned and Unmanned Aerial Vehicles". For

the purpose of increasing the efficiency of students' independent activity while preparing for classes a joint work of teacher and students was systematically conducted on the selection of additional sources of information. The main task for students was to analyze the information of Unmanned Aerial Vehicles' (UAV) application in various information sources. Students were offered divergent forms of reporting the results of their independent activity: writing an essay (development of reflective abilities and critical thinking), evaluation of media texts (activation of imagination, different kinds of thinking, visual memory); reporting (presentations, essays, reports). To ensure greater autonomy of students and enhance their subject position when working with the course content the electronic textbook "Application and Operation of Means and Systems for Special Monitoring" contains a section "Act Independently", which proposed guidelines to prepare a presentation or report, to write an essay, scientific articles. To provide additional information, the electronic textbook includes authentic video and audio materials, texts accumulated together without dividing into topics. The purpose of such an organization of course content is caused by the need to teach students to select the necessary material independently, systematizing and analyzing large volumes of information, which allows to some extent mimic the information-rich Internet environment, access to which is limited for students of departmental universities.

The final stage of the forming experiment assumed independent activity of students on the basis of the electronic textbook that focuses on the interaction of all the participants involved in the educational process (student <> foreign language teacher <> teacher of majors) to assess their independent activities.

The mid-experiment assessment in the control and experimental groups held by questionnaires and the analysis of provided results of their independent activity (reports, presentations, participation in scientific conferences and seminars, proposals for the introduction of additional materials for e-textbook) indicate the increase in the level of independent activity of students in the experimental group. Interpretation of the obtained data indicated significant changes in experimental group: number of students with a low level of independent activity decreased: motivational- axiological component – from 50,0% to 22.7%; cognitive component – from 54.5% to 29.5%; active component – from 59.1% to 29.5%; reflexive-evaluative – from 56,8% to 22.7%. At the same time, the number of students with a high level of independent activity increased from 13.6% to 40.9%; from 11.4% to 38.7%; from 9.1% to 36.4% and from 9.1% to 43.2%, respectively, for each of the components.

Discussions

The study of implementation of integrated subject - language training at university was caused by the requirements of the Federal State Educational Standard (2016), the State Program "Development of

Education for 2018-2025" (2017) and "Electronic University" and also emerging difficulties with the implementation of the question under study is described in researches of domestic (Bagramova, 2001; Krylov, 2019) and foreign authors (Wiesemes, 2009). Based on the positive experience and the predictable difficulties of the educational process within the framework of integrated subject - language training at university helped to develop a series of classes focused on the development of independent activity of students, which is necessary, as described in this study, for further successful professional self-realization and self-education throughout life. The result of the study is the author's e-textbook "Application and Operation of Means and Systems for Special Monitoring", allowing to provide a higher degree of interdisciplinary interaction of professional and foreign language components. The e-textbook consists of 6 Units, each includes a subsection "Outclass Activity", as well as sections with additional texts, reference information and videos. The advantage of e-edition is its "flexibility", implying the possibility of timely updating it with professionally-relevant information as well, which is especially important in the implementation of integrated subject and language interaction.

One of the subsections of the e-textbook is the "Steps to Autonomy", allows solving two educational tasks indicated by the requirements of the Federal State Educational Standard: increasing the level of students' independent activity and the formation of universal, professional and general-professional competencies. The following guidelines are included in the "Steps to Autonomy: subsection:

- Act Independently - an algorithm for the phased implementation of independent activities is proposed. Turning to the proposed sequence of actions at the initial stage of formation of independent activity skills allows the student to avoid difficulties in determining the sequence of actions: Step 1. Create Your Goal, Step 2. Generate Tasks, Step 3. What do Researchers say?, Step 4. Make Analysis, Comparisons and Create Your Conclusion, Step 5. Compare Your Goal and the Result, Step 6. Choose the Way to Represent Your Ideas.

- How to Prepare a Report - recommendations for preparation: Preparation and Planning -> Collecting and Handling Information -> Writing a Revising Report -> The Creative Side of Report Writing -> A Style Guide to Good Report Writing -> Improving the Presentation of Your Report.

- Summarizing the Text - offers phrases for abstracting and annotating a text and authentic abstract on professionally-oriented issues.

Strengthening of interdisciplinary interaction during classes while studying a foreign language contributes to the development of skills to assess the role of a foreign language in the daily and professional activities of any person. The reason for implementation of inter-subject interaction is the development of cognitive

independence of students on the basis of individual educational trajectory for every student. The level of retention of course content by students in this case may be different, but each of them will have practical significance.

The examples of the tasks provided in the e-textbook for the implementation of integrated subject-language training can be:

Task 1. Watch the video «Input, Processing, Output and Storage Information System Components». Answer the following questions.

What are the ways of comparing computer and human data processing and storage?

Make a list of all possible operations for data processing and storage mentioned in the video.

Using «Supplementary Texts», «Extra Video» find additional information and complete the list.

Make a scheme of data processing and storage for a UAV for a special mission.

Prepare the presentation on the theme «Data Processing and Storage».

Discuss the results of your research in the group in the form of a dialogue.

Performing similar tasks, offering a comparison of familiar daily activities with professional ones; the use of knowledge acquired while studying major subjects or during extracurricular activities; compilation of universal tables and diagrams; demonstrating the results of independent research in the form of a presentation, as well as being ready to discuss your point of view in a group, forms the natural-scientific literacy of students. The result of working with such tasks is the formation of universal competencies.

Conclusion

Thus, the study allowed to:

- 1) to identify the most promising directions for implementation of integrated subject-language interaction based on a theoretical analysis of the ideas of LSP, ESP, GE, CLIL of foreign authors and the integrated subject-language training described in domestic science;
- 2) to determine the scientific approaches in relation to the process of implementing the ideas of integrated subject-language training at university in the study of a foreign language, focusing on major subjects;

3) to confirm experimentally the effectiveness of the implementation of integrated subject-language training based on digital technologies in the educational process of a university, to determine the potential of the student's personality in increasing the level of independent activity with the aim of further professional self-actualization and the ability to learn throughout life.

The subject of further study can be: 1) development of the CLIL - course for students of engineering specialization with the 1st year; 2) to examine the influence of the level of students' independent activity and the development of universal and professional competencies in the process of integrated subject-language training.

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