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## **DIDACTIC POTENTIAL OF THE INTEGRATED APPROACH TO TEACHING FUTURE PROGRAMMERS PROFESSIONAL COMMUNICATIVE COMPETENCE IN A FOREIGN LANGUAGE**

**Abstract.** In the XXI century, the age of information technologies, traditional borders between disciplines and subjects are being erased. This process gives the floor for new sciences to appear which integrate the qualities of several traditional for XX century disciplines. Students need to use the advantages of discipline merging, which raises the problem of integrated teaching and learning, especially when it comes to professionally oriented foreign language learning in computer and Internet mediated classrooms. The article deals with theoretical basis of integrated approach implementation in the formation of foreign language communicative competence to future programmers. The structure of integration in the classroom settings has been substantiated in the paper as well as the types and levels of possible integration patterns. The theoretical findings have been empirically verified in the study process of three educational institutions to prove the efficacy of the suggested pedagogical procedures.

**Keywords:** integrated approach; future programmers; integration levels; thematic integration; conceptual integration; didactic integration.

### **1. INTRODUCTION**

**Problem statement.** The notion of integration has a broad application in pedagogical sources. Overall, it covers such pedagogical categories as unity, wholesome composition, connectivity, interdisciplinary, complexity, system-defined structure, interdisciplinary connection, polisystematicity etc. As generalized, these terms define one and the same phenomenon which implies merging of the learning content into one syllabus system in order to reach complex, consistent and wholesome learning and study result. At the same time, it's possible to find some specificity in the essential meaning of the mentioned above notions. In the paragraphs that follow we'll look at those specific traits in more detail.

**Analysis of recent research and publications.** It is necessary to define the key term "integrated". Modern literature on the topic differentiates between the notions of "integrated", "integrative", and "integrating" as applied to pedagogical research issues. "Integrative" means whole some processor phenomenon with its elements not to be possibly separated and singled

out as functioning in isolation or self-sufficient. This term can be used to name certain pedagogical trends or tendencies, functions of information. Though it's almost impossible to define the approach to learning using this particular notion since it neglects the significance of some selected structural components of integration, looking carefully simply at its (integration) result. We are strongly confirmed that for professionally oriented foreign language education of future programmers it is important to view all aspects and constituents of educational integration so that to bring the efficacy of the syllabus contents to the highest point and trace the interdisciplinary elements which might serve the general educational goal of intensification of the study process.

Similar meaning can be derived from the notion of "integrating". This term is basically used to define the unity of parts into the whole focusing attention on the result of merging. For instance, some process or role of some process can be integrating. As a result, both "integrative" and "integrating" have long been associated as similar in meaning. Thus, we don't believe that the latter notion can be used to describe the educational approach to interpreting the specificity of professionally oriented foreign language education of future programmers with regard to clear explanation of the phenomenon of integration and outlining of interdisciplinary connections between the components of the syllabus.

The term "integrated" is synonymic to "united", sometimes "uniting", implying the meaning of "complex, consisting of a number of components". It also predetermines not only the final result of element merging, but specific features and behavioural patterns of structural components, in particular. This term can be found in such word combinations as integrated learning, integrated method, integrated conclusion etc. Thus, we consider it to be appropriate to name the approach to professionally oriented foreign language communicative education, since it draws the attention to both the process of merging of the constituent parts and the complicated/ complex character of the approach, as well as the well-rounded universality of the final result.

Wholesome structure of any phenomenon can be viewed from both pedagogical and philosophical perspective. It point out onto the inner unitedness of the process or phenomenon, its inseparability and autonomy, independence from the outer surrounding. Speaking about wholesome structure of the study process (education process), we mean its complexity, unitedness and existence of interdisciplinary connections which contribute to creation of a unique, functional study system. Wholesome structure in terms of higher education reveals itself in orientation of all subjects onto solution of general goals, tasks and content of the learning materials and the formation of professional competence of future specialists in its broadest sense.

The conceptions of cross-curriculum and interdisciplinary connections are related in their meaning to integration. Namely, this question has been the centre of research conducted by I. Zvieriev, L. Bacharieva, A. Liferov and others. According to their point of view, interdisciplinary connection can be described in a narrow sense meaning the availability of similar qualities, functions, goals, tasks and characteristic features in a number of disciplines or subjects [1, c. 162]. This connection is traced in quotes, references to material previously learned at other subjects, research of different aspects of the same phenomena from the perspective of several disciplines, the use of the same terms by different subjects, study of concepts which are announced to be the subject of further studies by different disciplines [2, p. 15].

Systematicity is a pedagogical term which points out the relations between the whole and its parts, emphasizes structural and hierarchical structural principles and indicates logical and successive development of a phenomenon or a process in general [3, p. 54]. Systematicity in studies is seen in the hierarchical structure of educational subjects, in the movement from simple to difficult, interrelation of educational subjects and their content, performing complex

tasks on the basis of simple and similar ones. Thus, it can be said that systematicity within the integrated approach to professional foreign communicative preparation of future programmers is an indispensable category and a compulsory principle of the study process organization which helps to develop necessary language and speaking skills and knowledge for carrying out their professional responsibilities.

Integration of the study process is used as an antonym to studying each subject separately. So, integration presupposes such an organization of the study process in which all the topics are given and expanded within different educational subjects [4, p. 162]. For example, in teaching future programmers the notions of informational and web-technologies can be found within such educational subjects as “WEB-programming”, “Systematic programming”, “Computer networks”, “Architecture of computers”, “Java language”, etc. Apart from this, terms from the sphere of informational and web-technologies are studied within the framework of such educational subjects as “Professional business English”, “English for IT” and “English for professional aims”.

Thus, the content of the educational material is discussed within several subjects which complement one another and analyze professional terms and notions from different perspectives.

It should be noted that all the above mentioned categories and properties of the integrated approach are equally important and necessary for the professional foreign language communicative preparation of future programmers. The connection between the structural components of the integrated approach to teaching are depicted in fig. 1.

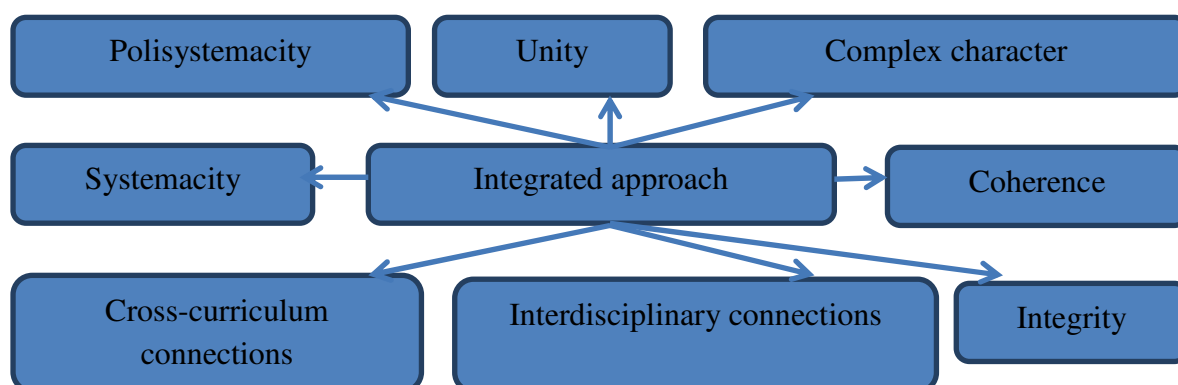


Figure 1. Categories and properties of the integrated approach

**The purpose of the article** is to specify the didactic potential and peculiarities of methodology implementing integrated approach to teaching future programmers professional communicative competence in a foreign language.

## 2. THEORETICAL BACKGROUNDS

I. Kozlovska differentiates several types of integration present in the study process [4, p. 162]. In general, integration can be traced in combining different teaching methods, forms, means with the material. For example, integrated approach can be implemented while organizing thematic additional courses which combine topics from various subjects. Also, integration is carried out in dividing educational material into thematic blocks or units which are discussed within different educational subjects. One more way of implementing the integrated approach is discussing the same topic on the basis of two or more educational subjects. The highest level of implementing the integrated approach is creating and

introducing a course which is based on merging all the educational material and its generalization within all the educational subjects [4, p. 162]. We consider that the integrated approach to teaching future programmers professional communication in a foreign language should be implemented on the last level as far as integrated and all-round mastering of the communicative competence, including linguistic and extra-linguistic professional peculiarities, is taken into consideration.

According to A. Yataikina, the following stages of integration are implemented into the study process [5, p. 2–3]:

1) thematic integration which manifests itself in learning the same topic within several subjects. As a rule, this type of integration has an illustrative and descriptive character and is used at the middle stage of formal education;

2) problematic integration, the essence of which lies in setting a certain problematic task and finding various ways to solve it from the point of view of different disciplines, theories and approaches. In such a way, problematic integration makes it possible to learn material in an integrated and generalized way and to provide various ways of applying it in practice;

3) conceptual integration, which manifests itself in applying the same methods, forms, means, principles and rules of teaching within different subjects. Such integration combines methods of organizing the study process, not the content or themes. Conceptual integration is considered to allow students better understand the specific character of studies and adapt to the requirements of the study process;

4) theoretical integration exists on the level of theory and means of organization of educational environment. It is a philosophic category which emphasizes interrelation between different theories and the formation and organization of the studies at educational establishments;

5) didactic integration, the essence of which lies in using and synthesis of categories, notions and principles from various fields of science.

### **3. METHODS**

The study consists of two parts. The methods of analysis and synthesis have been used in the theoretical part of the study. Pedagogical experiment with the students and teachers of three universities (Ivan Franko National University of Lviv (IFNUL), Mukachevo State University (MSU), Ukraine; Technical-Humanistic Academy in Belsko-Biala (THABB), Poland), the analysis and interpretation of its results have been used in the empirical part of the study.

### **4. FINDINGS**

All of the types of integration mentioned above can be combined within the integrated approach to teaching future programmers professional communication in a foreign language. For example, thematic language material can be discussed at all the subjects which are connected with learning scientific and professional terminology. By analogy, the combination of pedagogical, methodological and specific principles of teaching within the disciplines of a course seems to be appropriate. In general, the integrated approach to teaching future programmers professional communication in a foreign language provides optimal combination and choice of educational material and forms of its organization on the basis of all the educational subjects required for attaining the bachelor's degree.

According to A. Blum, the integrated approach is implemented in the three main programmes. They are coordinational, combinational and amalgamation programmes which

differ in the level in educational material integration and in the extent to which the material is combined [6, p. 12]. Apparently, such division is quite relative as it is impossible to combine all the types of integration into three groups. Still, such classification allows understanding the essence of the potential of the integrated approach and ways of its implementation into the process of teaching future programmers professional communication in a foreign language.

Coordinational programmes are based on the successive, gradual and consistent study of one branch of science at different educational subjects. Hence, the topics studied within one discipline are based on the material learnt previously at other subjects [6, p. 12]. Notwithstanding the substantiation and its being pedagogically justified, in practice creating textbooks on the basis of such interdisciplinary approach does not satisfy the need to develop students' integral world outlook. That is why coordinational programmes within the integrated approach are used in practice rather at primary than in secondary school.

Combinational programmes have the aim of combining the scientific knowledge of several branches into one subject to synthesize, generalize and structure it. An example of a combinational integration programme is the creation of the course "Introduction to software engineering" which teaches basic programming conceptions, computer systems, programming languages and the peculiarities of this branch. As a result, this course partially recreates the material which is the subject and the object of study of other disciplines [6, p. 12]. The creation of such courses makes it possible for students to get acquainted with scientific and professional vocabulary, understand basic terms and concepts of the chosen profession and point out further ways of working with the educational material.

A subtype of combinational integrated programmes is a connective programme [7, p. 4]. The connective programme presupposes the creation of one integrated course which combines the thematic material from different branches. For example, the course of social relations in the study process of future programmers includes the overview of mathematical theories and formulae as well as technical approaches to solving its main tasks. As a result, the course is closely adapted to the character of studies and to the profession of program engineers.

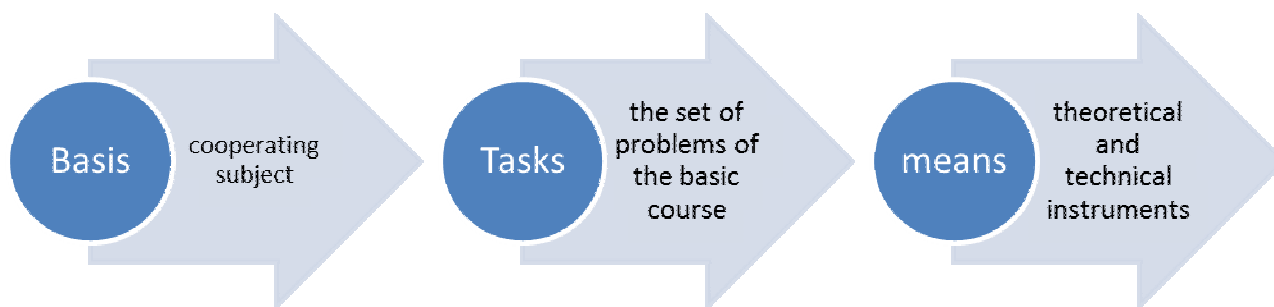
The advantages of creating and implementation of combinational programmes is summarizing, generalizing and synthesis of educational material as well as getting students acquainted with the specific character of the profession. However, it should be noted that such programmes are characterized by insufficient level of outlaying the material and the absence of analytical and critical approach to information comprehension. Furthermore, combinational programmes do not give full and comprehensive explanation of the material as they only give the information. Hence, we consider that the integrated approach to teaching future programmers professional communication in a foreign language should be based on combining the material effectively, but not on its simplification.

Amalgamation integrated programmes are applied during the whole process of studies at the bachelor's degree and make it possible to get acquainted with global problems of the humankind. It is possible to combine any subjects into a single amalgamation programme, but it is better to combine branches which are similar in their subject of study. For example, scientists suggest combining the topics of social sciences and natural sciences, theoretical and practical knowledge, foreign languages and subjects having cultural orientation [6 Bloom]. Evidently, such combination is rather theoretical as in practice it is quite difficult to implement such organization of the educational environment taking into consideration the frames of the higher education. However, understanding the amalgamation programmes makes it easier to understand the notion of educational integration and implement it in the study process.

Special attention should be paid to a coherent programme which is considered to be a subtype of the combinational one though having a set of different features. Coherent

integrated programme presupposes such material outlay when each following topic is based on the previous one and complements it. For example, the course “WEB-programming” begins from defining the notion of programming and its characteristic features. Within the following topic the classification of the types of programming is studied from the perspective of the studied features and peculiarities of this notion. Gradually, future programmers are getting acquainted with the essence of programming and study the problem in details. As a result, coherent integrated programmes are used within the frames of one course and presuppose the integration of the thematic aspect of the studies. We consider it important that this type of the integrated programme should be used in the course of teaching future programmers professional communication in a foreign language.

According to the investigations of Yu. Kaliagin, the integration is implemented on three levels. They are the basic level, the level of tasks and the level of instruments [8, p. 28-29]. The essence of these levels of integration is depicted in fig. 2.



*Figure 2. Levels of integration*

The basic level of integration in the study process presupposes implementation of interaction on the level of reduction [9, p. 85]. At the same time, reduction is viewed upon as a process the essence of which is in simplifying, shortening and even in loss of certain qualities or elements by the object [9]. It has already been mentioned that the process of simplification not always influences the quality of education and the productivity of the study process in a positive way. However, it should be noted that the process of reduction helps to set interdisciplinary connections and created an integrated base for further merging or combining of educational topics. From this perspective, reduction is an indispensable condition of the implementation of the integrated approach to teaching future programmers professional communication in a foreign language [9, p. 85].

Interdisciplinary connection is the presence of the connections between knowledge, skills and experience which occur as a result of the successive and coherent usage of optimal means, methods and forms of study as well as the influences of the surrounding world [2, p. 46]. Interdisciplinary connection is an indispensable pedagogical condition of the organization of the study process as well as the formation of the developing educational environment [9]. Moreover, it has already been mentioned that interdisciplinary character is one of the basic characteristic features of the integrated approach to the study process. Hence, the first level of educational integration presupposes the creation of the basis for the establishment of interdisciplinary connections and for integrating educational material.

On the second level of integration the synthesis of the courses is carried out on the basis of the previously formed basis. This process is called in tradisciplinary synthesis which presupposes merging various scientific theories and approaches within one courses [10, p. 37]. This process allows to achieve the unity of scientific knowledge and combine thematic material on the basis of the set interdisciplinary connections.

The third level of integration presupposes the implementation of the common theoretical and technical instruments for organizing the study process [9, p. 86]. The result of this is the creation of a unified course and a unified system of study [11, p. 16]. It should be noted that within the frames of the higher education such result is difficult to achieve as students constantly interact with various professors and, accordingly, various methods and forms of teaching. However, this level of integration allows to effectively combine educational material into thematic units or blocks and create favourable preconditions for the complex mastering of the professional communicative competence in a foreign language.

The implementation of the integrated approach was carried out within the scope of disciplines which the students cover while studying at the university: «System programming», «Implementation of UNICODE», «Developing four types of Windows applications», «Modelling of dynamic libraries», «Application development with the use of Windows API», «Programming with Java», «Operators in Pascal. Datatypes», «Syntax and semantics of operators in C++», «Modern object programming with Java». Distance study course was developed on the platform “ATutor” which comprised a system of exercises and tasks bearing the content of the above mentioned university disciplines. It was supposed to be covered by the students majoring in «Engineering of programming», «Computer sciences and information technologies», «Computer engineering», «System analysis» and «Cyber safety».

Integrated approach to teaching future programmers professional communication in a foreign language is carried out not only through the unity and correlation of the content of educational subjects, but also through keeping to the main pedagogical, methodological, didactic and specific principles of teaching, laws, regularities, aims and tasks. This means that it should ensure performing certain tasks of the study process. Let us consider the main ones.

1. *To develop students' personality with orientation towards social values and norms.* In fact, developing professional competence only does not allow graduates to become participants of their professional work to the full extent and makes it difficult to perform professional tasks set before them. Mainly, competitiveness of future programmers depends on their understanding of the norms of social behaviour, ethical and moral principles, national mentality and cultural values. That is why, integrated approach to teaching future programmers professional communication in a foreign language should provide the coherence of the educational and upbringing processes and develop the personality of a future programmer.

2. *Combine the content of education with the requirements and needs of social, political, cultural and economic situation in the society.* Nowadays, scientists agree that higher education does not give a person all the knowledge, skills and experience required for the successful living in the society, because the latter is rather dynamic and changes under the influence of new global processes and the transformation of societies. That is why the process of learning is a lifelong process and every time new terms and notions predetermined by the development of science and technology come into being. At the same time, the system of higher education is not a steady category as well, as it actively reacts to new social and scientific trends and implements them into the study process. Integrated approach to teaching future programmers professional communication in a foreign language should make the content of educational material meet the requirements of the society and adapt educational subjects to the current stage of the development of the country.

3. *Combine effectively pedagogical and social factors of influence on the higher education with the aim of achieving success in the study process.* Modern pedagogy and methodology also develop as sciences, acquiring new terms, tendencies and teaching methods. Integrated approach presupposes taking into consideration of the new forms, means and methods of teaching with the aim of their successful implementation into the study process. However, the choice of the new educational technologies should correspond to the

social requirements and expectancies as to the level of professional competence of future programmers. Hence, one of the main tasks of the integrated approach to teaching future programmers professional communication in a foreign language is to combine effectively new educational technologies and new social trends and factors.

4. *Provide the integrity and systematicity of scientific knowledge.* Like it has already been mentioned, systematicity and integrity are important elements of the integrated approach and of the study process organization in general. In addition to this, keeping to these pedagogical principles helps to master educational material in a more effective way and develops intellectual potential of future programmers. Integrity and systematicity are provided through successive, regular and logical organization of educational material within several interconnected disciplines.

5. *Show the connection between the educational material and possibilities of its usage in the future professional activity.* Mastering professional communicative competence in a foreign language depends not only on the level of linguistic knowledge. Learning theoretical material plays an important part in the formation of the professional competence of future programmers. However, the study process should combine effectively knowledge of the theory with practical lessons and with the demonstration of its practical implementation. For example, future programmers' professional communicative competence in a foreign language should combine interactive tasks, teaching business correspondence, imitation of the situations of real communication, setting actual language problems and suggesting ways of their overcoming, etc. integrated approach makes it possible to create the corresponding educational environment and ensure favourable conditions for the effective mastering of theoretical knowledge and practical skills required for the future professional activity.

6. *Make it possible to combine education and self-education.* The integrated approach can be implemented within several systems as far as a lot of scientists point out polysystemic character as its basic feature. Education and self-education are the systems which can be effectively combined within the integrated approach to professional foreign language communicative preparation of future programmers. Self-education presupposes doing a set of exercises in addition to the study process which is regulated by means of self-control, self-assessment and self-motivation. Self-education is an indispensable supplement to the formal education as it activates important psychological and personal mechanisms and helps to increase motivation level and students' interest in educational material. The integrated approach to teaching future programmers professional communication in a foreign language should combine effectively methods of education and self-education as well as help to develop the personality of students' of technical departments.

It should be noted that the process of developing professional communicative competence in a foreign language has an integrated character and is implemented exceptionally on the basis of the integrated approach. This is predetermined by the fact that the foreign language communicative competence is a complex notion consisting of a plenty of separate components, combining which it is possible to achieve the desirable result. For example, the language component of the foreign language communicative competence presupposes mastering four types of activity: speaking, writing, reading and listening. Developing speaking skills is carried out simultaneously and complexly as such organization of the study process allows to achieve high results [12, p. 19], [13, p. 123].

To verify the efficiency of the suggested pedagogical ideas, pedagogical experiment has been carried out at several higher educational establishments both in and outside Ukraine (Ivan Franko National University of Lviv (IFNUL), Mukachevo State University (MSU), Ukraine; Technical-Humanistic Academy in Belsko-Biala (THABB), Poland). 138 students participated in the experiment which contained six groups (three experimental and three control groups). The results of the experiment (see fig. 3) proved the efficiency of the



suggested methodology (the students in control groups didn't experience any changes in the usual procedure of their studies focused on foreign language communicative competence formation; the students in experimental groups used specially elaborated experimental resources) which has been evaluated highly by the students and teachers (see fig. 4).

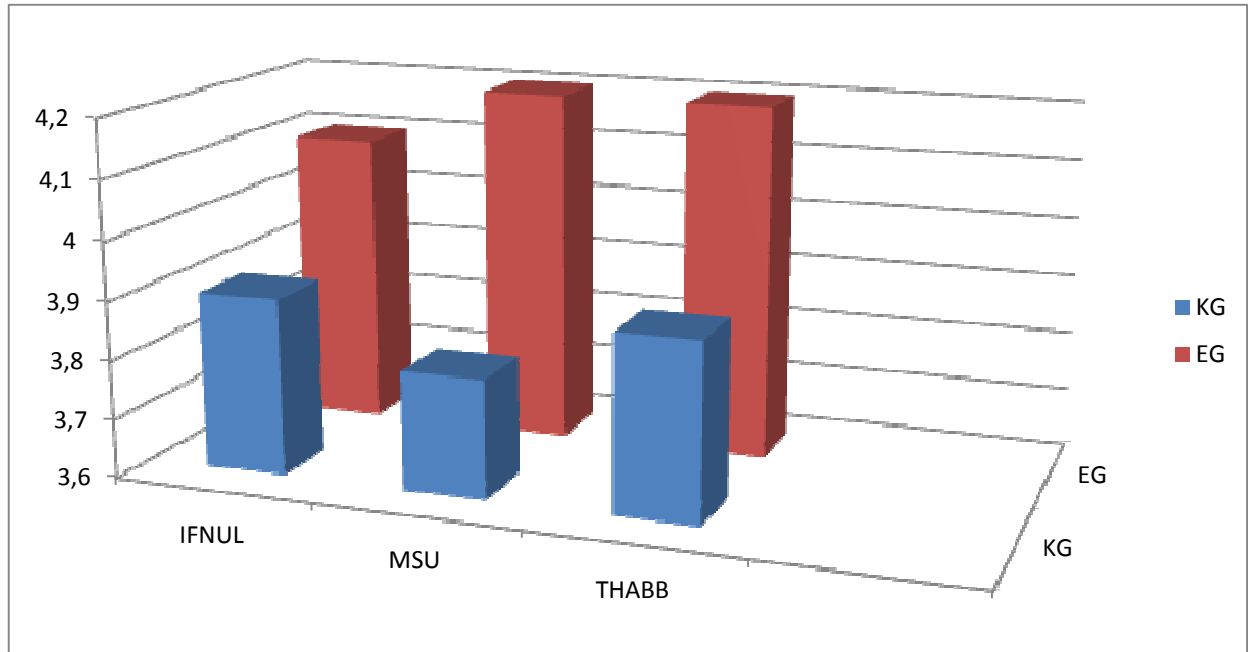


Figure 3. Comparative results of the experiment in experimental and control groups of three universities

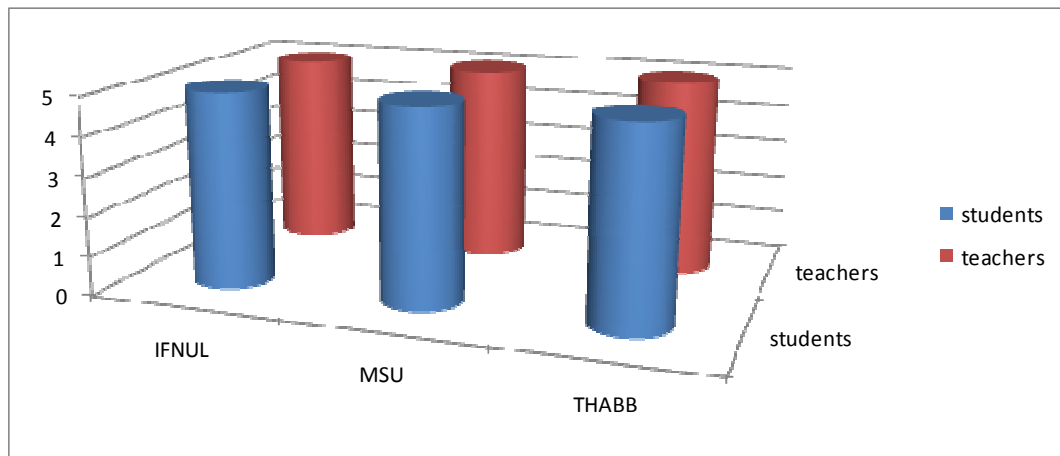


Figure 4. Evaluation of the methodology by teachers and students of experimental groups

## 5. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

So, the analysis of the essence of the integration and the integrated approach to teaching future programmers professional communication in a foreign language allows us to draw the following conclusions:

- there are differences in the meaning of the terms “integrated”, “integrating”, “integrational”. According to the approach suggested by us, the term “integrated”

should be used as it points out the process of combining and merging emphasizing at the same time the importance of the result as well as of the components;

- the basic notion of the integrated approach is the conception of integration which marks the process of merging, combining and the interconnection between separate notions with the aim of pointing out similar traits and formation of the integrated system of scientific knowledge;
- the integrated approach is closely connected with such concepts as integration, unity, coherence, interdisciplinary character, complex character, systematicity, polisystematicity. All of them predetermine the character of the organization of the educational environment and the organization of the study process for future programmers;
- there are different approaches to defining the integrated approach, its types and levels of implementation. None of them is universal but all the classification allow to understand the essence of this notion and ways of its effective use in teaching future programmers professional communicative competence in a foreign language;
- the integrated approach is an effective approach to teaching future programmers professional communicative competence in a foreign language as mastering a foreign language is a complex process which includes mastering linguistic and extra-linguistic knowledge, skills and experience. Scientists agree that the process of mastering a foreign language is integrated as it requires interdependent, simultaneous and complex learning linguistic and extra-linguistic phenomena.

Thus, the analysis of the essence and didactic potential of the integrated approach to teaching future programmers professional communicative competence in a foreign language as well as the results of the pedagogical experiment prove the effectiveness of this approach.

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## ДИДАКТИЧЕСКИЙ ПОТЕНЦИАЛ ИНТЕГРИРОВАННОГО ПОДХОДА К ФОРМИРОВАНИЮ ПРОФЕССИОНАЛЬНО ОРИЕНТИРОВАННОЙ ИНОЯЗЫЧНОЙ КОММУНИКАТИВНОЙ КОМПЕТЕНТНОСТИ БУДУЩИХ ПРОГРАММИСТОВ

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**Аннотация.** В XXI столетии, веке информационных технологий, традиционные границы между учебными дисциплинами и предметами стираются. Этот процесс способствует возникновению новых наук, которые интегрируют черты нескольких традиционных для предыдущего столетия дисциплин. Студенты должны пользоваться преимуществами такого объединения, которое высвободит проблему интегрированного обучения и преподавания, особенно в формировании иноязычной профессионально ориентированной коммуникативной компетентности с использованием компьютера и сети Интернет. Статья посвящена теоретическому обоснованию интегрированного подхода и его использование в формировании иноязычной коммуникативной компетентности в будущих программистов. Обоснована структура интеграции в процессе обучения, а также типы и уровни интеграции. Теоретические основы получили практическое использование и практическую проверку эффективности предложенных педагогических процедур в учебном процессе трех университетов.

**Ключевые слова:** интегрированный подход; будущие программисты; уровни интеграции; тематическая интеграция; концептуальная интеграция; дидактическая интеграция.

## ДИДАКТИЧНИЙ ПОТЕНЦІАЛ ІНТЕГРОВАНОГО ПІДХОДУ ДО ФОРМУВАННЯ ІНШОМОВНОЇ КОМУНІКАТИВНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ПРОГРАМІСТІВ

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**Анотація.** У XXI столітті, віці інформаційних технологій, традиційні кордони між навчальними дисциплінами і предметами стираються. Такий процес сприяє появі нових наук, які інтегрують у собі ознаки кількох традиційних для попереднього століття дисциплін. Студенти повинні скористатися перевагами такого злиття дисциплін, яке порушує проблему інтегрованого навчання і викладання, особливо в царині формування іншомовної професійно орієнтованої комунікативної компетентності з використанням комп'ютера й мережі Інтернет. Статтю присвячено теоретичному обґрунтуванню основ інтегрованого підходу і його використання у формуванні іншомовної комунікативної компетентності у майбутніх програмістів. Обґрунтовано структуру інтеграції у процесі навчання, а також типи і рівні інтеграції. Теоретичні засади отримали практичне застосування і практичну перевірку ефективності запропонованих педагогічних процедур у навчальному процесі трьох університетів.

**Ключові слова:** інтегрований підхід; майбутні програмісти; рівні інтеграції; тематична інтеграція; концептуальна інтеграція; дидактична інтеграція.

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