

РОЗДІЛ 2. СПРЯМОВАНІСТЬ НАВЧАННЯ
ДИСЦИПЛІН ПРИРОДНИЧО-МАТЕМАТИЧНОГО ЦИКЛУ
НА РОЗВИТОК ІНТЕЛЕКТУАЛЬНИХ УМІНЬ ТА ТВОРЧИХ ЗДІБНОСТЕЙ
УЧНІВ ТА СТУДЕНТІВ

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E. Zhelezniakova

ORCID ID 0000-0001-6409-4761

T. Silichova

ORCID ID 0000-0001-5003-2711

Simon Kuznets Kharkiv National
University of Economics

SOME ASPECTS OF THE TEACHING NUMBER OF SUBJECTS
IN FOREIGN LANGUAGE IN MODERN UNIVERSITIES

У статті розглянуті основні аспекти викладання ряду предметів на англійській мові у вищих навчальних закладах. Проаналізовано основні дослідження в цьому напрямку, наведено власний досвід авторів статті. Показано, що в сучасному світі спостерігається тенденція зміщення основного акценту з традиційного володіння іноземною мовою до більш фахової спрямованості: іноземна мова в професії.

Позначені складнощі та специфіка подальшого розвитку такого напрямку, а саме викладання ряду предметів іноземною (англійською) мовою в рамках сучасної вищої школи. Окреслено, що дана проблема не може бути вирішена тільки за рахунок збільшення годин іноземної мови в навчальному процесі. Для її вирішення потрібно зовсім інший підхід, а саме підготовка викладачів з певного фаху, які володіють іноземною мовою. Крім цього при викладанні ряду предметів іноземною мовою змінюється і сам підхід до навчання, структура проведення занять, система контролю знань.

На прикладі викладання курсу «Вищої та прикладної математики» в Харківському національному університеті імені С. Кузнеця, показані особливості викладання даної дисципліни англійською мовою. Спираючись на аналіз досліджень, наукових робіт в цьому напрямку, і власний досвід авторів статті, можна сказати, що не дивлячись на те, що математика є однією з дисциплін, яка найменш схильна до мовних змін, подальший розвиток цього напрямку вимагає великої та кропіткої роботи. Перш за все, необхідна підготовка викладача із певного фаху, який володіє іноземною мовою. Матеріал, що викладається на курсі повинен бути якісно забезпеченим та науково обґрунтованим, методика викладання матеріалу на іноземній мові відрізняється від методики викладання рідною мовою. Система контролю також потребує змін, тому що в цьому випадку контролюються дві складові: знання мови і знання предмета. Але, незважаючи на ці всі складнощі, викладання предметів іноземною мовою є актуальною вимогою сучасності, і її впровадження в навчальний процес – одна з основних умов не тільки поліпшення конкурентоспроможності майбутнього професіонала, але підняття рейтингу університету в цілому.

Ключові слова: вища освіта, іноземна мова, математика, навчання, предмет, професія, фахівець, університет, навчальний курс.

Introduction. The globalization of education pushes more and more demands on the system of modern higher education. It isn't a secret for anyone that the problem of training and preparing a competitive specialist is apriority task for any country, which likes to increase its leadership positions in the world. And modern universities have expanded their functions from educational institutions to international centers for a long time, where is formed not only basic knowledge. They are the places, where appears the first contact, happens an exchange of cultures, information, they

take responsibility for a forming of a personality in the both cases: a future specialist and person in the full sense of these words. At the same time, the communicative component of education is playing the biggest role; and as consequence, the problem of communication arises not only among compatriots, but also at the level of international contacts. And as a result, a learning a foreign language becomes not just a desirable component, but it is a necessary factor in the arsenal of knowledge of a future professional. But, it should be noted in this direction that the priority in the study process of foreign languages has recently shifted from the need of a general level of language proficiency to the need to have a professional speech, be able to change a professional experience.

Analysis of relevant research The last studies and researches in this direction show that the studying of any foreign language (English in our case), as the language of the future job, the language of communication, is a new and very important direction in the systems of a modern high school not only in Ukraine, but also on global scale. So, most researchers and scientists are thinking, that only to be able to speak foreign language in daily life isn't enough today. The ability to keep a usual talking is fundamentally different from the ability to keep a professional conversation. And this fact is the one biggest problem of the modern university education.

Yes, each university has a foreign language as a subject in its schedule. And often a large numbers of hours are given to it, but despite this fact, about 90% of graduates of higher education haven't any skills of professional speech in a foreign language; they are not able to translate some small articles professionally, not able to participate in scientific debates and conferences. It is the fact that the solution of this problem is more complicated than it seems firstly. In this case it is impossible doesn't agree with the point of view of S. Kutateladze, who also emphasizes the catastrophic state of the English knowledge in the professional language level, especially among graduates in natural science specialties and directions, and this level doesn't correspond to the huge role of a foreign language that it occupies in modern science in the global professional world [5]. S. Kutateladze notes that the solution of this problem isn't simple enough; and the introduction of more hours of a foreign language in the studying plans of universities is not able to solve this problem till the end, because pure teachers of English have only linguistic education and nobody of them has full knowledge of the specifics of the subject. Therefore, one of the directions for solving this problem may be the teaching subjects in a foreign language by subject teachers directly. This point of view is actively supported by many scientists and researchers. So, for example, in the research works of I. Stepanyan., G. Dubinina, E. Ganina it was emphasized that foreign language knowledge can form such kind of the important quality for a future specialist as multifunctionality. In their works is focused attention on the differences between general language teaching, and teaching the language as the language of future job. It is noted that phrases, terminological vocabulary, the structure of building professional sentences are often radically different in comparison with ordinary speech, and therefore only increasing the hours of teaching any foreign language as such will not give the desired result [6, p.170]. According to the other point of view of scientific, the problem can be only solved by involving subject teachers in this process. As it is going for some more detailed directions, L. Bizyuk claims in her works that only early involvement of students in teaching the professional specifics of the English language gives the best results [2, p. 20]. T. Vasilyeva believes that with the study of a foreign language as a separate subject in higher education, it is necessary to introduce additional disciplines such as, for example, « Translation Technique ». S. Eliseev, S. Efimchik, S. Lichevskaya consider that the lack of live communication with native speakers is the greatest difficulty. In addition, they put their attention on difficulties in the perception of any foreign speech, which are associated with the difference of language structures in the native and the foreign languages [4, p. 45]. J. Alinina, V. Bodrjakov, G. Pochodzjei consider that the early introduction into project methods is one of the most important stages in learning a foreign language for a future professional, when students must be able to work independently, and try to organize small professional startups already at the first stages of their studies [1, p. 21]. I. Smotrova pays great attention to the formation of business correspondence skills; Solzhenitsin L. F. emphasizes the importance of professional communication.

There are many studies and views in this direction, and despite their differences, one thing can be emphasized once again: the problem of learning a foreign language has shifted from the

plane of learning a language for everyday communication to the plane of learning a foreign language as the language of a profession, the language of a future professional. The analysis of domestic and foreign literature on this direction has shown that this problem is relevant on a global scale as a whole. Thus, the world's leading universities have a large number of foreign students, whose percentage are increasing and will only grow in the future. Therefore, they also face this problem from two sides.

Firstly, foreign universities should organize training in such a way that the arriving students overcome the language barrier well enough and can join with new professional environment very quickly.

Secondly, domestic students (of the respective states) must also learn an additional foreign language, which will allow them in the future to fill themselves quite well in a professional environment.

So, some aspects of this problem are clearly enough indicated in the works of foreign colleagues (H. Bremmer, D. Hicks, P. Ur) [7; 8; 9]. It should be noted that the authors emphasize the same shortcomings: the lack of a language in the profession, the inadequacy of only increasing the hours of teaching a foreign language at the university by linguist teachers, a large phonetic difference and the difference between the language construction formations that exists in the native language and the studying language.

In addition, researchers agree that in the case of the introduction of such training: when students study a subjects in a foreign language, and at the same time there are foreign students in the group, it is necessary to talk about bilingual education, and doesn't talk about studying the subject separately only. So, now we will look at the different features of teaching students in a foreign language (English) in higher educational institutions and universities of Ukraine. As a rule, in this case we often have a deal with mixed groups. Moreover, for Ukrainian students, English is the language they are learning, and as a result they are having double complexity of the situation: the language plus a subject. And this situation is very difficult for most of them. As result, a teacher must comment what is happening in their native language in any case (Ukrainian, Russian). And foreign students stay in the opposite situation: they have chosen to study in English, since it is their native language, but they learn an additional language (Ukrainian, Russian) due to their stay in the country for five years of study. And this fact also leads to the effect of bilingualism, and creates additional difficulties for them as well. If we talk about the division of groups: to form separately domestic groups that study the subject in a foreign language, and separately foreign ones that study the subject in their native language and additionally study the language of the country, this situation, of course, can simplify the situation for both part of educational process: for the students themselves and for the teachers, but not so much.

But in this case, it is very important to consider other factors as well. So, many advanced countries, such as the USA, Canada, Germany, reject such kind of a division, and strive to form more international groups. The reason lies in the consideration of the geopolitical interests of these countries, first of all. As a rule, universities today are not only centers for acquiring knowledge, but centers of the contacts formation, of the cultures influence, and the establishment of such intercultural connection between peoples. And all this supports strengthening the spheres of influence of the state (country) itself on the international arena.

As has been shown by foreign researchers, the division of groups according to the level of training is one of the directions in solving this problem. But, if we talk about a language, the level of such kind of division is often determined only by the results of language tests, and they don't give an unambiguous result of the level of language proficiency very often. In addition, such kind of educational process has not only language training but professional training too, and for example, sometimes situations can happen that the students with high language level have a low subject level or vice versa. All this specificity is inherent to the all system of global education as a whole. However, there are realities that relate directly to Ukrainian higher education. So, for example, the first of the questions that should be asked to Ukrainian students when they choose to study in English is the question of motivation: « Why do students choose to study in English? » Well, firstly, most students, which decide to study in a foreign language, do not understand the

difference that simple everyday speech will be radically different from professional conversation what they will hear in their classes.

This is a specialized terminology, the ability to understand the condition of tasks, which, due to the specifics of the grammar of a foreign language, may sound completely different in the comparison with the usual statement of the problem in the native language. Plus, of course, there is problem of understanding and learning a new subject.

Further, the majorities of students or applicants are practically not informed, or even have no idea that if their goal of studying subjects in English is to study at a foreign university, then the level of professional training in many countries is quite different from the level of study at Ukrainian universities. And you need to be ready to make up this difference yourself. All this can reduce the motivation factor to zero. In addition, the question of the teachers which are able to teach the subjects in English stays very acute. And for getting a really well-trained subject teacher who has very good professional knowledge in the subject, and at least can be able to speak some fluent English, is necessary to provide a lot of conditions. In this case the teacher needs to have a constant contact with his colleagues from foreign countries, to have possibilities to take part in different business work trips. And modern Ukrainian universities dislike providing all of these. If, somebody thinks that the teacher must provide this on his own, then the question also arises: « Why does he need this? » And, additionally, it should be noted that it is a complete lack of high-quality English-language literature on the professional field on Ukrainian market, and the process of preparing and conducting one lesson in English requires not only language knowledge, but also a huge routine work.

Aim of the study is to analyze the current situation, to highlight the problems and difficulties with which faces the higher school of Ukraine, especially the teaching a number of subjects in a foreign (English) language; to show the disadvantages and advantages of certain teaching methods.

Presenting main material. As example, for such kind research has been chosen the discipline « Higher and Applied Math », which is taught in the first year of education on the faculty of International Economic Relation on specialization 242 « Tourism ». The choice of discipline was not accidental.

Firstly, mathematics, as a fundamental discipline, is the least susceptible to language dependence; despite there are still heterogeneities and differences in the presentation of the material, definitions and form of material.

Secondly, the discipline it taught throughout the year. And its first part: « Higher Mathematics » is simpler in definitions, terms and in language as its second part « Probability Theory and Mathematical Statistic », where students must better understand the text problem. Where, exactly, the conditions, terminologies, presentations, statements of the problems and other things play more significant role. Such kind of distribution of presentation structure and material learning contributes to the best adaptation of students to study both parts: language and the subject. In addition, it should be noted that the presence the same teacher for a long period of study (one year) is very important factor too. The research was carried out during the 2019/2020 academic years. The initial dates were follows: most of the students who study in this specialty have low knowledge of mathematics; only 35% of students pass on the average mathematics as an entrance exam when entering the university. Groups are also mixed: there are foreign students among domestic students, but it is not possible to take out foreign students in separate groups, primarily due to the low number of foreign students in groups (there are 5 foreigners for 20 domestic students on the average). In addition, it should be added that not all foreign students can be classified as native speakers. The level of language training of domestic students is also different, however, the situation when some of the students are fluent in the language, and the others practically don't speak, isn't observed too. Of course, it would be expected that students who have declared about their wishes to study in English-speaking groups are almost fluent in the language or have at least very high level. But, unfortunately, as practice shows, it is quite difficult to find out this fact, because the first problem that teachers can observe at the beginning of their studies is the lack of elementary communication.

So, students themselves have significant difficulties in speaking in front of a group of students or teacher, and communication or expressing their point of view in a foreign language adds even more uncertainty. And it is quite difficult to understand what the reason for such kind of uncertainty is: the language, subject, or the elementary lack of skills in speaking and working in front of an audience. In this case, the bigger presence of the mathematical component in the first semester only is a great advantage, during this time students can more fill their lacks of knowledge in mathematics than in language. So, at this stage, it is enough to be able to operate with very simple concepts and mathematical terms, such as simplify, factor, cancel, fraction and some others, to be able to build sentences that are simple by grammatical structures. Of course, it is necessary to take into account that these mathematical concepts are new for each student, and it is necessary constantly to focus on the fact that knowledge of the subject, terminology, and the formulation of tasks must be basic for further development oneself as a future specialist. For this, the teacher forms a small dictionary of terms for students, which they must remember and use in the future at the end of each topic or lecture. On the picture 1 is shown the part of vocabulary to the topics « Matrices. The Systems of Linear Algebraic Equations ».

In addition, it is necessary to pay attention to the fact that a priority should be given to professional training, and only after that, as a result, of language training, if we are talking about a future professional who speaks a foreign language. So, only presence of the special knowledge can help to understand the problem, which is formulated in a foreign language from the context of a task. At the same time, it is necessary to take into account that the structures of languages are different, and in different languages the same problem can sound differently, and it (a problem) can't always be understandable easy only thorough directly translation.

Vocabulary

- *consistent*- совместна;
- *inconsistent*- несовместна;
- *elementary transformations*-элементарные преобразования;
- *inverse matrix*- обратная матрица
- *regular*- невырожденная;
- *singular*- вырожденная;
- *adjoint*- союзная транспонированная

Pic 1. Vocabulary

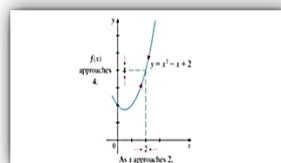
So, for example, if we elevate some expression, we use the expression « to the power », but if we tell about the degree of a polynomial (as any number), then in this case the degree of the polynomial is expressed with the word « degree ». As practice has shown, the best result gives the block structure of the material presentation in the form « lecture-practice-laboratory work ».Let us show this by using the example from the topic: « Limits of a Function ». The fragment of the lecture is shown on the picture 2.

Lecture Limits of Functions 1

What are the limits of function? Begin with some of examples

Example 1

Let we have $y = x^2 - x + 2$, if $x \rightarrow 2$, we have $y = 2^2 - 2 + 2 = 4$, or we can write: $\lim_{x \rightarrow 2} x^2 - x + 2 = 4$. Or we can also say that the value of function $y = x^2 - x + 2$ approaches to the number 4 as the variable x tends to a point 2. Graphically we have:



Pic. 2 The fragment of the lecture « Limits of Function »

During the lecture, students are introduced to the topic with minimum number of new words. Moreover, by writing the lecture, a teacher usually uses the principle: more mathematical concepts and minimum operations with a new English vocabulary, grammatically sentences and phrases should also be quite simple. In a practical lesson, students usually solve examples using basic communication vocabulary. And required conditions are: using lecture vocabulary (in English), and the mathematical validity of solving examples and their explanations. There is a possible example of the task solution and its comment.

$$\text{Solve the limit: } \lim_{x \rightarrow 4} \frac{x^2 - 6x + 8}{x - 4} = \left[\frac{0}{0} \right]$$

Solution

Let we have: $\lim_{x \rightarrow 4} \frac{x^2 - 6x + 8}{x - 4} = \left[\frac{0}{0} \right]$. Factor the numerator. For this we can use the next property: $ax^2 + bx + c = a(x - x_1)(x - x_2)$, where x_1 and x_2 are roots of polynomial $ax^2 + bx + c$ and get the answer:

$$\lim_{x \rightarrow 4} \frac{x^2 - 6x + 8}{x - 4} = \lim_{x \rightarrow 4} \frac{(x - 2)(x - 4)}{x - 4} = 2$$

As we can see here, the comments are quite simple, and both types of students: well prepared in language students and students with week preparation in English will feel themselves equally confident. It should also be noted that a joint work gives very good effect, when the teacher involves students for the direct translation of the material with operating the main vocabulary of the subject. In addition, using of syntax-English mathematical environments for calculations, such as MatLab and Octave in laboratory works, also gives an additional effect in the constructing mathematical constructions in English. The situation becomes more complicated in the second semester, as the discipline changes in the structure. The second part «Theory of Probability, Mathematical Statistics, Mathematical Programming and Operation» is more difficult, tasks are textual for their nature, and formulations of problems and examples cannot be realized through simple expressions and phrases. Let's give an example of such kind of the task.

Example.

Let we have in the class 10 girls and 12 boys. For us necessary to form a group, which consist from 5 girls and 3 boys. What is the probability to do this?

Solution.

According to main formula of the probability: $p = \frac{m}{n} \Rightarrow n$ -is all combinations to take 8 people (5 girls and 3 boys) from 22 people (10 girls and 12 boys). In this way is $n = C_{22}^8$ and m -is only choices, they are necessary for us and $m = C_{10}^5 \cdot C_{12}^3$. We get the answer: $p = \frac{m}{n} = \frac{C_{10}^5 C_{12}^3}{C_{22}^8}$.

In process of solving such problems, it is already necessary to use two components: to have a very good knowledge in the mathematical apparatus and language, respectively. It should be noted that to have and be able to use these both factors are not easy for all students.

Trough the complexity of the second semester, lectures are given by teacher in the classrooms only in English, and the material that students can use for better understanding (usually it's given on the Personal Education System sides) is given in two versions, if possible: English and Russian.

As noted earlier, it exist a lot significant differences in the constructions, expressions and other forms of material realization, when it is submitted in English. And in other way, there are foreigners in the group; many of them are studying Russian as a foreign language. And such kind opportunities: to use both languages by learning is not so bad for both parts of students.

This technique (a material is given in two languages) gives good results, in case of difficulties; a student can always use the material in the language that is more understandable. The example of the parts of the lecture from the topic: «Game theory» is given on the pictures 3 and 4 (both languages) respectively.

Лекція Теорія Ігр

Введение

Рассмотрим такой пример. Существует ситуация, когда два человека играют в какую-то игру и выигрыш одного игрока зависит от того как поведет себя другой. В ситуации, когда разыгрывается приз, и каждая сторона таких отношений не сообщает другой о своих намерениях, поведение их неизвестно друг для друга, и говорят, что эти игроки находятся в *конфликтной ситуации*.

Т. е. каждый игрок должен принять решение, заведомо не зная, как поведет себя другой игрок. Линия поведения, которую, принимает игрок на данном этапе, называется, *стратегией игрока*.

Математическая модель, которая описывает такую конфликтную ситуацию, называется *игрой*, а раздел математики, которая изучает все это, называется теорией игр. В данной лекции мы рассмотрим игру между двумя игроками, (один из них нацелен на выигрыш, другой на проигрыш) в которой сумма выигрыша одного равна сумме проигрыша другого, и она называется *ценой игры*. Такие игры называются

Pic. 3. The Part of the Lecture «Game theory» (Russian)

Lecture Game theory

Introduction

We have situations, where somebody (one side of business) must make a decision without any knowledge about a decision of other. Such kinds of situations, when we should take into considerations the interests of both sides are called *conflicts*.

The mathematical model of such kind conflict situation is called a *Game*, and the chapter of math which studies this is called *The Game Theory*.

Both conflicts sides are called *Players*, and the line of behavior of each Player is called *Strategy*. The difference from real situation is in that: mathematical model (*Game*) has strong rules. In this chapter we will talk only about *Two-Person Zero-Sum Game*

- The *Two - Person Game* has only two Players;
- Each Player has a finite set of strategies;
- A sense of game is: each player makes one step without knowing anything about the behavior the other player;

Pic. 4. The Part of the Lecture «Game theory» (English)

However, despite the fact that such kind of presentation of the material is optimal and convenient for the students themselves, exists a danger that students can relax and use only the version of the lecture that is convenient for them due to their perception. In order to avoid this, there are many methods of monitoring and controlling the achieved results.

Results. Various methods of monitoring and controlling the acquired knowledge can be used to assess the results achieved during the course.

These are polls, written control works, large individual tasks, and a lot of other excises and jobs. The assignments were different in structure, content, and execution time. But the main idea is constructed into the fact that students must be constantly involved in the work process, and especially they must work with the English-language professional literature. So, for example, one of the kinds of independent work was a large homework assignment, as a result of which the student had to complete several tasks (up to 10) with a full and detailed description the way of their solution, based on mathematical statements.

In addition, in order to consolidate both parts: a vocabulary and subject knowledge, some theoretical control (colloquium) is given twice per semester. It is a list of several questions, which need answers from students. Topics and structure of them are known in advance. So, for example, show the some questions of such kind theoretical controlling to topic "Mathematical Statistic. Mathematical Programming".

Colloquium questions

- It is given a "picture" of game theory and some payoff matrices. You should find the payoff matrix which corresponds the " picture"

- Show the number of the most disadvantageous strategy
- Find a saddle point, the upper and lower price of game
- Which transportation method you know

They motivate students not only to study a material, but to keep an eye on what was happening all the time. It should be noted that such a system of material supply and control, in general, gave good results.

As result, about 5% of students could not stand the load, and they are steadily transferred from English-speaking groups to groups with their native language of teaching till the end of the first semester. And for fifth part of students difficulties only increase motivation, and they do completing tasks gladly. The main part of students improves their level of training not so much.

If we will talk about the second semester, the level of the students' knowledge becomes better, and everyone chooses the style and rhythm of the work that passes individually, and the group moves on to the second course completely full.

Conclusions. Integration into the global, cultural and educational space requires high-quality training of future specialists who not only are able to learn, and have a certain set of professional knowledge at the same time, but are also able to integrate into the world community very quickly. In this context, proficiency in a foreign language, especially English, as the language of international business is an urgent need.

In this regard, modern universities are faced with the task of providing future specialists with high-quality professional language training, adequate to the requirements of a modern economically developed community; develop professionally oriented habits of future specialists, which will allow them to successfully conduct international business, improve their professional qualities, and fluently communicate in a foreign language.

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Железнякова Э. Ю., Силичева Т. В. Некоторые аспекты преподавания ряда предметов на английском языке в современных университетах.

В статье рассмотрены основные аспекты преподавания ряда предметов в высших учебных заведениях на английском языке. Проанализированы основные исследования в этом направлении, приведен собственный опыт авторов статьи. Показано, что в современном мире наблюдается тенденция смещения акцента с традиционного владения иностранным языком к более профессиональному уровню: иностранному языку в профессии.

Обозначены сложности и специфика дальнейшего развития такого направления, а именно преподавания ряда предметов на иностранном (английском) языке в рамках современной высшей школы. Акцентировано, что данная проблема не может быть решена только лишь за счет увеличения часов иностранного языка в учебном процессе. Для ее решения требуется совершенно иной подход, а именно подготовка преподавателей предметников, владеющих иностранным языком. Кроме этого при преподавании ряда предметов на иностранном языке меняется сам подход обучения, структура проведения занятий, система контроля знаний.

На примере преподавания курса «Высшей и прикладной математики» в Харьковском национальном университете имени С. Кузнеца показаны особенности преподавания данной дисциплины на английском языке. Опираясь на анализ исследований, научных работ в этом направлении, и собственный опыт авторов статьи, можно сказать что, несмотря на то, что математика является одной из дисциплин, которая наименее подвержена языковым изменениям, дальнейшее развитие этого направления требует большой и кропотливой работы.

Необходима подготовка преподавателя предметника, владеющего иностранным языком. Излагаемый курс должен быть, прежде всего, методически качественно обеспечен, методика изложения материала отличается от методики преподавания на родном языке. Система контроля также должна быть изменена, так как все-таки в этом случае контролируются две составляющие: знание языка и знание предмета. Но, несмотря на эти все сложности, преподавание предметов на иностранном языке является актуальным требованием современности, и его внедрение в учебный процесс - одно из основных условий не только улучшения конкурентоспособности будущего профессионала, но поднятия рейтинга университета в целом.

Ключевые слова: *высшее образование, иностранный язык, математика, обучение, предмет, профессия, специалист, университет, учебный курс.*

Zhelezniakova E. Y., Silichova T. V. Some aspects of the teaching number of subjects in foreign language in modern universities.

The article discusses the main aspects of teaching a number of subjects in higher educational institutions in English. There are analyzed the main researches in this direction, it is presented the authors' own experience.

It is shown that a tendency to shift the emphasis from traditional knowledge of a foreign language to a more professional level is the main tendency of the modern world. There are indicated the difficulties and specifics of the further development of this direction, especially the problems with are joint with teaching a number of subjects in a foreign (English) language. It is emphasized that this problem cannot be solved only by increasing the hours of a foreign language in the educational process. For solving it is required a completely different approach: to have or to prepare subjects' teachers, who are able to teach in foreign language a subject. In addition, the structure of the classes, the system of knowledge control is changed when teaching a number of subjects in a foreign language. There are shown the features of teaching the discipline «Higher and Applied Mathematics» at the S. Kuznets Kharkiv National University in English as example.

Based on the analysis of research, scientific work in this direction, and the authors' own experience, we can say that, the further development of this area requires a lot of painstaking

work, despite the fact that mathematics is one of the disciplines that is least susceptible to language changes. It is necessary to prepare a subject teacher who speaks a foreign language.

First of all a course should be presented methodically and qualitatively provided, the methods of presenting the material are different from the methods of teaching in the native language. A control system must also be changed too; two components must be controlled in this case: the knowledge of the language and the knowledge of the subject. But, despite all these difficulties, the teaching subjects in a foreign language is an urgent requirement of our time, and its implementation in the educational process is one of the main conditions not only for improving the competitiveness of a future professional, but raising the university's rating as a whole.

Key words: higher education, foreign language, mathematics, training, subject, profession, specialist, university, training course.

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О. М. Коломієць

ORCID ID 0000-0003-4008-3990

Я. О. Іващенко

ORCID ID 0000-0002-4592-7972

Т. В. Щеголь

ORCID ID 0000-0002-8172-0127

Черкаський національний університет
ім. Богдана Хмельницького

ЗАДАЧІ ЗА ГОТОВИМИ РИСУНКАМИ У НАВЧАННІ УЧНІВ БУДУВАТИ ПЕРЕРІЗИ ПІРАМІДИ

Аналіз результатів виконання учнями завдань зовнішнього незалежного тестування з математики показує, що протягом останніх років близько 80% учасників тестування не змогли визначити вид і зобразити переріз заданою площиною многогранника, зокрема піраміди. Тому проблема вдосконалення методики навчання учнів будувати переріз багатогранників є актуальною.

Метою статті є з'ясування особливостей побудови системи задач за готовими малюнками на тему «Переріз піраміди площиною».

Для побудови системи задач за готовими малюнками доцільно враховувати візуальну складність завдання. По-перше, візуальна складність визначається кількістю і об'ємом смислових одиниць, представлених на малюнку, по-друге, певний вплив має процедурний компонент задачі. Крім того процес розв'язку задач на побудову перерізів многогранників ускладнюється через необхідність виконувати в уяві перехід від візуально спотвореного зображення до візуально ймовірного способу і навпаки. У статті наведено спосіб побудови диференційованої системи задач за готовими малюнками, розташованих в таблицях-матрицях. Наприклад, в таблиці вид піраміди можна ускладнювати по горизонталі, а по вертикалі ускладнювати розташування точок, що належать площині перетину піраміди. Крім того під час складання системи завдань треба враховувати і як внутрішньо-предметне, так і міжпредметне наповнення задачі. Ефективним є використання програми GeoGebra, яка дозволяє будувати зображення багатогранників, їх перетину, обертати отриманий малюнок, розглядати його під різними кутами, що допомагає формувати вміння учнів відтворювати цілісний просторовий образ, переглянути покрокову побудову перетину, досліджувати вид перетину багатогранника, зокрема піраміди, залежно від розміщення точок, через які проводиться розтин.

Ключові слова: навчання учнів геометрії, задачі за готовими рисунками, візуальна складність задачі, побудова перерізів піраміди, програма GeoGebra.