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An interdisciplinary approach to teaching professionally-oriented english

The paper considers application of interdisciplinary approach to teaching professionally-oriented English for the students of physics. Interdisciplinary pedagogical practice allows the teacher to cross the traditional boundaries of discipline-centered teaching by drawing knowledge from two or more academic disciplines. In teaching foreign languages at non-linguistic faculties it is especially important to develop skills of rendering of special scientific texts. This work fully implements possibilities of interdisciplinary approach to teaching foreign languages. Therefore, one of the tasks of teaching English at the natural science faculties is to form skills of working with the original English-language literature on specialty, and in particular, to develop skills of writing summaries of the texts. Students have to learn how to write annotations and abstract in the English language to the scientific articles written in their native language. On the example of teaching English at the of Physics & Technology it is shown that interdisciplinary approach helps students to gain better understanding of physical laws.

Key words: interdisciplinary approach, professionally-oriented English language, writing summary.

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Кәсіби-бағдарлы ағылшын тіліне оқытудағы пәнаралық әдіс

Бұл мақалада физика мамандығы бойынша оқитын студенттерге кәсіби-бағдарлы ағылшын тілін оқыту үдерісінде пәнаралық әдістің қолданылуы қарастырылады. Пәнаралық педагогикалық практика оқытушыға оқыту үдерісінде немесе академиялық пәндерден алынатын білімді қолдана отырып, жекелеген пәндердің дәстүрлі шекарасын игеруге мүмкіндік береді. Тілдік емес факультеттерде шетел тіліне оқытуда студенттерге арнайы ғылыми мәтіндерді аудару дағдысын дамыту өте маңызды. Мұндай жұмыстың түрі шетел тіліне оқытуда қолданылатын пәнаралық әдістің мүмкіндіктерін толық іске асырады. Сондықтан да ғылыми бағыттағы жаратылыстану факультеттерінде ағылшын тіліне оқытудың бірден-бір міндеті – бұл мамандық бойынша оқылатын ағылшын тілінде жазылған түпнұсқа әдебиеттермен жұмыс істеу дағдыларын қалыптастыру және жекеше алғанда, ғылыми мәтіндермен жұмыс істеу дағдысын дамыту болып табылады. Студенттер ана тілінде жазылған ғылыми мақалаларына аннотация және түйін жазып үйренулері қажет. Мысалы, физика-техникалық факультетінде ағылшын тілін оқытуда қолданылып жүрген пәнаралық әдіс студенттерге физика ғылымы заңдылықтарын терең түсінуге мүмкіндік беретінін көрсетті.

Түйін сөздер: пәнаралық әдіс, кәсіби-бағдарлы ағылшын тілі, түйін жазу.

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Междисциплинарный подход к преподаванию профессионально-ориентированного английского языка

В статье рассматривается применение междисциплинарного подхода к процессу обучения профессионально-ориентированному английскому языку студентов-физиков. Междисциплинарная педагогическая практика позволяет преподавателю преодолеть традиционные границы отдельных дисциплин, используя в процессе обучения знания из двух или более академических дисциплин. В обучении иностранным языкам на неязыковых факультетах особенно важно развивать навыки перевода специальных научных текстов. Эта работа полностью реализует возможности междисциплинарного подхода в обучении иностранным языкам. Поэтому одной из задач преподавания английского языка на естественнонаучных факультетах является формирование навыков работы с оригинальной литературой по специальности на английском языке, и, в частности, развитие навыков реферирования научных текстов. Студенты должны научиться писать аннотации и резюме на английском языке к научным статьям, написанным на родном языке. На примере преподавания английского языка на физико-техническом факультете показано, что междисциплинарный подход помогает студентам достичь более глубокого понимания физических законов.

Ключевые слова: междисциплинарный подход, профессионально-ориентированный английский язык, написание резюме.

**AN INTERDISCIPLINARY
APPROACH
TO TEACHING
PROFESSIONALLY-
ORIENTED ENGLISH**

Nowadays, the relationships in the scientific community are characterized by broad international cooperation and active information exchange. Therefore, special attention is paid to teaching foreign language in the university system, the purpose of which is to provide graduates with the ability to become part of the international educational space with active intercultural communication in the framework of their professional and scientific activities.

To succeed in university and in our rapidly changing work force, students today must learn to be more critical, inventive, collaborative and technically skilled, than ever before. But these new demands on students mean new demands for educators, especially in learning to deal with new and changing strategies. In recent times, there have been numerous academic discussions of the problem of interdisciplinarity. Interdisciplinary pedagogical practice allows the teacher to cross the traditional boundaries of discipline-centered teaching by drawing from two or more academic disciplines to approach the text.

Educators are seeking ways to help students make sense out of the variety of life experiences and bits and pieces of knowledge being taught in the curriculum typically divided into special subjects not interconnected with each other. To reduce some of the fragmentation, the teacher must apply his creativity and flexibility. Curriculum integration is necessary to teach about topics that cut across university subjects. Even when integration is not necessary, it is often desirable, and when the content drawn from one subject is used, it enriches the teaching of another subject. It is especially important to use interdisciplinary teaching working with professionally-oriented language. The title of the subject itself tells us about the necessity of interdisciplinary approach.

Interdisciplinary teaching is a method, or a set of methods, used to teach a unit across different curricular disciplines. There are many different types, or levels, of interdisciplinary teaching. The most common method of implementing integrated, interdisciplinary instruction is the thematic unit, in which a common theme is studied in more than one content area [1, 57]. Scholars that advocate for curriculum integration argue that the topics studied should originate from students and their teachers, and not from imposed curriculum packages.

Thematic units can also fall short of teaching in-depth content to students. Often a theme is used to link unrelated subjects, with little deference to students' prior knowledge or interests. This superficial coverage of a topic can give students the wrong idea about teaching, perhaps missing the idea of curriculum integration in the first place. Thematic units can contain pointless busywork and activities created solely to make a link to a theme.

Barton [1, 58] identifies ten models of integration that fall into three general categories:

- 1) integration within single disciplines,
- 2) integration across several disciplines, and
- 3) integration within and across learners.

She defines the goal of integration as follows: «to help young minds discover roots running underground whereby contrary and remote things cohere and flower out from one stem.»

As such, integration represents a way of thinking rather than simply an overlapping of curriculum. Perkins and Salomon [2, 17] utilize the term «transfer» to describe this way of thinking. They distinguish between «learning» and «transfer». «Learning» is characterized by the ability of the student to demonstrate performance in a context that is more or less the same as the learning situation. «Transfer» takes place when the student is able to apply knowledge acquired to different situations.

Is interdisciplinary integration desirable? There are those who question whether it is, in fact, advisable to engage in interdisciplinary integration in our schools. From a Jewish perspective, we find some hesitancy, even among those who advocate the concept of Torah Umada, the integration of Torah and general studies. In his address to alumni of Yeshiva University on the school's fiftieth anniversary, Dr. Norman Lamm, president of the university, quoted his predecessor, Dr. Samuel Belkin: «Our job is to give the students the material; their job is to let the materials interact within their minds.» To use the word interdisciplinary, one must show that particular disciplines have been mastered and appropriately joined. Such interdisciplinary synthesis is simply not feasible for most youngsters during the middle years of childhood, or for most of their teachers. Most so-called interdisciplinary curricula can be considered as proto-disciplinary activities.

Heidi Hayes Jacobs [3, 27] indicates that the largest obstacle to curriculum integration is that people try to do too much. Successful implementation must take into account various levels and phases of integration that might be possible in a school.

1) Integration does not have to be interdisciplinary. The first step toward integration is to foster integrated thinking with each discipline.

2) Teachers who are capable of drawing on information from other disciplines should be encouraged to do so when appropriate, but not at the expense of the mastery of their own discipline.

3) Interdisciplinary integration can be fostered, as well, without interdisciplinary instruction. Such integration involves the process defined by Fogarty as integration within and across learners. An example of this process would be a project that calls on the student to draw on a variety of disciplines in order to complete the work.

The realms of theatre, dance, music and art are closely associated with the Humanities, different branches of arts drawing upon each other for inspiration. Film studies is another area that cannot be ignored when studying texts which have been adapted into feature films. In that sense, an interdisciplinary study is an old hat for English teachers. They have to take a holistic approach to the text—which means that they have been using this method of teaching long before it became popular as a new method of pedagogy.

The most common example of interdisciplinary study in English teaching can be seen in the complex and interrelated relationship between history and literature. Understanding of history is fundamental to the analysis of literary texts. Literature reflects history, and history shapes literature.

We can state that not only history and literature can be used as an example of interrelation between subjects. Interrelation is in the title of the subject «Professionally-Oriented Foreign Language».

Interdisciplinary instruction fosters the acquisition of foundational knowledge, promotes integration of ideas from multiple disciplines and provides insight on how to apply knowledge which advances students' understanding of how to learn. Moreover, students are encouraged to account for the contribution of disciplines that highlight the roles of social interaction when analyzing problems. Thus, the very structure of interdisciplinary learning is consistent with the core features of significant learning, so students are expected to find interdisciplinary education engaging and thus an effective way of advancing their understanding of topics under investigation.

Moving from a disciplinary oriented form of teaching to an interdisciplinary form is not something absolutely new for a teacher. First, most educators are familiar with the methodologies and empirical practices of related disciplines so acquiring the necessary cross disciplinary knowledge to become an interdisciplinary teacher will not be overly stressful or time consuming. Second, most educators are

familiar with task modeling, an instructional strategy that promotes learning through observation, which is fundamental to interdisciplinary teaching since most students are unfamiliar with interdisciplinary approaches to learning, so instructors do not have to learn an entirely new form of pedagogy. Third, synthesis of information from across disciplines, the most demanding element of interdisciplinary teaching, is an activity that most scholar-educators have engaged in previously or can learn to do with modest effort. Finally, instructors can determine the share of the course that is interdisciplinary, so they insert into their course the level of interdisciplinarity that is ideal for them given their experience with this form of teaching and the nature of the course they are leading.

It is a common concern of educators and parents how being taught in the foreign language will affect learners' knowledge, skills, and understanding of the subject. Because the medium of learning is less perfectly known than the L1, it is feared that this will lead to reduced subject competence as a result of either imperfect understanding or the fact that teachers preempt this problem and simplify content [4, 186]

In teaching foreign languages at non-linguistic faculties of universities it is especially important to develop skills of rendering of special scientific texts. This work fully implements possibilities of interdisciplinary approach in teaching foreign languages. In everyday practice, many specialists often need to make oral or written presentation in his native language of the summary of papers containing valuable information written in a foreign language. It is also common practice for the publication of scientific articles in journals and thematic collections in the native language with the abstract in the English language. Therefore, one of the tasks of teaching English at the natural science faculties is to form skills for working with the original English-language literature on specialty, and in particular, to develop skills of writing summaries of the texts.

In addition to writing summaries of the English-language texts in the English language it is useful to do such types of work as writing summaries of the English-language technical texts in Russian and the Russian-language texts in English. These skills are essential both for undergraduates and specialist with master's degree, who should get acquainted with modern information technologies, methods of producing, processing and recording of scientific information. At the present stage of development of the world science all stages of work with scientific information necessarily include the ability to work with literature in various languages.

Teaching English we can consider some topics taught in the course of physics. The same theme can be considered at the lessons of physics and English. In the course of physics students study Newton's laws and there are groups where physics is partially taught in English. An important contribution to the interdisciplinary approach is learning physical terms at the lessons of English. The students get to know definitions of terms from science popular texts and it is a kind of introduction to more precise definitions, which they find in their textbooks on physics. For example, the students can find the following definition of plasma in the English textbooks:

For example: If the weight of the object in water is less than the weight of the water displaced, the object will float. This is known as buoyancy or the Archimedes principle.

The students get to know such term as «buoyancy» and it is easier for them to learn a more difficult definition from the textbook on physics:

Buoyancy is an upward force exerted by a fluid that opposes the weight of an immersed object. In a column of fluid, pressure increases with depth as a result of the weight of the overlying fluid, the pressure at the bottom of an object submerged in a fluid is greater than at the top of the object.

As an introduction to learning terms and definitions of physical laws, we used the lessons of Dan Fullerton in *Aplusphysics*.

The law of conservation of mechanical energy is written as:

$$mgh = \frac{mv^2}{2} + \frac{I\omega^2}{2},$$

where h is the distance traveled by the load from the beginning of movement till its fall from the platform;

v is the linear velocity of the translational motion of the load at the time when it touches the platform;

ω is the angular speed of rotation of the disk when it touches the platform with the load.

We see that there are many common terms and calculations, though the level of calculations in the video is lower as it is a school subject.

Video lessons help the students to learn how to pronounce the words properly. The necessary supplement to the course of physics in English is listening to the extracts from lectures on differentiation and integration as it is impossible to present physical laws without this mathematical apparatus. Here we present an extract from the lecture:

Functions satisfying the condition are called orthogonal, and the system functions is called an

orthonormal basis formed by harmonic functions with multiple frequencies. The orthogonality condition can be written in compact form, using the Kronecker delta:

$$\int_0^T u_i(t)u_k(t)dt = \delta_k$$

where

$$\delta_k = \begin{cases} 0, & i \neq k, \\ 1, & i = k. \end{cases}$$

The choice of video material for the classroom was limited by the range of themes studied by the students and the level of their knowledge of English. In one of the articles on interdisciplinary approach to teaching students of non-linguistic specialties it was suggested to use lectures of the Nobel Prize laureates for the master course students. We tested the possibility of usage of the lectures, but it turned out to have too disadvantages. The first one is the complexity of the subjects discussed by the lecturers, the second one is the level of English. Therefore we came to the conclusion that it is more efficient to use the texts and video close to the studied subjects.

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