INTERDISCIPLINARITY IN THE HIGHER TECHNICAL EDUCATIONAL INSTITUTIONS

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Abstract. The solution of the Ukrainian integration problem in the field of education needs a set of reforms in higher educational institutions. The analysis of the peculiarities of contemporary science (more interdisciplinary) and technical education (connection and dependence of general technical disciplines, vocational oriented and humanitarian disciplines) is considered. The achievements in the field of interdisciplinarity are given. The aim of the paper is outlined. The notion of interdisciplinary learning is considered in the context of teaching the students of technical specialties. The interdisciplinary links (between a foreign language and general technical disciplines; a foreign language and general technical disciplines; a foreign language and vocational oriented disciplines (narrow specialization); a foreign language and other humanitarian disciplines; technical / vocational oriented disciplines) are defined. The internal discipline links (between topics within a general technical / vocational oriented disciplines, English) are described.

Keywords: interdisciplinarity, interdisciplinary learning, students of technical specialties, interdisciplinary links, internal discipline links, technical universities, humanitarian disciplines, general technical disciplines, vocational oriented disciplines, foreign language.

Introduction

Today the solution of the Ukrainian integration problem into Europe is urgent and needs a set of reforms in all spheres of our society. Higher technical education is an essential part of our state that requires alterations. They involve updating the content of training, the development of new methods of teaching, the use of various learning technologies that could improve the quality of students' education.

But only taking into account the peculiarities of contemporary science and technical education can give us an opportunity to provide changes and achieve positive results. One of the peculiarities of current science is that it is more interdisciplinary. It means that scientific problems are complex and they are beyond the area of a single discipline. That is why researchers need knowledge from different disciplines, activate and combine their various skills for finding solutions.

Secondly, the process of teaching technical students aims at giving the acceptable technical education which includes the necessity to master a set of inseparable general technical disciplines and vocational oriented ones. These disciplines can be considered in tight connection and dependence. Only understanding such a deep link between the mentioned disciplines could lead to new scientific innovations.

Thirdly, the block of humanitarian subjects in technical universities, among them one of the most important – a foreign language, is connected with technical and vocational oriented disciplines. Mastering foreign languages gives a student a range of profits. They are:

– improving students' foreign language skills in listening, speaking, reading, writing and translation;
– expanding and enhancing the knowledge in the technical sphere;
– realization of communication;
– increasing motivation of students to study English and technical / vocational oriented disciplines;
– widening the interests;
– getting international experience in the field of technologies;
– the possibility of studying at on-line foreign courses.

English as a foreign language in technical universities can be considered to be a cluster of different subjects. It is a subject that can show links between different knowledge.

So, all the above peculiarities show the importance of interdisciplinarity in technical universities.
It is known that interdisciplinary learning means such a process of studying that uses connections across different disciplines, synthesis of students' knowledge, sub-skills and skills, and reflects the complex approach of understanding the professional field.

The problem of interdisciplinarity in pedagogy is not so new. The research of interdisciplinary involvement in the process of teaching and learning foreign languages covers different layers of educational system from schools to higher educational institutions. For example, A.V. Konyshcheva has considered interdisciplinarity as an important principle in learning a foreign language at school (Konyshcheva, 2004), H.H. Jacobs has suggested the interdisciplinary syllabus within the school subjects (Jacobs, 1989). Regarding this phenomenon in the high school, it is possible to mention the scientific work of N.K. Kotilenkov who has investigated the ways of improving teacher training through interdisciplinarity (Kotilenkov, 1996), M. V. Pravdina whose dissertation is devoted to the problem of integration of the general technical and foreign language training as a form of cultural engineering in technical universities (Pravdina, 2006), M.V. Cytovich who has considered secondary features of language education in Russia and interdisciplinarity as a reserve of quality upgrading education (Cytovich, 2010), the investigation of N.E. Medvedeva about the interdisciplinary approach to teach students advertising within teaching business English (Medvedeva, 2006), the contribution of J.R. Davis about different levels of collaboration through planning, content integration, teaching and testing (Davis, 2004).

Nevertheless the problem of providing interdisciplinarity in teaching English or other foreign languages in technical universities is still open and needs researching in the context of peculiarities of modern science and technical education.

So, the aim of this paper is
- to outline and analyze the main links between disciplines in the technical universities;
- to show the examples of interdisciplinary and internal disciplinary links in the educational process.

Overview

Training of specialists of technical specialties includes general technical disciplines (for example, mathematical analysis, algebra and geometry, theory of probability, discrete analysis, general physics, software, computer graphics, operating systems, computer architecture, etc.), vocational oriented (for example, information theory and coding fundamentals of information protection, protection of confidential information, etc.) and humanities (such as Ukrainian language, ecology, philosophy and foreign language), which have been selected on the basis of curricula "Educational Qualification Characteristics" and "Professional Educational Programs". Since a foreign language is a part of a structured curriculum, it is clear that foreign language teaching should be linked to the established disciplines cycles and its main purpose is "the formation of students' professional linguistic competence that will contribute to their effective functioning in the cultural diversity of educational and professional environments" (British Council, 2005).

English as a separate subject accumulates knowledge from different disciplines, so it is possible to outline the links: interdisciplinary and internal.

Let us consider interdisciplinary links that contain the connections between:
- a foreign language and general technical disciplines;
- a foreign language and vocational oriented disciplines (narrow specialization);
- a foreign language and other humanitarian disciplines (a link to Ukrainian, Ecology, Philosophy and other disciplines);
- technical / vocational oriented disciplines.

The first group of links (a foreign language and general technical disciplines) is important for enriching the student's thesaurus by appropriate technical terms, exploring stylistic and grammatical features of texts that belong to certain genres (mostly scientific and popular articles and scientific papers). General technical mastery of vocabulary can occur on the first and second years of studying at the technical university, it is the base for successful learning vocational oriented vocabulary.

The second group of links is a foreign language and vocational oriented disciplines. It is implemented in teaching listening, speaking, reading and writing based on vocational oriented texts which are selected from courses aimed at mastering specialization. The emphasis is given on specificity of vocational oriented vocabulary, grammatical and stylistic genres.

It should be noted that the first and second groups of subjects are based on clear and consistent reasoning, logical thinking and evidence that need from the students' fluency in a foreign language to express
their opinions on issues (it means that an idea is realized through the verbal expression) successfully. These links are directly interrelated because the first group is based on the second one.

The third group of links (a foreign language and humanities, all except internal English links) is realized through the comparison of features of Ukrainian and English vocabulary, grammar and style. In addition, the comparison can be realized through the studying such a topic as "Recruitment" (the comparison of resume writing and the other business papers, etc.). Also, the links between a foreign language and environment are obvious when students learn to communicate in a foreign language on the environmental problems of society. Within bonds of a foreign language and philosophy it is possible to mention rational knowledge, that is associated with the objective reality in which the word has a meaning, and the text reflects the scientific facts that are transformed into relevant activities.

The fourth group of links (between technical / vocational oriented disciplines) includes the connections between technical disciplines, technical and vocational disciplines, vocational disciplines. For instance, studying the topic "Astronomy and Astrophysics" the first year students explain the difference between these notions, give examples of various phenomena to show the difference. Learning the topic "Fractals" the link between mathematical fractals and steganography attracts students interests to find connections and the ways of hiding messages or images.

Besides interdisciplinary links it is necessary to focus on internal disciplinary links (within the general technical and vocational oriented courses; a foreign language). They are links between:

- topics within a general technical / vocational oriented discipline;
- topics within English (types of speech activity, grammar and other topics within language learning).

The obvious internal links between topics of technical / vocational disciplines can be found during studying vocational oriented English when one topic becomes a bridge for the other one. For example, the first English lessons for the students in the field of information security are devoted to studying historical facts of hiding information and then the students learn how to cipher messages with the help of substitution and transposition ciphers. This type of links is important to follow during planning topics for studying English for Special Purposes.

Also it is possible to mention internal discipline links within the proper foreign language that for technical students serves as an object of studying, and a means of communication that distinguishes English from other disciplines included in the curriculum. A foreign language is a tool that helps students acquire new knowledge from other disciplines. For instance, writing term papers or theses is connected with studying the problems by foreigners and it often happens that some issues are more or less developed abroad, so knowledge and skills of English communication help students to understand information better and widen knowledge in a particular issue. The interconnection between listening, speaking, reading and writing in a foreign language is realized during appropriate sub-skills and skills formation on the material of a particular topic.

Thus, the selection form different technical, vocational oriented and humanitarian disciplines contributes to the formation of students' foreign language skills and at the same time the improvement of technical and vocational oriented knowledge.

Conclusions

In the technical universities English as a separate subject by its nature is open to use the content from different fields of scientific knowledge. Planning the topics for the discussion in a foreign language, teachers of humanitarians together with teachers of special subjects have to select thoroughly the key subjects of a wide range of various disciplines, pay attention to tight interconnections between different subjects within a certain subject.

So, incorporation of interdisciplinary and internal disciplinary links promotes:

- generalization, structuring and systematization of students' knowledge in different discipline cycles;
- development of the ability to see a problem deeply and find the appropriate rational solutions;
- updating and improving learning content;
- unification of the technical and vocational conceptual apparatus;
- improvement of students' foreign language skills;
- activation of students' cognitive activity;
- increasing motivation in studying.
Perspectives of further scientific research can be investigating the acceptable approaches in the interdisciplinary educational process of high school.

References