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АКТУАЛИЗАЦИЯ МЕЖДИСЦИПЛИНАРНЫХ СВЯЗЕЙ В АСПИРАН-
ТУРЕ СОВРЕМЕННОГО УНИВЕРСИТЕТА

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ACTUALIZATION OF INTERDISCIPLINARY LINKS IN POST-
GRADUATE STUDIES AT MODERN UNIVERSITY

Educational potential of interdisciplinary links in higher education is considered on the example of two postgraduate disciplines of the Polytechnic University. The practical task of the discipline "Interdisciplinary Links in Higher Education" is the creation of language exercises for interdisciplinary foreign language manuals. The practical task of the discipline "Methods of Teaching Special Disciplines" is an essay on conducting an interactive class on the core discipline of a post-graduate student, taking into account the interdisciplinary links (IDL) in the relevant area of training.

Introduction. Nowadays advanced higher education in most countries is supposed to provide not only proper level of teaching various complex disciplines, but also reflect the field of interdisciplinary research. In the university learning process, interdisciplinary links (IDL) are a unifying factor for professors and ensure continuity and integrity of teaching, taking into account the interaction of the substantive and procedural components of the disciplines involved.

In connection with the entry of Russia into the Bologna Convention and the beginning of the reform in the Russian system of higher education, and also because the modern period is characterized by the development of integrative processes in the European educational space, there is a need to study interdisciplinary links (IDL) in higher education. IDL are a reflection of integrative processes in the applied aspects and represent a means of improving the quality of higher education through the properly arranged interplay of disciplines.

Didactic integration in education is not merely a union of the content components of the curricular disciplines, but the process of their interaction, interpenetration and complementation. Representing one of the integration levels, interdisciplinary links are realized through the contribution of each separate discipline into the synthesis of substantive information from these disciplines.

Training on the basis of interdisciplinary links deduces these disciplines to the level of integration, while making special demands on the methods of their teaching. In the process of teaching, taking into account interdisciplinary links, a professor should have a creative approach, the ability to use information technologies in the learning process to form the integrity of students' personalities.

In the process of creating and establishing IDL, various faculties and departments have to constantly interact with each other in order to coordinate the content elements of the disciplines and correlate them with the time of studying these disciplines in the curriculum. That is why it is necessary we carefully think over the ways of their implementation and the necessary educational and methodological resources. The IDL created in this way are updated in the course of lectures, practical and seminar sessions. A student who has mastered the knowledge system on an interdisciplinary basis has a solid prerequisite for further successful scientific and professional activities, since interdisciplinarity is today one of the fundamental elements of the educational content [Попова 2011], hence its evident topicality for further research.

When carrying out pedagogical activity in an interdisciplinary aspect in the context of the disciplines of the future students' specialty, it is important we adhere to the principle of integrative didactic planning. Its practical implementation presupposes a specific methodology for selecting the teaching material and organizing training classes in the discipline that is chosen to be the interdisciplinary basis. The quality of interdisciplinary interaction in this case may vary depending on the composition of the integrating components and the degree of their actualization in the process of interdisciplinary synthesis.

General analysis of IDL in higher education will not be sufficient without proper examples of disciplines interaction in their syllabi and/or educational products prepared as the result of such interaction.

Looking for good IDL examples in the educational system of the Russian Federation, we should consider post-graduate education as the main source of reference. As a matter of fact, the new Law on Education passed in 2012, introduced a three-level system of education and postgraduate studies became the third stage of higher education for the training of highly qualified personnel in the scientific and pedagogical sphere. Thus, instead of the self-sufficient form of postgraduate education, separate from the higher education proper, which it used to be, post-graduate education has now become the third level of higher education. Introduction of Federal state standards for postgraduate studies in 2014 mean that the syllabi for specific training disciplines of the postgraduate curricula are to be developed for graduate students.

Generally speaking, most of the disciplines involved in post-graduate studies at Peter the Great St. Petersburg polytechnic university have some interdisciplinary content, but in this article we aim at analyzing two of those standing out as having the most concentrated interdisciplinary content: "Interdisciplinary Links in Higher Education" and "Methodology of Teaching Special Disciplines". Let

us evaluate the interdisciplinary potential of these disciplines in terms of their syllabi and educational products expected as their outcome.

“Interdisciplinary Links in Higher Education”. The main purpose of this discipline [Акопова, Попова 2014], intended for postgraduate students of linguistics, future teachers of foreign languages, is multilateral consideration of the IDL in higher education, especially those formed on the basis of a foreign language, and aimed at removing objective difficulties in perception of theoretical curricular disciplines. The main objectives of studying the discipline are familiarization with the current state of development of the sphere of higher education; consideration of integration processes as well as the Bologna convention and competence approach in the field of higher education; mastering general methodology of IDL introduction and the development of interdisciplinary computer-based tasks; applying an interdisciplinary approach to the creation of manuals in a foreign language. At the end of the course, a future teacher should have a clear idea of the IDL formation methodology and an effective methodology for teaching this discipline in the postgraduate groups.

There are two main directions in the interdisciplinarity development in contemporary higher education: the wide use of information communication technologies and the increasing role of foreign language learning, English, in particular. Information technology competence is the most meaningful universal requirement for all postgraduate students, while foreign language competence is especially relevant in the countries, where native tongues are other than English.

Therefore, an interdisciplinary potential of computer technologies is considered in the IDL discipline as an integrative core for the IDL formation in teaching in the system of higher education. The importance of modern technological opportunities for teaching in higher education is underlined. Wide choice of application programs, as well as ergonomic, technical and methodological qualities of computer training materials are highlighted. The use of computer learning tools is evaluated for different higher school disciplines, especially foreign languages.

An integrative role of a foreign language is analyzed theoretically on the use of foreign language as a goal itself and means of teaching other curricular disciplines. Overview of standard university manuals in a foreign language is given and their basic didactic components are identified. A theoretical model of an interdisciplinary foreign language manual is discussed thus emphasizing the aspects of interdisciplinary approach. Practical educational assignments involve preparation of foreign-language exercises for the professionally-oriented texts provided by specialized, mostly technical, departments of the Polytechnic university. Thus, due to the interdepartmental cooperation [Звягинцева 2016] a customized teaching manual emerges as an outcome of this challenging course [Коджаспиров, Роговая 2017].

Among other things, content and language integrated learning (CLIL) is considered to be an interdisciplinary phenomenon. The difference between teaching

English for Specific purposes (ESP), English as Medium for Instruction (EMI) and CLIL proper is discussed as part of the IDL course under consideration. Students are supposed to understand the intermediary place of CLIL methodology on the imaginary scale of foreign language teaching in higher education. Teaching skills in terms of the CLIL methodology in higher education are also considered [Попова, Коган, Вдовина 2018].

As future educators or organizers of higher education, postgraduate students of pedagogical profile are mastering the methodology of developing matrices of interdisciplinary links to optimize the learning process on the curricular basis. Interdisciplinary matrices correlated with the recommended competences to optimize the training process for learners also emerge as the course outcome.

“Methodology of Teaching Special Disciplines”. This discipline is aimed at the post-graduate students’ mastering the basic knowledge, skills and competences necessary for teaching in higher educational institutions. Post-graduate students are supposed to study theoretical and practical foundations of engineering pedagogy and methods of teaching special professionally-oriented disciplines. This discipline is considered to be so important that it embraces the whole post-graduate student body of the Polytechnic University.

Pedagogical technology, one of the core aspects of this discipline, is perceived as a complex integrative formation, including a hierarchical and orderly system of operations and actions. Pedagogical technology is a certain algorithm or a set of pre-planned activities for the performance of educational assignments, a set of technological procedures that ensure the professional activity of the instructor and the assurance of the final result; it guarantees the achievement of the planned result as required by state educational standard. Pedagogical technology is often unified with information technologies to provide the highest efficiency of teaching regardless of the subject [Одинокая, Попова 2016].

Methods of lecture delivery and holding of seminars are also highlighted in the discipline syllabus. Interactive teaching methods nowadays enrich traditional monotonous and boring lectures, which can be delivered with the use of brainstorming, debates, case-studies, games, etc. Interpersonal interaction is supported by computer-assisted learning, or mobile learning, which is no longer new for contemporary students. Different types of lectures are also considered, such as *problem solving lecture, lecture imitating press conference, lecture with pre-planned mistakes*, etc. Advanced autonomous work of students, known as *flipped classroom* [Bergmann, Sams 2012], may also be used if the discipline is limited in the number of contact hours and the subject matter is not extremely complicated.

Methodology of teaching special disciplines is full of numerous interdisciplinary “intersections” of pedagogy vs any other special discipline. In order to start working out the required special discipline syllabus learners are familiarized with the interdisciplinary “browsing” of the curriculum, i.e. the analysis of the curriculum of a certain basic educational program in order to determine the

place of the special discipline in the educational process. Analysis of the curriculum to identify the previous and subsequent disciplines is important to establish the continuity of “vertical” interdisciplinary links and take into account possible substantive compatibility of consistently positioned disciplines.

Analysis of a certain curriculum with the objective of finding adjacent simultaneously taught disciplines for establishing “horizontal” interdisciplinary links is also recommended. It might be feasible to match the sequences of disciplinary modules of one discipline with those of another one for more effective teaching of both disciplines. Development of inter-departmental collaboration [Каргина 2014] may also improve the effectiveness of the educational process, as cognitive, educational and developing potential of academic disciplines may be enhanced by proper attention paid to interdisciplinary aspects from different perspectives. Interdisciplinary competences relating to a certain range of educational subjects and educational fields are thus formed along with subject competencies within specific academic disciplines.

The main requirement for getting a credit in this discipline is submitting an interdisciplinary essay (4000 words) on delivering a lecture in a special discipline with a detailed description of interactive teaching methods. In the introduction the learners are supposed to state the goals and objectives of their special discipline, competences formed as the result of studying this discipline and indicate its place in the curriculum and possible correlation to the other curricular disciplines. The subject matter of the lecture, as disclosed in its detailed plan, should be only the background for the selected methods of teaching, which are to be substantiated, foregrounded and illustrated with proper examples. This essay is to demonstrate interwovenness of pedagogical and special subject lines, and the whole essay is to prove post-graduate students’ familiarization with new trends in lecture delivery techniques. The pedagogical content, as also reflected in the bibliography, is supposed to be domineering and equal to 60-80%, whereas specific, mostly technical, subject content was to be the rest.

This educational assignment, unexpectedly, turned out to be difficult for most of the learners, who interpreted it in favor of their own special disciplines and submitted their lectures on the subjects of *strategic personnel management, fluid and gas dynamics, modern biophysics methods, basics of computer modeling, numerical simulation of burning process, fluid and gas mechanics, optical information processing, brain-based education*, etc The pedagogical content was a kind of background constituting only 10-20% of the whole content. When the professor demanded that the essays be corrected to emphasize methods of teaching, some students, especially those from China, Arabian and African countries, started arguing, explaining their reluctance to change by their sufficient teaching experience in traditional vein. It took a long time to make sure they understand what should be done for the credit in this discipline.

It is also interesting to note that there were a few purely pedagogically oriented works, describing all possible methods of teaching and neglecting their

connection with their subject. As for the best papers in this discipline, they were analytical, demonstrated learners' critical thinking and profound understanding of both specialty and teaching methods, with teaching aspects interwoven into the special substantive aspects.

In **conclusion** it should be said that the syllabi of both disciplines "Interdisciplinary Links in Higher Education" and "Methodology of Teaching Special Disciplines" are aimed at the advancement of interdisciplinarity notion as one of the significant teaching ideas to be spread for the benefit of contemporary higher education. The idea of integration development should be supported by other integrative disciplines and their educational results, as demonstrated in the educational products, will eventually contribute to the integrity of learners' personalities, which will make our world more humane.

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