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FORMATION OF GLOBAL PROFESSION-RELATED FOREIGN LANGUAGE COMPETENCY ON THE BASIS OF INTEGRATIVE APPROACH AS AN IMPORTANT ASPECT OF FUTURE ENGINEERS TRAINING FOR PETROLEUM INDUSTRY

Interdisciplinary tasks of petroleum industry boost intensive international collaboration and intercultural cooperation. This necessitates the development of global profession-related foreign language competency required for both engineers and middle-ranking staff since it is a crucial factor in interdisciplinary and international team work training for the next generation of petroleum engineers. The authors of the present paper suggest educational process design based on integrative approach and relevant principles.

Key words: interdisciplinarity, petroleum education, professional competences, interdisciplinary educational technologies. interdisciplinary teams, foreign-language training, integrative approach, global profession-related foreign-language communicative competency.

Н. Тимків. Формування глобальної професійної іншомовної компетентності на основі інтегративного підходу як важливий фактор підготовки майбутніх інженерів нафтогазової галузі. Мультидисциплінарність завдань, які стоять перед нафтогазовою галуззю, сприяє активній міжнародній співпраці і міжкультурній взаємодії. Виникає необхідність формування глобальної професійної іншомовної компетентності як інженерних кадрів, так і спеціалістів середньої ланки, що є важливим фактором випереджальної підготовки майбутніх інженерів нафтогазової галузі до роботи в міждисциплінарній і міжнародній команді. У статті для вирішення цього завдання запропоновано будувати навчання на основі інтегративного підходу і низки виділених принципів.

Ключові слова: міждисциплінарність, нафтогазова освіта, професійні компетенції, міждисциплінарні освітні технології, міждисциплінарні команди, іншомовна підготовка, інтегративний підхід, глобальна професійна іншомовна комунікативна компетентність.

Н. Тымків. Формирование глобальной профессиональной иноязычной компетентности на основе интегративного подхода как важный фактор подготовки будущих инженеров нефтегазовой отрасли. Мультидисциплинарность задач, стоящих перед нефтегазовой отраслью, способствует активному международному сотрудничеству и межкультурному взаимодействию. Возникает необходимость формирования глобальной профессиональной иноязычной компетентности как инженерных кадров, так и специалистов среднего звена, что является важнейшим фактором опережающей подготовки будущих нефтяников к работе в междисциплинарной и международной команде. В данной статье для решения этой задачи мы предлагаем строить обучение на основе интегративного подхода и ряда выделенных принципов.

Ключевые слова: междисциплинарность, нефтегазовое образование, профессиональные компетенции, междисциплинарные образовательные технологии, междисциплинарные команды, иноязычная подготовка, интегративный подход, глобальная профессиональная иноязычная коммуникативная компетентность.

In this rapidly changing world of technology and economic conditions, it is essential that practicing petroleum professionals continue to grow in their skills and knowledge in order to stay competitive and relevant in the industrial workplace. At present, the Ukrainian system of higher professional education stands at a pivotal moment. Challenges of globalization and international competition for talented specialists pose new problems for the Ukrainian technical universities. Under currently changing circumstances, professional success of alumni of technical higher education institutions is governed not only by the knowledge acquired, but also by the ability to conform to changes.

The objective of the article consists in revealing such notions as "interdisciplinarity" and "interdisciplinary approach" which are connected with changes in the system of university petroleum training and continuing professional development. The most important methodological principle to ensure the efficiency of future engineers training petroleum industry system has been identified - the education system should be sensitive to the changes in science, technics and technologies, which, in turn, result in changes in engineer's professional activities. Interdisciplinarity is considered as one of the effective tools to support enthusiasm of young generation for petroleum engineering; to increase motivation of future petroleum experts; and to enhance the efficiency of collaboration between professionals from different fields.

The problems of the formation of global profession-related foreign language competency on the basis of integrative approach as an important aspect of future engineers training for petroleum industry at higher technical educational institutions have been considered by J.Beynon, L.G.Brown, A.D.Chan, G.Codner, J.Fishbein A.Lidgett, C.S.Nair, N.Walker, T.Williams, A.Patil, and Yu.Zavalevskyi and other scientists.

Definition of interdisciplinarity (multidisciplinarity, crossdisciplinarity, etc.) includes a transdisciplinary perspective as "a way to expand the scientific outlook considering any phenomenon outside the framework of any single scientific discipline" *[11]*. The idea of synthesis and integration of knowledge, that lies in the foundation of this principle probably have more than one millennium already *[2]*.

A detailed analysis of the common terminology in this area can be found in studies completed by L.R.Ackoff, T.Ausburg, H.H.Jacobs, J.H.Borland. and others as well as in the proceedings of international conferences held in recent decades, including those held under UNESCO auspices *[1, 3, 8, 9, 13]*.

Contemporary technologies in petroleum industry are based on interdisciplinary approach, i.e. their development and implementation involve knowledge from different spheres – chemistry, physics, geology, biology, ecology, economics, information, etc. Such developments related, for instance, to tight oil recovery, environmental safety of offshore fields or associated gas utilization require knowledge and breakthrough technologies from different spheres which are, as a rule, developed unevenly in different countries. It is more effective to organize interdisciplinary cooperation at the international level using advantages of various na-

tional engineering and research schools, as well as practical experience of manufacturers – technologists and engineers – from different countries. One of the consequences of the globalization in petroleum industry is fractional production – when its components are produced in different countries, which increases significantly the number of international contacts and their significance. More and more joint upstream petroleum projects are implemented on the basis of international and interdisciplinary developments, exchange of practical experience, and international cooperation with different share of domestic and foreign capital both in Ukraine and abroad. The effective interaction within teams becomes more important, the teams being not only interdisciplinary but also international. Now petroleum engineers' proficiency in English is one of the principle skills allowing companies to be integrated in the international professional community. The skill in professional foreign communication becomes of great importance for Ukrainian engineering education, as students are to gain effective language training based on professional communicative competence *[12, 33]*. However, contemporary language training is to be performed in such a way that petroleum engineer could exercise professional activity in an international interdisciplinary team. It is of no doubt that there is a demand for a shift in the language training system towards qualitatively new level of cross-cultural interaction competency, global professional language competency of both future engineers and working specialists based on professional communicative competency.

The efforts to address the problem mentioned above have led to introduction of (ESP – English for Specific Purposes) into the system of professional training. It is considered to be a priority in the sphere of education innovation. ESP training allows using foreign language as a tool to develop global professional language competency (GPLC).

The essential features of the given competency derive from the requirements for education programmes specified by accreditation agencies, as well as from professional functions of a globally competent engineer.

As early as in 2007 the main criterion of all agencies was the demand for global model of engineering accreditation that can be used to assess engineers' global professional skills [10, 642]. As a result, in 2008 A. Patil, C.S. Nair and G. Codner distinguished six basic qualities of a globally competent engineer *[11]*, in 2009 A.D. Chan, J. Fishbein and L.G. Brown expanded the list by adding ten qualities *[2, 4–9]*. Having analysed those qualities and requirements of leading international accreditation agencies for a globally competent engineer *[6, 3–9; 4, 17–19; 5; 7, 6],* we identified five basic blocks of GPLC intended to master language skills of a globally competent engineer.

1. Communicative skills: ability to work and communicate in the national and international environment with representatives of any nations and cultures; transform information; ability to conduct discussions and arguments, brain storming, professional oral and written communication in native and foreign languages; make reports, present projects, ability to argue, and persuade.

2. Independence: ability to study and implement innovations independently in a single-discipline sphere, ability to use up-to-date information technologies; knowledge and skill of searching for and collecting professional information in different databases (library and electron ones); ability to perform self-study, self-development, self-education for the life-long personal professional development.

3. Developed critical thinking: ability to cope quickly with a problem of any complexity, respond adequately; ability to analyze, generalize, observe, interpret, criticize, reason, and act creatively; mastery of critical thinking techniques; ability to select evaluation criteria reasonably, knowledge of value system; ability to analyze, process, and present information in the form of review, report.

4. Skills of professional communication: ability to be a member/leader of multidisciplinary and cross-cultural team; ability to negotiate with employees of other organizations; ability to manage and report to; knowledge of labour market and economics; ability to effectively interact; ability to work in the innovative environment.

5. Global (ethical) communication: ability to understand the influence of his/her profession on society, industry, nature, and economy at the global scale; knowledge and ability to effectively apply professional ethics; understanding of responsibility in making professional decisions; skill of running international business, solving problems related to national differences; ability to understand diversities and differences between native and other cultures; knowledge of ethical aspects of cultures; knowledge of diverse disciplines and skill of their synthesizing to apply for non-diversified environment; ability to compete and cooperate in international context.

Based on the enumerated qualities required from a global engineer, we regard GPLC as future/working specialist's ability to effectively use language knowledge and skills in the secondary language environment to solve basic communicative, presentation, and technical professional problems, communicate successfully and ethically in the condition of professional international cooperation, to be a member or leader of interdisciplinary international teams, to think critically and respond flexibly in any conditions of professional cross-cultural cooperation, as well as readiness for life-long professional self-development in the sphere of international communication. Analyzing GPLC components, it should be noted that communicative skills are not just in a row with other components, but they are basic, central skills, as mastering all other components is performed via, first of all, communication.

It is suggested that GPLC of petroleum engineers and students should be efficiently developed by introducing an "Intensive integrative foreign language course" based on integrative approach and interdisciplinarity. The course could be a part of both basic university and further professional development training.

The integrative approach is conditioned by the interdisciplinary character of petroleum engineer's professional activity, as well as more general trends - integration of science, education, and industry resulting in uniting the content of different disciplines [8, 162]. The integrative approach makes possible to link the profile disciplines with foreign language that generates sustained interest in language learning and increases motivation. The regular interdisciplinary integration focused on professional sphere at the foreign language classes has a positive effect on development of professional qualities. Interdisciplinary integration allows students to build an integrative professional worldview, develop critical thinking and imagination, increase cognitive activity, develop creative skills, as well as perform intensive cognitive and research activity [9, 34]. Such an approach strengthens the preparation for work in interdisciplinary international teams and projects, and can be adopted for both basic and additional education.

The following basic principles of "Intensive integrative course of foreign language" aimed at GPLC development were distinguished: the principle of professional relevance (the content of the course was designed in view of professional functionality), the principle of language authenticity (the course should not only facilitate communicative skills development, but also the skills of correct usage of speech patterns), the principle of time and load management (the course is designed in such a way that student's active and passive vocabulary increases 4 times as compared to that in the traditional training method), context-based principle (the content is selected in such a way that new words are learnt in the process of contextual guess and in the subsequent learning process they become a stimulus for student's reaction), the principle of motivating content (learning content creates professional environment producing situa-

tions/problems to encourage students to speak), the principle of integration of all learning activities (communicative skills cannot be separated from other types of language activity, hence, there should be integration of speaking with other language skills and competencies), the principle of teaching to learn (learning content is to teach students to use foreign language as a tool for information search and self-development), the principle of speaking and culture integration (the course content is to be focused on development of speaking interculture), the principle of critical thinking development (tasks are to be focused on development of student's critical thinking, which gives a future specialist flexibility to analyze professional conditions).

The global economy in which petroleum engineers live is in constant change and evolution. The requirements for future petroleum experts today include not only solid technical knowledge but also make them know how to apply that knowledge to real world problems. For these reasons, engineering education must reach beyond the academic world and draw in industry. The real world experiences that future petroleum specialists must have to be effective come from industry and not the more research oriented university environment.

Competitiveness and economic security of any country is provided by natural, human, energy, material and non-material resources. There is a strong relationship between economic competitiveness and volume of GDP per person. The latter is associated with the level of well-being of the population. The quality of human capital, with such important characteristics as education of the population and its willingness to change in accordance with changing conditions of external and internal environment. Global challenges of the modern world – climate change, globalization, demographic situation, competition for resources, technological revolution, etc. – become powerful drivers for development of new trends in the social, economic, technical and political spheres. One of such trends in science, technology and education is interdisciplinarity, that can be determined as a "principle of organization of scientific knowledge, which opens wide possibilities of interaction of many disciplines in solving complex problems of nature and society" *[9]*.

Conclusion. Regardless of the fact that organization of implementation of effective interdisciplinary projects in science, petroleum engineering, technology or education requires not only the involvement of specialists from various fields of activity, but also planning a synergistic effect, as a kind of guarantee of obtaining fundamentally new solutions and results that, under certain circumstances, can ensure a victory in competition in the relevant markets. Training of leaders and specialists for such projects who are able to work effectively in interdisciplinary teams and projects – specific and not familiar task for modern engineering universities. Those learning and teaching tools that are used today, contents of educational programs, available infrastructure can hardly ensure the preparation of interdisciplinary projects leaders, professionals able to think free out of the box, to generate innovative interdisciplinary ideas and projects, efficiently organize interdisciplinary working teams. All activities of technical university teams in this area should be based on holistic understanding of the challenges they face, the ability to change in the right way the form and contents of engineering education, to create the necessary infrastructure, and crucially, the ability to change themselves.

Therefore, competitiveness of contemporary production is provided by a specialist of new type capable of working at global international scale, performing effective professional activity in international interdisciplinary teams. It is strongly believed that the shift of foreign language training towards development of global professional language competency is a turning point in the change of focus on foreign language training of national engineering community and medium level specialists of not only petroleum engineering, but also other industries with high potential of international cooperation and interdisciplinary developments.

REFERENCES

1. *Ackoff Russell L.* Systems, organizations, and interdisciplinary research // Systems: research and design: Proc. 1st Systems symp. / Case Inst. of Technology; ed. by Donald P. Eckman. – New York: John Wiley and Sons, Inc., 1961. – P. 26–42.

2. *Chan D.* A global engineer for the global community / D. Chan, J. Fishbein // J. Policy Engagement. – 2009. – Vol. 1, № 2. – P. 4–9.

3. The Charter of Transdisciplinarity [Electronic resource]: adopted at the First World Congress of Transdisciplinarity, Convento da Arr?bida, Portugal, November 2–7, 1994 / translation from English V.I. Moiseeva V.I. // Basarab Nicolescu: [person. site]. – Paris, cop. 2012 Basarab Nicolescu. – URL: http://basarab-nicolescu.fr/chart.php, free access. – Title from the screen (usage date: 09.08.2016).

4. Criteria for accreditation engineering programs [Electronic resource]: Effective for reviews during the 2015–2016 accreditation cycle // ABET. Baltimore, ABET, 2014. 27 p. Available at: http://www.abet.org/wp-content/uploads/2015/05/E001-15-16-EAC-Criteria-03-10-15.pdf, free. – Tit. from the screen (accessed: 12.06.2017).

5. Criteria for engineering education accreditation [Electronic resource]. General Criteria // China Engineering Education Accreditation Association (CEEAA): website. Beijing, 2012–2016. Available at: http://www.ceeaa.org.cn/criteriaG_en.html, free. – Tit. from the screen (accessed: 23.12.2016).

6. Fachspezifisch erg?nzende Hinweise zur Akkreditierung von Bachelor – und Masterstudieng?ngen des Maschinenbaus, der Verfahrenstechnik und des Chemieingenieurwesens [Electronic resource]: Stand 09. Dez. 2011. ASIIN. D?sseldorf: ASIIN, 201. – 15 p. – (ASIIN FEH 01 MB VT 2011-12-09). Available at http://www.asiin-ev.de/media/feh/ASIIN_FEH_01_Maschinenbau_und_ Verfahrenstechnik_2011-12-09.pdf, free. – Tit. from the screen (Usage date: 12.06.2017).

7. JABEE common criteria for accreditation of professional education programs [Electronic resource]: Applicable in the years 2012 (Revised as at 10 July 2015). Tokyo, JABEE, 2012. 7 p. Available at: http://www.jabee.org/public_doc/download/?docid=6434, free. – Tit. from the screen (accessed: 23.12.2016).

8. *Jacobs, H.H.* The interdisciplinary concept model: Theory and practice / H.H. Jacobs, J.H. Borland // Gifted Child Quar. (Fall). – 1986. – Vol. 30, No 4. – P. 159–163.

9. Lori, Nicolas Francisco. Interdisciplinarity in engineering education: Trends and concepts // Engineering Education. – 2014. – Issue. 14. – P. 31–37.

10. *Patil A.* Accreditation of engineering education: review, observations and proposal for global accreditation / A. Patil, G. Codner // Europ. J. Eng. Education. – 2007. – Vol. 32, № 6. – P. 639–651.

11. *Patil A.* Global accreditation for global engineering attributes: A way forward [Electronic resource] / A. Patil, C. S. Nair, G. Codner // Proc. 19th conf. of the Austral. Assoc. for Eng. Education, Yeppoon, Queensland, Dec. 7–10, 2008. – Yeppoon: Austral. Assoc. for eng Education, 2008. Available at: http://acquire.cqu.edu.au:8080/vital/access/services/Download/cqu:4206/ATTACHMENT01?open=true (accessed: 24.05.2017).

12. Petrova G.A. Formation of students' foreign language professional and communicative competence. Cand. Sci. (Pedagogy) diss.: 13.00.08 / G.A.Petrova. – Tomsk, 2009. – 175 p.

13. World declaration on higher education in the twenty-first century: vision and action [Electronic resource]: adopted by the World Conf. on higher education, UNESCO House, Paris, France, 9 Oct. 1998 / UNESCO Culture of Peace Programme. – Paris: [S. n., 1998]. – 18 p. – (Culture of Peace). – URL: http://www.unesco.org/cpp/uk/decla-rations/world.pdf, free. – Tit. from the screen (usage date: 03.08.2016).