

опыта решения профессиональных задач, особенно если игра неподготовленная и требует моментального принятия решений [3, 4].

Подводя итог вышеизложенному, можно сделать вывод о том, что использование игровых технологий для гуманитаризации инженерного образования целесообразно в связи с тем, что реализация данной группы технологий, с одной стороны, предполагает имитацию профессиональной деятельности студентов, самостоятельное решение проблемных ситуаций, а с другой стороны, способствует формированию и совершенствованию у обучающихся определенных личностных и профессиональных качеств и мотивации к осуществлению будущей профессиональной деятельности.

#### СПИСОК ЛИТЕРАТУРЫ

1. Бирюкова Н.С. Современный университет: гуманизация и гуманитаризация – необходимое условие обновление содержания образования // Известия Российского государственного педагогического университета им. А. И. Герцена. – 2013. – № 159. – С. 48–55.
2. Саламова Н.Ю. Гуманизация и гуманитаризация – необходимые условия модернизации образования // Проблемы и перспективы развития образования в России – 2011. – № 12. – С. 14–19.
3. Григорьев О.В. и др. Современные технологии обучения. // Инновации в образовании. – 2011. – № 7. – С. 17–24.
4. Зарукина Е.В. и др. Активные методы обучения: рекомендации по разработке и применению: учебно-методическое пособие. – Санкт-Петербург: СПбГИЭУ, 2010. – 59 с.

#### SPECIFICS OF CHEMICAL TECHNOLOGY OF FUELS AND HIGH-ENERGY SUBSTANCES SCIENCE-BASED COURSE DELIVERED IN ENGLISH

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***Annotation.** Teaching science-based courses in English is relevant for modern universities involved in the internationalization processes globally. Teaching aids development becomes very actual as academic culture and methods of teaching of the target audience – international students can be different. Thus curriculum design and teaching aids development for the science-based course Chemical Technology of Fuels and High-energy Substances delivered at TPU becomes an important issue. The level of training is PhD studies within specialty 05.17.07 Chemical Technology of Fuels and High Energy Substances. The course is intended for the subsequent sessions within the academic discipline of the professional training in English. The course embraces face-to-face sessions, independent studies, tasks and tools for formative and summative assessment of graduate students' progress.*

Currently, our university is faced with the task of provision high quality training for undergraduate and graduate students to enable competitiveness of scientific and educational activities in all scientific and technical fields on international scale. As a result, teaching aids and pedagogical competences development in the field teaching of disciplines of the professional training, in the conditions of internationalization of educational activities of the University is quite actual. When developing teaching aids for a science-based course it is necessary to get acquainted with international examples of the curriculum design, assessment measures and assignments database, and analyze the specifics of the educational process of teaching when delivered through the medium of English.

The specifics of a science-based course delivered through English are the goals of professional competences and language skills development. The content of the science-based course Chemical Technology of Fuel and High-Energy Substances represents fundamental scientific and applied research in the field of chemistry and technology of processing of liquid, gaseous and solid fuels, including oil and petroleum products [1].

The science-based course discussed in this paper embraces actual topics. Increasing the efficiency of motor fuel production is possible by solving the following problems: increasing the octane number of gasoline, chemical and thermal stability of jet fuels, increasing fuel consumption and improving the low-temperature properties of diesel fuels, reducing the specific consumption of rocket fuel. Therefore, the creation of new fuel compositions with higher energy intensity compared to existing ones and at the same time meeting all other requirements of environmental aspects of fuel processing, in many leading countries belongs to the priority areas of scientific research. In this regard, Russia and other countries actively search for the technologies for energy-intensive fuel compositions. Development of liquid hydrocarbon fuels conditions the increase of the range of cruise missiles by 20% compared to the range of other fuels. Currently, there is the need to develop optimal fuel compositions based on liquid hydrocarbons.

Thus the course is aimed at training highly qualified specialists in the field of chemical technology, primary and deep processing of oil, gas and gas condensate. The curriculum enables participation in university research activities. The course is industry needs related. Sufficient research experience of the course teaching staff of the program and the real production infrastructure enable graduate students to obtain excellent knowledge and skills.

Among generic skills developed within the course are research organization skills, information search, team work and independent studies. The course specifics are development of the skills in English which also requires certain strategies for learning.

Subject specific skills include knowledge and skills of implementation of the technology of industrial processing of oil and gas into motor fuels and macrokinetics of chemical processes and reactor design. The important feature of the curriculum is its interdisciplinary nature involving the study of modeling and cybernetics methods of chemical and technological processes, macrokinetics of chemical processes and reactor design. The acquired expertise allows students to participate in research and production activities.

To sum up, the science-based course delivered in English has its specific features mentioned in this paper. Thus the course teaching staff is to enable English skills, have sufficient professional background to deliver such course.

The discussed research has been performed within TPU in-house professional training course in Pedagogical Design of Science-Based Courses in English.

## **REFERENCES**

1. Frantczuskaia E. , Kukurina O. , Slesarenko I. , Rymanova I. Science-based course delivery in english for chemical technology majors // INTED2019 Proceedings. 13th International Technology, Education and Development Conference. – Valencia, 2019. – Pp. 6057–6066.