

Engineering pedagogics

USING GIS-TECHNOLOGY IN ROLE-PLAY AS AN EFFECTIVE MEANS OF
ECOLOGICAL COMPETENCE FORMATION AMONG THE FUTURE
ENGINEERS

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The article is focused on the ecological competence formation among future mining engineers. The paper defines that the role-play using GIS technologies is one of the special training means which activates and intensifies the studying process.

Keywords: training means, future engineer, environment, role-play.

Trends of the present-day society cause steady requirement for qualified specialists in mining industries [1]. Among education priorities one can state

modern ICT implementing which provides educational process improvement, increases education availability and effectiveness, and trains young generation for living in the information society [5-7].

While using GIS-technologies in the environmental competence formation among future mining engineers there are basic training educational forms such as lecture (first of all problem-solving lecture), practical classes, laboratory classes (frontal work, work in groups or in pairs, individual work, etc.), demonstration and project forms of studying [3, 4]. Additional educational forms include educational tour, role-play, tutoring, counseling, self-study.

Role-play is one of the special educational training forms. It can be carried out before opening a new topic to stimulate learning motivation and intensify studying process while preparing students to perceive new material. Also it can be used after explaining the new topic to fix the acquired knowledge. Moreover role-play can be useful even after studying the theoretical section for summarizing and control purposes. The main educational aim of role-play is to increase practical focusing, fixing and creative applying of acquired knowledge [2, p. 144].

Role-playing in the studying process serves as a means of developing high level professionalism among students. It is a distinctive education form due to which future mining engineers can test various productive communication schemes. Efficiency of role-playing is provided by student's "immersion" in a such situation that requires setting personal objectives and making individual choice, which are performed in a situation of self-selection and self-value. All of that helps to create the first component of ecological competence among future mining engineers.

Among the main educational results of role-playing one can distinguish the development of communication skills, quasi-professional activities, reflection, critical thinking, work in a team, abilities to solve problems quickly adapting to new situations, etc.

Educational role-playing allows teachers to set axiological, social and behavioral contexts into the studying process of future mining engineers. Thus in

comparison to traditional training conditions it helps to create more appropriate teaching models for professional competence formation among the future specialists. Based on the principles of competitiveness, efficiency and initiative, role-play is an effective form of studying process which allows students to demonstrate and apply obtained knowledge, skills and experience in their future careers. Conclusions about the role-play using efficiency can be made by comparing expert evaluations received after its implementation.

Here is an example of a role-play usage, which has been applied in the first stage of ecological competence formation among the students of Mining Engineering department.

There are several main components which constitute the represented game sample. They are a general overview of the game, a description of the situation, a goal of the game, a task for the participants, a formal model, a formal model analysis, obtained results of the game.

The aim of the game is to enlarge the knowledge and perceptions of environmental problems in Kryvyi Rih industrial unit which is situated in the Dnieper economic region.

The role-play game has been held between the two groups of students. Each group has consisted of 15 people who have played following to the script. Before the game students have prepared essays on the topic “How Dnieper economic region enterprises affect the hometown environment”. In 2 weeks students have assigned roles, also they have received environmental review materials, discussed the general features of the scenario, possible questions and answers which should be prepared in advance.

Representing the materials of role-play game the teacher does not impose his/her opinion, but only acquaints students with different views and perspectives of Kryvyi Rih environment industrial unit. The students have to decide themselves what is the environmental situation in their native city.

At the beginning of the game its rules have been announced and it is held in a form of a round table discussion about the ways the Kryvyi Rih city environment

improvement.

Players have been divided into two groups. The task of the first group is to defend the pessimistic forecast of Kryvyi Rih environment. The task of the second group is to defend optimistic perspective of Kryvyi Rih. The rest of the students have been acting as the journalists who have been watching the debate and putting the questions to the participants. Journalists can support any point of view (including the view which can be totally different from the represented ones). Before the debate starts all the participants have to vote for one of the points which they receive by choosing one of two balls - the black (pessimistic) and the white (optimistic).

Before the game is started the floor has been given to the representatives of each group. The first group has the role-acting students who are the head of agricultural statistics and environmental Main Statistical Office in Dnipropetrovsk Region, the inspector of the Sanitary Service, the representative RSA.

They have reported that Kryvyi Rih industrial unit is one of the most industrially developed economic regions in Ukraine. This is why the Kryvyi Rih environment is constantly influenced by strong anthropogenic impact. There are more than 4 thousand sources of air pollution in Kryvyi Rih city. According to the data of mining and metallurgical enterprises total pollutant emissions into the air amounts 322.8 thousand tons in 2014. The main air polluters are PJSC “ArcelorMittal” Kryvyi Rih”, JSC “Southern Mining”, JSC “Northern Mining”, JSC “Central Ore Mining and Processing Plant, PJSC “Heidelberg Cement Ukraine”, JSC “Inhuletskyi Ore Mining and Processing Plant” and JSC “Kryvbas Iron Ore Plant”.

Then the floor has been given to representatives of the second group, which consists of the general director of JSC “Arcelor Mittal Kryvyi Rih”, the head of PJSC environmental department and his vice heads from “Arcelor Mittal Kryvyi Rih”, the representatives of other polluter enterprises”. Speakers have noted that the basic environmental activities in the present-day city comprise comprehensive and effective implementation of measures stated in the long-term program

approved by the Dnipropetrovsk Regional Council of 29.04.2011 №110-6 / VI
This program aims to solve Kryvyi Rih environmental problems and to improve its environment. The main activities identified by this program deal with the air and surface waters improvement flooding elimination, environmental protection from other types of pollution.

Than “the journalists” have been invited to express their opinion. They have pointed out that due to high anthropogenic impact on the Kryvyi Rih environment, it has nowadays poor ecological situation, which leads to rocks shifts above the underground cavities and creates new forms of man-made landscapes. Environmental problems also arise in soil pollution, degradation and irreversible loss of lands by locating mining, steelmaking and blast furnace waste units in the territory of agricultural land. It goes from bad to worse because of immense soil contamination and water pollution due to throwing highly mineralized mine waters into the rivers Inhulets and Saksahan. The emissions of hazardous pollutants in the atmosphere of the city are about 634 kg per capita, and most of these hazardous substances are toxic.

After the round-table discussion participants have taken decision to write the resolution aimed to create in the local Executive City Committee the Public Council consisting of ten experts, that are nominated and voted at one.

The teacher carefully watches the way of debates and keeps the time. At the end of the discussion each team is given the opportunity to sum up the information. During the discussion, all students use a great variety of data prepared in advance using GIS technologies and Internet.

After the discussion, all the participants receive two balls of different colors and vote again. According to voting result one can conclude that public opinion has changed.

Conclusion. Summing up we would like to mark that choosing such training means as role-play with-GIS technologies is determined by activity, time and place of execution. It allows combining of methodologically justified information and communication technologies and the studying process in order to achieve teaching

objectives.

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