Methodology for using foresight technology in training future ecologists in Uzbekistan

Oktyabr Rakhimov, Dilrabo Rakhimova, Laylo Ashurova, and Abdulaziz Khujakulov

1 Introduction

One of the main principles of the modern organization of the education system in the era of information society and high technologies in the world is to predict the future education system. Also, considering that socio-economic development is accelerating, planning based on future predictions is the basis of sustainable development. In the current era of globalization, the use of Foresight methods is considered the most effective and acceptable option in the development of strategic plans, road maps and concepts related to the solution of major problems (ecological, socio-economic, technological, political, etc.) on the scale of the world, region, state or economy.

In our advanced and competitive world, it is important for future experts, especially managers, to be able to predict the future of industries or a particular business. They should have the skills to create long-term plans for growth and development. Using foresight technology is very useful and trustworthy when making plans, ideas, and plans for future technologies [1-2].

In the global education system, research projects are being done to help students become better at predicting the future. These projects use special methods during the learning process. Foreign universities that prioritize the education of future technology are focusing on teaching foresight technology as a separate subject to managers, economists, and service...
Foresight technology is commonly used in modern education in advanced countries, but there is still more work needed in developing its theory, practice, and methods. Foresight technology helps us guess and influence what will happen in the future. It is a useful tool for making progress in Europe, the USA and Asia, and it also helps improve education by teaching us important skills.

At the same time that big changes are happening in Uzbekistan's higher education system, using digital technologies in education is really important. In Uzbekistan, universities are increasingly focusing on using digital tools for teaching. After studying the works of many scientists, they found that using digital technologies more in higher education in Uzbekistan needs further research. They should study this process carefully and compare the positive and negative sides about it. Studying how digital technologies affect the health and mental well-being of young people in the future is a difficult task.

For instance, visual content can be applied even in teaching languages. As Doniyorova G.Sh states, “teachers appreciate the support that pictures contribute to classroom performance because they motivate language learners to make associations between part of information.”

The use of foresight technology in the ecological education system is the basis for the further development of the economy and business, including entrepreneurship, and the development of a sustainable future activity strategy of enterprises and companies. This is one of the main tasks of future managers.

2 Actuality of the problem and literature analysis

Foresight research experiences of higher education institutions in developed countries are best used in the development of long-term, 10-30-year educational development strategies and concepts aimed at modernizing higher education and improving the quality of education. Strategic concepts developed on the basis of such technology make it possible to adapt to future changes without repeating standard solutions [3.]

In the following years, foresight began to occupy a wide place in professional education in developed countries. E. Brady [4], R. Gilligan, T. V. Yakubovskaya [5], N. B. Pugacheva [6] in their scientific work showed that foresight technology plays an important role in the formation and development of the innovative economy.

Foresight programs conducted by foreign universities include the "Strategic Foresight" master's program of the Department of Management of Aarhus University (Denmark), the master's program "Culture of Prediction: How Scientists See the Future and Shape Society" of the Faculty of Science and Technology of Aarhus University, Department of Mathematics (Denmark), Adam “Foresight and Strategic Analysis” program of Mitskiewicz University (Poland), "Strategic Foresight" program of Białystok University of Technology (Poland), "Strategic Foresight" program of California College of Culture (USA), "Future Research" program of Berlin University (Germany), Ontario College of Culture and Design "Strategic Foresight and Innovative Activities" program (Canada), "Strategic Foresight" (Doctor of Strategic Leadership) program at Regent’s University (USA), "Knowledge and Foresight Techniques" program at Swinbury University of Technology (Australia) "Foresight" at Manchester University "Art and Horizon Scanning: Anticipating, Making Recommendations, and Transforming the Future of Science and Innovation" program (UK), "Strategic Innovation and Shaping the Future" program of the University of Podstam (Germany), the "Master's Program for Researching the Future" of the School of Economics of the University of Turku (Finland) ...
3 Methods and materials

Pedagogical observation, comparative analysis, generalization, pedagogical experiment - test, mathematical-statistical analysis, mental cards, expert survey of foresight, development of scenarios, future box, and Delphi methods were used in the research process.

The authors developed a methodology for using foresight technology in the teaching of specialized subjects in the field of "Ecological" education. In the recommended methodology (see Figure 1), the stages of using foresight technology in training sessions are divided into the following 3 blocks: the stage of training preparation; stage of training; independent education.

**BLOCK 1. Stage of preparation for training.** At this stage, the type of training (lecture, practical, seminar) planned to use foresight methods is selected. Then the foresight function is defined and based on these two factors, the foresight method is selected for use in the selected training session. A problem (assignment) is formulated on the subject in accordance with the selected foresight method.

**BLOCK 2. Training using foresight methods.** The study group is divided into two or three small groups of experts and is introduced to the problem defined in step 1 on the topic. Then information is provided about the recommended foresight method and the method of its use. The future scenario for this problem is predicted using foresight methods. In this, each small group of experts creates and presents its own future scenario for the problem. After the presentation, the best scenario will be selected.

**BLOCK 3. Self study.** In independent education, the long-term future strategy of the industry or enterprise is developed, presented and evaluated by each of the small groups according to the scenario selected during the training under the guidance of the teacher.

The use of foresight methods in training sessions of specialized subjects in the field of "Ecology" education leads to the formation of "Eco-foresight competence" in future ecologists. Eco-foresight competence is characterized by the formation of readiness and ability to predict the future of the impact of production processes on the ecological environment in the professional and scientific-reflexive activities of future ecologists.

Positive aspects of ecologists in choosing an ecologist specialty, knowledge of a set of specialist disciplines, experience in reflexive professional activity, preparation for effectively solving environmental culture, environmental protection and ecological issues, thorough knowledge of foresight methods and practical application as indicators of eco-foresight competence evaluation can include the ability to independently improve one's professional competence, self-development and assessment. The development of "Eco-foresight competence" in future environmentalists is characterized by the environmentalist's strategic planning skills and understanding of responsibility for his own decision and management methodology [7]. Environmental foresight is a form of environmental forecasting that helps to create a future in a strategic plan, taking into account the competitive advantages of the enterprise.

Foresight competence V.M. Panfilova [8] A.N. Panfilov, A.I. Gazizova, P. Luksho [9], P.L. Skolkova [10], L. It is covered in the scientific works of M. Andryukhina [11], A. Kononiuk [12], A. Sacco-Szymańska, S. Ollenburg, L. Trivelli. From the analysis of scientific research works that reveal the essence of the terms "Competence" and "Competence" it can be concluded that these terms complement and express each other. Based on the above analysis, "Eco foresight competence is the ability of experts in the field of ecology to correctly predict the long, medium and short-term future of the environmental impact of production processes in an enterprise or company, to make strategic planning, to make quick decisions on the implementation of plans and to ensure the achievement of the specified result, having knowledge, skills, and training on control and assessment, and eco-foresight competence is a set of personal characteristics aimed at using this knowledge, skills and training in the course of professional activity" (author's definition).
Fig. 1. Methodology of using foresight technology in education sessions

Use foresight to determine the type of training

1. Defining the foresight method
2. Defining the foresight function
3. Developing a topic problem
4. Developing an expert group

Steps to use foresight methods

BLOCK 1. Education preparation level

BLOCK 2. Training using Foresight methods

BLOCK 3. Independent education

Choosing the best scenario
Formation of foresight competence is based on self-development and assessment, educational approach oriented to scientific and creative activity and systematic, active, variation, practice-oriented principles, foresight, interactive and problem-based teaching methods in a complex way, lectures, practical and seminar classes, and application in independent education and it certainly implies the use of teaching tools based on digital technologies.

It is recommended to look at the formation and development of eco-foresight competence of future ecologists as a whole system and divide it into 2 major stages based on systematic analysis:

1. Theoretical knowledge, qualifications, skills, and experiences acquired by future ecologists in the process of higher education related to the formation of foresight competence.

2. Factors for the development of foresight competence formed during the period of work in production after higher education.

The activity algorithm of ecologists is complex, varied, and person-oriented. The eco-foresight competence of ecologists is formed depending on their theoretical knowledge, skills, and abilities on the use of foresight, personal professional characteristics, psychological characteristics (melancholic, choleric, sanguine, and phlegmatic), and professional experience. In addition to managing the production of clean ecological products in enterprises, institutions, and companies, future ecologists also manage the human factor (employees), therefore, we have included in this algorithm the personal characteristics (character) of the manager and the level of knowledge of labor psychology and labor laws.

Most importantly, it depends on the ability to approach self-development and self-assessment and to be able to use their skills in practice. This also corresponds to the principle of "Learning for a lifetime". Since ecologists are management personnel in the field of ecology, they need to be able to foresee the environmental impact of their enterprise or company's main areas. For example, in the conditions of Uzbekistan, the effect of the irrigation regime on the salinity level of the land is problematic. The impact of groundwater on the growth and development, of cotton yield was carried out in two directions, which makes it possible to distinguish them in comparison [13]. It is appropriate to carry out eco-foresight research in this direction.

In future ecologists, there should be an integral connection between the main components that determine the professional competence and the components that determine the foresight component, because the foresight component is an integral part of the professional component.

4 Conclusions

One of the distinctive features of training ecologists in the higher education system of Uzbekistan should be to provide future ecologists with conceptual knowledge such as foresight and forecasting, the ability to correctly determine the goal, the formation of tasks, and the determination of ways to solve them, and the development of active management. However, the current teaching methodology does not fully ensure the formation of abilities aimed at solving these urgent issues in future ecologists. Therefore, it is very important and necessary to include subjects related to foresight technology and the concept of "Eco-foresight competence" in the educational programs of future ecologists in Uzbekistan. The use of foresight technology is the most effective and optimal option for the development of strategic plans, road maps, and concepts that determine the environmental impact of any enterprise, organization, or company in the market economy and long-term development in the field of clean ecological product production. The use of foresight methods in the teaching of specialized sciences in the field of ecology education serves to provide future ecologists with conceptual knowledge such as foresight and prediction, the ability to correctly determine...
the goal, the formation of tasks, and the determination of ways to solve them, and the
development of active management.

References