METHODS OF FORMING AGROPHYSICAL KNOWLEDGE THROUGH INNOVATIVE TECHNOLOGIES

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ABSTRACT

The article describes the formation of students' agro-physical knowledge through the use of innovative technologies, that is, the specifics of the activities of future agronomists, the content of their components, the innovative model of agro-physics as an object of activity, the information model of agrophysical processes.

Keywords: Capillary, pressure, osmotic, diffusion, surface tension, spherical surface, radius, particle, wetting, peripheral angle.

INTRODUCTION

The students of agronomy direction of agricultural higher educational institutions are given the following criteria for the use of innovative technologies in lectures, workshops, problem solving and laboratory work, depending on the professional activity of the student:

- the level of knowledge on using innovative technologies in motivation and professional activity;
- the level of formation of the student's ability to use innovative technologies in professional activity;
- the degree of formation of the creative position of the student.

The structure of the initial learning situation served as a basis of the development of agrarian knowledge modeling using innovative technologies in the students of agronomy education.

In the creation of the process of formation of agro-physical knowledge of students by means of innovative technologies, that is, the features of the activities of future agronomists, the content of its components, the study of innovative technologies in agrophysics were observed as objects of activity. The object of student activity is also an information model of the agrophysical phenomenon or process being studied in teaching through innovative technologies.

The prerequisite of pedagogical provision of students with agrophysical knowledge through innovative technologies is the readiness of the teacher to the process. The teacher must have a program of formation of agrophysical knowledge and skills based on the study of agrophysics using innovative technologies. It can create such a program only if it has the following qualities:

- High pedagogical education and high professionalism of agrophysics teacher;
- Knowledge of important professional qualities, professional skills, professional abilities of the future agronomist and their formation and development in the course of professional activity.

It is also important that the learner is ready to develop agrophysical knowledge and skills. The methods of formation of agrophysical knowledge (professional culture) are different: direct

interpretation of individual characteristics, professional business games, competitions, working with small groups, efficient use of graphic organizers, demonstration of the effectiveness of professional formation and development.

There is a need to develop an object that corresponds to the content of agrophysical education taking into account the level of readiness of students, which is the third condition for the formation of agro-physical knowledge on the basis of innovative technologies. The interaction is involved in the learning process. The model corresponds to the block “Formation of agro-physical knowledge based on innovative technologies”. Formation of agrophysical knowledge through innovative technologies in the learning process is carried out in teaching general professional and special disciplines.

Students enrolled in agronomy education in agricultural higher education institutions with varying degrees of agrophysical knowledge. Therefore, the degree of formation of agrophysical knowledge in the student should be taken into account in the learning process. The student may further develop practical knowledge and skills based on the level of agro-physical knowledge he has acquired. It is possible to distinguish between low, medium and high levels of agrophysical knowledge formation in students.

Special methodological training occupies a special place in the whole system of preparing students for the use of innovative technologies in the professional activity of students. The technology of training future agronomists for the use of information and communication technologies includes the task of developing students' research, creative independence and skills of studying and summarizing best practice.

Effective technologies based on the integration of pedagogical and innovative technologies were used in the learning process to ensure the quality of future agronomists. The basis of such technologies is modern didactic means of learning (e-learning tools).

When developing e-learning tools, a set of requirements for their quality will be developed, and compliance with them will be a key element of the e-learning technology.

Development of learning materials using components of electronic learning tools should be used in compliance with modern teaching methods (experiments, comparison, observation, abstraction, generalization, concretization, analogy, induction, deduction, analysis, synthesis, modeling, including mathematical modeling and systematic analysis).

Methodology

The article pays special attention to the use of innovative technologies in the organization of practical exercises. In organizing a workshop on Agrophysics on the theme "Capillaries in Plants," students were asked to perform demonstrative experiments on the rise of water in thin glass tubes of different diameters. Students put water in special bottles and observed water rising up in different tubes. They were asked to explain the cause of this physical phenomenon on the basis of their theoretical knowledge in agrophysics. The other tube moisturizing intervals are similarly elevated across the tubes to a different height than the fluid level in the large tank. The rising tide of the tube moisturizing fluid is derived from the following formula:

$$(1)\quad h = \frac{2\alpha}{\rho g r}$$

There: α - surface tension coefficient of water; ρ - density of fluid; g - acceleration of free fall; r- tube radius. The dissertation shows the application of this formula to water. If the water

temperature is 20°C, we get the following for h:

$$h = \frac{0{,}15см^2}{r} ..(2)$$

The teacher mentions that the simplified (2) formula can be used for any water temperature that is practically over 0°C.

Based on the above formulas, it is explained by the large capillary forces in the soil with pore diameters ranging from 100 μm to 3 μm.

For practical laboratory work on agrophysics, students were given a number of practical tasks in order to determine cell juice concentration and osmotic pressure, transpiration intensity and relative transpiration using technical scales, determination of crop irrigation time based on increased electrical resistance to plant leaves' tissues, determination of soil solid phase, soil capillarity property using picnometer, determining the moisture using the way of soil drying, the heat capacity of soil by means of the calorimeter, the heat transparency using cylindrical probe Gin and determination of soil thickness and humidity using gamma rays.

CONCLUSION

As a result, it becomes clear that practical training plays an important role in the advancement of agronomic and professional knowledge of future specialist agronomists.

At the end of the lesson, the teacher will check the students' assimilation of the new teaching material. The teacher observes the increasing interest, motivation, and responsibility of the students during the course. Throughout the lesson, the topic is gradually linked to the other disciplines that the student is learning, and through short discussions the necessary solutions are found.

Thus, the main purpose of using modern pedagogical technologies in the learning process is to activate and intensify student activities.

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