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ROLE OF PROJECT PREPARATION IN FORMATION PROFESSIONAL COMPETENCE OF FUTURE SPECIALISTS IN AGROENGENEERING

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Summary. New educational standards include significant changes in the structure, content, aims and objectives of education of Agroengineering specialists. According to this the research of the role of project preparation in the professional competence formation of future specialists in agroengeneering was conducted. The results of the investigation the preparatory stages that are based on the systematic approach, which inclines four main components for making an agroengeneer as a specialist be ready for project activity, are represented. Beginning at the first preparatory course the improvement of educational pedagogical technologies should be directed to the target integration of subjects with providing growth of the results at each stage - physics and mathematics, general and special. The role of physical and mathematical education and formation of general professional competence of the future agroengineers, activity and the level of teachers' influence on the project training of students was investigated.

Keywords: project training, professional competence, activity, future specialists in agricultural engineering

Introduction.

European integration development of education in Ukraine is characterized by increasing of innovational and social and humanistic components based on new scientific and informational pedagogical technologies of education. The Law of Ukraine on Higher Education [1] creates conditions for improvement of the combination of education with science and industry to prepare highly-qualified specialists, who are able to compete, for high-tech and innovative development of the country, self-identity, and meeting the needs of the labor market at the highest international standards.

Professional competence of Bachelor (major #208 "Agroengineering") includes:

- to develop rational scheme of the technological process for the specific producing conditions basing on the economic efficiency;
- to choose technical means for main and additional operations;
- to adjust parameters and modes of machines work in the technological process and technological lines;
- to develop operation maps for operations and processes accomplishment;
- to design transportation processes;
- to create technological maps of machinery repairing and restoring its pieces;
- to design equipage of the industrial zones and sites;
- to design compounds and mechanisms of machines and equipment;
- to calculate details and compounds of machines and non-standard equipment;
- to perform composite drawings of machines and equipment basing on the standard pieces, joins and machinery;
- to develop and improve the schedule of complexes, machines and equipment;
- to organize service and diagnostics of machines;
- to select materials and modes for the repairing and restoration of pieces;
- to calculate and evaluate index of exploiter of machine train in the areas of business;
- to control the quality of the mechanized operations and products;
- to determine compliance відповідність of operating modes of machines with their design features;
- to select machines and combine machine units in existing technological lines of manufacturing crop and livestock products;
- to determine the technical condition of tractors, cars and sophisticated machine units.

***Prerequisites and means for solving the problem*.**

Brukhanova N.O. [2] investigated the designing of pedagogical training of future engineers system. Basing on the problematic research analysis she found out that training teachers of vocational schools and higher educational institutions of I and II accreditation level should be conducted during the whole educational period. It is claimed that training of teachers should have external and internal connections due to which high level of preparation future specialists is provided. This includes spatial, temporal and informative coherence, educational and logically formed sequences and the continuity of professional and educational development. The author noted that the implementation of partial solutions is insufficient, that's why she recommended the mechanism of future teachers' complex designing of engineering basing on the system approach. Unity of systematic, activity, person-centered and competence approaches and their complex integration is in the base of the pedagogical designing offered by this scientist.

She proved that the teaching system for future specialists should be designed according to the means of integration system of activity and student-centered approach.

Project preparation as a term could be regarded in two ways:

1.as a process of making a future agroengineer be ready for project activity in Higher Educational Institution gradually;

2.as a result of professional training and the ability to implement professional competence in an actual industrial project activity.

Solution of the examined problem.

The process of gradual formation consists of four stages, which correspond to four Bachelor Degree courses and additionally one or two Master Degree courses. During the first one phasing is based on the system approach which involves four main components of formation agroengineers' readiness for project activity. They are:

- the first stage (about the first and the second year of study) is advanced Physics and Mathematics training and capacity for competent analytical thinking;
- the second stage is formation of general engineering competency and constructive abstract thinking;
- the third stage is study of special subjects based on machine designing, design of working bodies;
- the fourth stage is formation of special disciplines on exploiter, repair of technical facilities and economic components of agribusiness;
- the fifth stage is formation of the ability to research, to find the optimal technological and constructive solutions.

Beginning from the first year (the first stage) of teaching a future agroengineer in Higher Educational Institutions development of educational methodology should be directed on target integration (connection, interpenetration, converging, and formation of interrelations) of subjects with further growth due to integration processes and efficiency of each particularly and everyone generally that are influential on competence of a future specialist. To solve this problem effectively end-to-end-design technology should be imbedded into the educational process, because one of its implementation is discipline integration. Especially it concerns the theory and methodology of interdisciplinary integration in designing of continuing teaching process of agroengineer. End-to-end-design method is based on fundamental principle and vocational orientation

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through target integration of physics and mathematics, basic and special disciplines. This method makes it possible to create a sequential actions system to create progressive teaching methods. Studying the Physics and Mathematics module is the base that will help students catch on basic and specials disciplines, master project activity successfully.

Analysis of academic literature shows that range of authors distinguish the following stages of designing:

- a graphical object modeling;
- making schematical and calculation diagrams;
- development of constructive solutions of the product and its parts [3].

Having analyzed the process of solving practical tasks of physics and mathematics module we can claim that calculation is an important part of basic process to prepare a student for the project activity. Organization of educational methodology of training an agroengineer based on end-to-end-designing helps to sufficiently increase students' interest to study Physics and Mathematics module, and, consequently, general and special ones. Students begin to understand all the necessity and importance of knowledge from these areas for their future project activity [3].

Researches made by T.I. Shyshelova, M.P. Bazhneva, T.K. Konovalov, T.O. Pavlova show the actuality of using project method during the training specialists able to compete, for didactic scientific base of pedagogical methodology and teaching that includes consequences, forms of organization and means of education which are vital in the distinguishing efficiency and rationality of a subject, that influence on the progress and the results of educational process. Scientists mentioned above made and implemented organizational and pedagogical model of important for education projects for junior grades of Bachelor's Degree. They showed that the key to successful usage of this method is educational process to be directed on formation skill of project activity and active cooperation with teachers of special disciplines, in other words, establishment of interdisciplinary connection of physical and mathematical module, basic and special ones.

It should be noted that the method of projects was analyzed in the article "*Method of projects in the theory learning of a future agricultural engineer"* [4].

It is important to start studying elements of the method of projects from the first courses at the university, and actual manufacturing processes should become the basis for the topics of course projects. It means that the method implemented into educational process allows students to complete course and thesis projects successfully.

Themes of educational design research in the first phase are agreed with the discharging departments which enables to realize the holistic approach to vocational training of future specialists in agricultural production, provides professional orientation training after the method of breakthrough projecting. It should be noted that it is appropriate to start breakthrough projecting even among schoolchildren for the sake of vocational training of talented schools leavers (as well as that of vocational schools and colleges) to enter higher agricultural schools where they will be able to continue their projecting activities during the phased studying of program subjects.

It is important to work more actively on the formation of higher school students' project activities themes while studying the course "Introduction to Specialty" in the first semester. It is here where students can get acquainted with research themes of departments, university, regional peculiarities of the use of agricultural equipment. While in the first months of studying are students organized to develop their project activities , starting from physical and mathematical sciences unit, the tasks of breakthrough through projecting will be resolved more successfully. Shyshelov T.I., Konovalov M.P, Bazhenova T.K., Konovalov P.M., Pavlova T.O. developed, tested and organized the first phase of the professionally directed teaching physics after the method of breakthrough projecting objects of professional activity. A result, the conditions for self-creative activity of students are formed as wells as their professional competence, cooperation between teachers of related disciplines is improved, the role of motivational factors for professional self-development of a future specialist as personality, motivational components needed to studying physics (higher mathematics, theoretical mechanics) are conceptualized for solving future professional tasks. Effective motivation is a powerful driving force and an efficient mechanism aimed at a more successful mastering of project activity stages [3].

An important is role belongs to physical and mathematical education in formation of overall professional competence of future specialists in agroengineering. Educational institutions that train professionals of agroengineering in accordance with the Ministry of Education and Science of Ukraine and standards of education, that should create conditions for training highly qualified specialists, which acquire professional competences, including those associated with the project. In general, the concept of "design expertise of agroengineering" refers to the willingness and ability of graduates based on knowledge and skills, purposefully organized methodically correctly, independently [5] and also in groups [6] and teams to solve relevant issues and problems of professional project activities and evaluate the results of the generated projects.

To form the general and professional competencies of project activity, student must master a number of subjects, that are important mathematical engineering professional-professional values. Each training course is capable of making a contribution to the professional development of future specialist. An important role in this belongs to mathematics and related disciplines as universal interdisciplinary analytical system, which provides a logical, precise and objective description and study of objects and processes.

Always mathematics was important in forming the thinking style of the students, and it has not lost its meaning is important and will always be. With the transition to new educational standards, that are adapted to European and other countries with high developed economies, from the standpoint of system competence approach in education, developed pedagogical technologies of education, in which growing role belongs to improving the quality and depth of study of mathematics, as the fundamental basis of intellectual abilities and the formation of professional, including professionally-oriented competencies.

The basic physical and mathematical foundations of future specialist, taking into account of professional competences of agroengineer, which should have a graduate of university as a specialist in higher education are formed mainly on the first and second courses of studying.

During the formation of mathematical analytical system it is important to be based on the development of motivation to study of mathematics, achieved in the implementation of the educational process by teachers of physical and mathematical sciences, innovative technologies, active and interactive methods, the use of electronic educational resources are aimed at training future professional in agricultural engineering. Teachers often use play and practically oriented learning in the classroom. We use educational technologies such as working in groups of four - five students, problematic education, search and differentiated methods for studying disciplines of mathematical cycle. The University conducts annual Olympiad in mathematics and physics and other activities for students. As a result of the students activities the we form the importance of the role of mathematics in professional engineering project activity.

The key to the deep fundamental knowledge of mathematics is the first comprehensive thorough study of all sections of physical and mathematical disciplines in the educational programs, providing sufficient knowledge solving engineering and special tasks of project activities to meet the needs of training and production, and secondly, mastering skills of mathematical modeling in the field of future professional activity of graduates will be demanded in the labor market.

The fundamental mathematical training of graduates is an important component for his/her project activities, as it will promote understanding and rapid development of new techniques and technologies, their further modernization and development, introduction of new production in agriculture economically viable principles and methods of agribusiness.

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Mathematical modeling skills enable maximum application of mathematical knowledge to adapt to the development of science and practice, which proves the importance of the formation of professional competence of graduate. Mathematical modeling applications in the specialty allows students to combine theoretical knowledge with their needs, makes it possible to seek ways to enhance the application of theoretical knowledge in the future specialty directly in the learning process.

Physical and mathematical knowledge develop, expand and get deepeer in the study of theoretical mechanics (first - second courses Bachelor).

We formed basic mathematical tools used in almost all disciplines, aimed at developing of project activity. For example, during the performance of course project of agricultural machines the students are recommended to perform a special section "Mechanical and technological preconditions for the development and theoretical analysis of the functioning of the device". It is based on analytical relations, formulas, systems of equations conducted theoretical studies, in which set numeric value or the change of speeds, power, capacity, etc., may be necessary to determine the structural and technological parameters designing, calculating, spare parts for the strength of hardware in a complex environment, etc.

Teachers and students, who are subjects of the educational process, play an important role in pedagogical technologies of project preparation for agroengineers. Their interaction is multifactorial in nature and affects the criteria for assessing the quality of education, forming the integral, general and special competencies of the specialist in different ways. The teacher can act as a lecturer on theoretical training of specialists, the supervisor (head) of course and diploma projects, a consultant (assistant) from the features of the project activity, the moderator of project preparation and in other functional roles.

According to the scientists [7], the lecturer is the first to influence the process of project preparation of future specialists; he develops the part of calculation algorithm of the project, summarizes the literature while taking into account the regional features of agribusiness, brings to the students the overall meaning of the project work, presents a general plan for achieving the goal of the project work and the stages of its implementation. He teaches students consistently, logically and with regard to the pragmatic component, carry out the assigned tasks. Also the lecturer develops methodical support and organizes independent project work both in the form of individual and complex projects. The main control over the quality of the project preparation of future specialists remains with the lecturer, although it should be noted that the lecturer coordinates the general didactic training of specialists with the head of the department, where the process of forming future agroengineers is being conducted.

The teacher who is the project manager issues the task taking into account the initial data, teaches students to use scientific, methodical and reference literature, information training tools, develops an action plan, provides detailed information on the issues to be solved, suggests ways to solve them, etc. Thus directive behavior is specific for the project manager (Figure 1.1.).

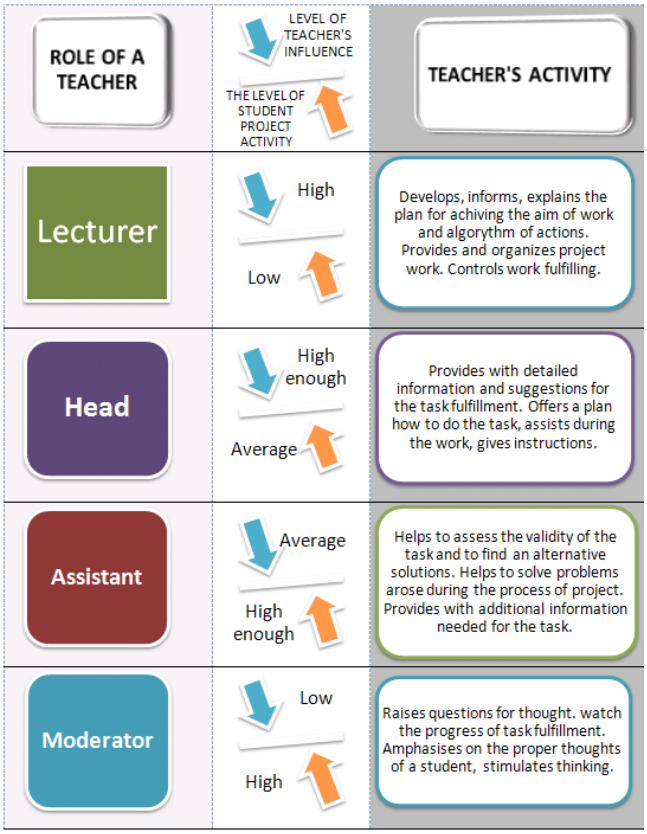

Figure 1. Role of a teacher according to the level of his influence on independent project activity of a student

In the process of project preparation of specialists, the role of the teacher-consultant is limited to helping in solving problems, finding alternatives, searching for literature sources, providing additional information on certain issues of project activities. If necessary, he helps to assess the reliability of the task and find an alternative solution to problems that are arising in the process of independent design work, and also provides additional information for the task implementation.

The teacher also can act as a moderator. He sets the overall strategic goal for students' project activities, controls the discussion and debates, develops, communicates, explains the plan for achieving the goal of the work and the course of action, raises the issue for reflection, oversees the process of accomplishing the assignment, focuses on the relevant thoughts of the student, stimulates thinking.

The role of the teacher is very important in the technological process of forming readiness for independent, individual or collective project activities of the student in the implementation of educational projects. The effectiveness of the organization, the motivation of the work of students and the success in the performance of the assignment depends on the quality work of the teacher, whether he takes into account all factors that are affecting on the result of independent work, timely and qualitatively examination of the tasks.

In higher education institutions teachers act as a consultant or, under certain conditions, a moderator in preparing students for conferences, olympiads, diploma projects, etc. During the individual preparation of students on issues of independent project work, the teacher should direct the student's activity, adjust and evaluate their work, and motivate their activities. At the same time, the teacher should require the consolidation of certain knowledge, as well as enable the student to form and express their thoughts. In other words, the role of the teacher depends on the purpose of the student's learning and the type of activity with which to achieve this goal.

Results and discussion. At the first stage of forming readiness for the project activity of the future agroengineer, it is important to ensure the development of common physical and

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mathematical competencies with their integration with special competencies. The skills of the bachelor's project activity are formed gradually during 4 stages. Mathematical modeling of applied problems by specialty makes it possible to apply theoretical knowledge in practice during the production activity of a graduate of a higher agricultural educational institution. To achieve the goal, effective creative cooperation between the teacher and student is important.

Conclusion. An effective process of forming readiness for the project activity of future specialists in agroengineering is possible on the basis of innovative training technologies in accordance with the preparation program. The physico-mathematical apparatus that is formed at the first stage of training is the basis for studying practically all educational disciplines that ensure the formation of professional project competences. An experienced, educated, pedagogically trained teacher as a lecturer, supervisor (head), consultant, moderator, mentor is able to help students solve their tasks, as well as effectively manage the process of educational project activities both in the implementation of individual and complex projects. The role of the teacher depends on the set goal of learning at a certain stage. The results of the research showed that creative motivated-oriented cooperation with the use of didactic training facilities ensures the quality training of agroengineering specialists in higher educational institutions.

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