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Project method and Ecosystem approach in the formation of Functional Literacy among Students

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Abstract. This article discusses the basics of knowledge for applying a new approach to the development of education. This study shows what role the application of the project method and educational ecosystems plays in updating the education system and overcoming global challenges facing our civilization. At the initial stage of practice, before completing the project assignment, we determined the initial level of students' knowledge. In courses 3 and 4, the subject of research was such topics as "types of scientific activity", "preparation of a research program", "general scientific methods of theoretical and empirical research". It is noted that the students of the 3rd and 4th courses showed satisfactory results.

Keywords: project method, ecosystem, research, empirical research.

Проектный метод и экосистемный подход в формировании функциональной грамотности учащихся

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Аннотация. В данной статье рассматривается основы знаний для применения нового подхода к развитию образования. Это исследование показывает, какую роль играет применение проектного метода и образовательных экосистем в обновлении системы образования и преодолении глобальных вызовов, стоящих перед нашей цивилизацией. На начальном этапе практики, перед выполнением проектного задания, мы определили начальный уровень знаний студентов. На курсах 3 и 4 предметом исследования были такие темы, как «виды научной деятельности», «подготовка исследовательской программы», «общенаучные методы теоретического и эмпирического исследования». Отмечается, что студенты 3-го и 4-го курсов показали удовлетворительные результаты.

Ключевые слова: проектный метод, экосистема, исследования, эмпирическое исследование.

1. Introduction

Within the framework of the project "The impact of human activity on climate change", students developed a model of a small ecosystem of living organisms and studied the influence of smoke, temperature, light, humidity on it. The students observed the actions and changes of the organism in the ecosystem. We made our conclusions by comparing the results obtained with the literature data. To date, there are holistic approaches to learning, focused on the future, based on foresight research and forecasting emerging problems.

This suggests that a turning point has come when educational systems are ready to start acting on new principles. This transition will require us, students and teachers, to simultaneously apply the achievements and principles of the past – but at the same time make every effort to create long-term and sustainable approaches that could respond to the large-scale challenges of our time. The ecosystem approach is beginning to develop in many spheres of public life, the main task remains the creation of ecosystems in education. It is necessary to change the approaches to education for people of all ages - from the youngest to the elderly, because the solution of pressing problems depends on each of us. The relevance of the article is determined by the fact that in connection with the transition of higher education to a new technological structure, the task of developing Project Education is extremely important. The new technological structure is associated with the development of design activities. This leads to an increase in the relevance of the project" higher education". At the same time, such a transition to work under the new technological order should be accompanied by an increase in the quality of higher education in technical universities. In recent years, the problem of the formation of functional literacy of students has been the subject of research by many domestic and foreign scientists. Considers functional literacy as part of the culture of the information society, and also believes that knowledge of foreign languages affects the acquisition of functional literacy. Researchers consider the problem of functional literacy from the point of view of its importance for achieving educational results in various fields, improving the quality of reading and writing, personal development and training of personnel, etc. however, in schoolchildren and students, this issue is not fully studied [1].

The competence of scientific interpretation of phenomena includes the ability to apply relevant natural-scientific knowledge to explain a phenomenon; recognize, use and create explanatory models and concepts; complete and scientifically substantiate assumptions about the course of a process or phenomenon; explain the principle of action of a technical device or

technology. The purpose of this work is to show that the project method and educational ecosystems can be a new horizon for the evolution of education systems. Within the framework of this project, I would like to answer the following questions: 1. What skills, knowledge and educational trajectories can help students and make their lives fulfilling and successful? 3. What role can educational ecosystems play in overcoming global challenges and creating conditions for the prosperity of people, communities, humanity, the biosphere and the planet as a whole? This article shows that the optimal way of practical participation in the research and formation of various ways of education development is a project method and educational ecosystems built on the principles of holistic development and "life affirmation", strengthening contact with life. The study of scientific publications on the topic of the article indicates the following. Project management and Project Education can be considered as tools to improve the quality of all stages of education. Project Education can involve the processes of student self-organization. The development of a project approach is considered as a way to modernize domestic education. Scientists are considering new concepts and technologies of project educational activities. Project activity is considered as a structural element of the educational process. Teachers believe that it is important to develop a project culture in universities [2]. The vast experience of Project higher education is accumulated at the Moscow Polytechnic University, as evidenced (in particular) by such publications. In the context of the formation of a new technological structure, forecasting of the development of Regions and sectors of the economy is carried out. At the stage of the formation of a new technological structure, an ecosystem approach is developing in higher education.

2. Materials

The methods used. Theoretical methods: comparative historical analysis, literature analysis, analysis of the basic concepts of research, causal analysis of the studied phenomena, forecasting.

Empirical methods:

- data collection and generalization (observation, conversation, analysis of documents and products of activity, teachers' work experience, etc.);
- evaluation (self-assessment, rating, pedagogical consultation);
- control and measurement (scales, sections, tests);
- the study of the pedagogical process and the changed and really taken into account

situations (pedagogical experience and practice) verification of research results in the educational process);

- data processing (mathematical statistical, graphical, tabular) [3].

The research work was carried out for 3rd, 4th year students of the pedagogical educational programs of the Natural Science direction of Hacettepe University. The subject of the study is "organization and planning of scientific work". 60 students took part in the experiment.

The essence of the project method of education can be expressed in its functions. The implementation of the project method allows us to assume such functions:

1) creating interdisciplinary competencies among students in the process of implementing educational projects;
2) teaching skills of practical use of the knowledge gained during training;
3) obtaining activity skills in the field of integration of science, practice and education;
4) integration and integrated use of explicit and implicit knowledge during the implementation of innovative projects;
5) formation of the project organizational culture within the project team;
6) education of students in the process of implementing an educational project within the framework of the project culture and group;
7) integration of all types of acquired knowledge, skills (competencies) and organizational subculture in the structure of the implemented project;
8) development of culture and skills of personal and business communication between members of the educational project team during the implementation of the educational project;
9) mutual training of team members during the implementation of an educational project;
10) formation of a mechanism for mutual control by members of the project team of the level and assessment of the sufficiency of the student's competencies, verification of the adequacy of the project culture based on the results of the educational project, and more.

3. The results of the study and its analysis

At the initial stage of practice, before the project task, we determined the initial level of knowledge of students (figure 1). In the 3rd and 4th courses, the subject of research covered such topics as "types of scientific activity", "drawing up a program of research work, "general scientific methods of theoretical and empirical research". As can be seen in figure 1, the 3rd

and 4th year students showed the following results: qualitative performance was 74% in the 3rd year; 81% in the 4th year students (figure 1).

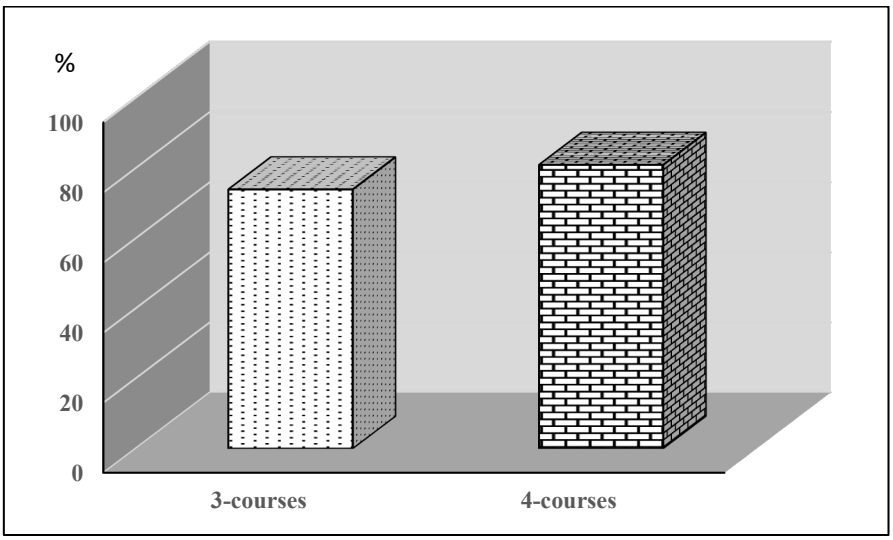

Figure 1. The initial level of knowledge quality of students (Compiled by the authors).

According to the test results, it is observed that the quality of primary education of students is at an average level, which may depend not only on academic performance, but also on the fact that another factor is the assimilation of the material by students only theoretically.

To determine the functional literacy of students, students were offered creative tasks and determined 3 levels of functional literacy (optimal, acceptable, critical).

The optimal level is 1-20 points. Students ' levels of functional literacy were evaluated according to bloom's taxonomy of thinking (knowledge, understanding, application analysis, synthesis, evaluation).

If the student identifies all the thinking abilities according to bloom, it means that they have a higher level. Students have logical thinking, a sequence of actions to be performed. Such students are characterized by high cognitive activity and the need for knowledge. They have a high level of completeness and strength of knowledge.

The permissible level is 1-10 points. Students of this level are characterized by completing all tasks, but there is no clear sequence of completed tasks. Students of this level are characterized by the speed of completing certain tasks, a high level of knowledge, but the correctness of the actions is average. In such students, it is not enough to critically evaluate actions and evaluate their own opinion. At this level, the learner knows, understands, applies, analyzes, but cannot set goals, group, classify, prove, etc.

Critical level-1-5 points. At this level, the student knows, understands, but cannot connect, plan, calculate, choose, etc. Students cannot independently organize their activities and work only under the guidance of a teacher. After analyzing the answers of students, we came to the following conclusion:

Most students do not have the proper level of educational and cognitive abilities, which leads to incorrect completion of tasks in the process of educational activity. Therefore, we can say that without mastering educational and cognitive skills, students will not be able to apply their knowledge in the discipline "organization and planning of scientific work" in everyday life.

Thus, comparing the answers of students of the 3rd and 4th year, we can conclude that the level of functional literacy of students is at an average level.

In the 3rd year, the highest level was 15%; in the 4th year, it was 21%.

4. Conclusion

Upon completion of the design activity, appropriate conclusions were drawn on all projects, which were submitted to the defense in the form of a presentation. In the 3rd and 4th year students, according to the results of the control work, the percentage of the quality of students ' knowledge changed.

Students showed high results in these groups at the final stage: qualitative performance was 92% in 3rd year students; 95% in 4th year students (figure 2). High results can be explained by the fact that the use of Project technology in the course" organization and planning of scientific work " not only affects the interest of students, but also increases the quality of student performance with the formation of functional literacy.

The role of design technology for the formation of professional skills and competencies of future teachers is of invaluable importance [4].

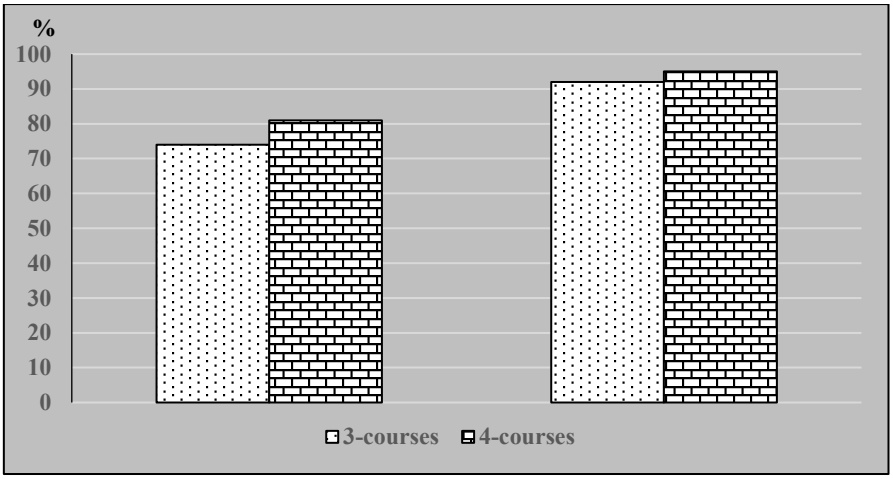

Figure 2. After the end of the project work quality of students ' education (Compiled by the authors).

In the students of the control group, these data are at an average level. When performing projects, students used interdisciplinary knowledge, for example, by performing calculations, they relied on knowledge in the field of mathematics, relied on chemical science by compiling various chemical equations, relied on physical laws when compiling models, turned to language science when working with foreign literature and conveying a conceptual thought, etc.

The creation of interdisciplinary communication is the organization of collective problem solving, including the formation of systematic interaction in the process.

Thus, the design activity in the discipline "organization and planning of scientific work" showed a positive effect on the formation of functional literacy of students.

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