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DEVELOPING FUTURE TECHNOLOGY TEACHERS' SKILLS IN CALCULATING PRODUCT COST THROUGH EDUCATIONAL PROJECTS

Abstract

The article examines the issue of developing future technology teachers' skills in calculating product cost through the implementation of educational projects within the course 'Developing the economic competence of future technology teachers'. Particular attention is paid to the importance of integrating theoretical knowledge of economics and technology into the educational process, which enables students not only to acquire theoretical knowledge but also to

develop practical skills necessary for their future professional activity as technology teachers.

One of the main methods that contributes to the development of students' economic skills is the implementation of educational projects. The process of manufacturing products, which includes the selection of materials, calculation of production costs, recording of working time, depreciation of equipment and other economic factors, is an important stage in the training of future teachers. Students learn to calculate the cost of a product by taking into account the costs of materials, labour, the use of tools and equipment, and they also assess the economic efficiency of production.

Special attention is given to the use of modern information technologies in the educational process. The use of software such as Microsoft Excel to automate cost calculations enables students to calculate production expenses quickly and accurately. This allows students not only to master methods of cost calculation but also to acquire practical skills in using information technologies, which is an important element of contemporary pedagogical activity.

Research activity is also of great importance in developing economic skills among learners. Participation in research projects, such as analysing the costs of manufacturing furniture or other products, enables students to study methods of cost accounting in greater depth, calculate production cost and analyse the economic efficiency of production processes. This allows students to apply the knowledge they have acquired in practice, as well as to develop skills in economic analysis and decision-making.

The article emphasises the importance of applying an interdisciplinary approach in the training of future technology teachers, which includes not only technological knowledge but also the economic skills necessary for successful pedagogical activity. Attention is focused on the need to improve curricula and

teaching methods that will ensure a high level of economic training for future pedagogical specialists.

Keywords: cost calculation of a product, economic competence, future technology teachers, educational projects, research activity.

Problem Statement. In the context of current economic development and the globalisation of production processes, the issues of efficient resource use, cost reduction and increasing product competitiveness are becoming particularly relevant. In this context, developing future technology teachers' skills in calculating product cost becomes an integral component of their professional training. The ability to perform accurate economic calculations is a necessary condition for preparing specialists capable of effectively applying production technologies and cost management in real educational and production settings.

Of particular importance in the training of future technology teachers is the integration of economic and technological aspects into the educational process. Since modern production is impossible without a clear system for calculating product manufacturing costs, future technology teachers must not only master basic economic principles but also be able to apply them in practice. Thus, the development of product cost calculation skills becomes an important component of the professional competence of future teachers in the field of technology education.

One of the most effective methods that contributes to the development of these skills is the implementation of educational projects that integrate theoretical knowledge with real practical tasks. By involving students in the process of creating real products that require economic calculations, they gain not only a deep understanding of the economic aspects of production processes but also practical skills in cost calculation. Educational projects in which future technology teachers solve tasks involving real economic calculations contribute to the

development of their critical thinking and their ability to adapt acquired knowledge to specific production conditions.

The scholarly literature emphasises the importance of project-based activity as one of the most effective teaching methods, enabling students to gain experience of working in real production settings and to apply acquired theoretical knowledge to solving specific practical tasks. In the context of technology education, educational projects that include product cost calculation help future technology teachers not only to master the basics of economic calculations but also to develop project management skills, cost assessment skills and the ability to optimise production processes.

This study aims to examine in detail the methods and approaches that contribute to the development of product cost calculation skills in future technology teachers through the implementation of educational projects. Particular attention will be paid to identifying the key factors that influence the effectiveness of this process, as well as to analysing the role of pedagogical support in the development of these skills.

Knowledge of the fundamentals of product cost calculation is essential for effective production management, economic planning and cost optimisation. Contemporary pedagogical practice requires the integration of economic knowledge and skills into the educational process, which ensures students' ability to justify expenses and calculate the cost of products. In particular, the process of developing these skills in future technology teachers is largely carried out through the implementation of educational projects, which enables students to apply theoretical knowledge in real conditions, particularly within technological and production activities.

Analysis of recent research and publications. Scholars have been actively studying the issue of developing economic skills in students of technological specialities. Among the leading authors are Haidarzhynska O. and Koverha D.,

who in their work ‘Main methods of product cost calculation and types of cost accounting systems’ examine the key methods of product cost calculation used in production activity, particularly within the framework of accounting for production costs. They emphasise that the proper application of these methods is important for the effective training of students in technological specialities, since future teachers must possess product cost calculation skills in order to teach learners the fundamentals of economics and production. In this context, not only the theoretical mastery of these methods is important, but also their practical application in the learning process [2].

An important contribution to the study of this topic is the research of Verhun V., Tsvek O. and Voronko R., who in their work ‘Methods of cost accounting and product cost calculation and directions for their improvement’ propose directions for improving cost accounting methods that help increase the efficiency of product cost calculation. The authors note that the integration of modern economic methods into the educational process helps future technology teachers better understand the economic aspects of production processes and transmit this knowledge to learners [1].

Davydiuk’s research emphasises the importance of national regulatory acts in improving methods of cost accounting and product cost calculation. He stresses that the adaptation of cost accounting methods to contemporary learning conditions should be based precisely on national standards and regulatory documents. In turn, this contributes to the development of students’ ability to perform accurate economic calculations, which forms the basis for the effective management of production processes [4].

In his research, Tsapiuk examines both national and international experience in methods of cost accounting and product cost calculation, emphasising that, in order to improve the economic training of future technology teachers, it is necessary to take international experience into account. This enables students to

master best practices in cost calculation and adapt them to the conditions of domestic education [6].

The studies by Hlushach Yu., Yeremian O. and Yaroshenko A. also focus on methods of cost accounting and product cost calculation, particularly for specific fields such as information technology, which demonstrates the diversity of approaches to cost calculation across different sectors and academic disciplines. They note that knowledge and skills in product cost calculation are key for students studying in fields related to economics and technology [3].

In Ukraine, the issue of economic training for future technology teachers is regulated by a number of legal and regulatory acts. In particular, the Law of Ukraine 'On Education' (No. 2145 VIII, dated 5 September 2017) establishes the general principles for organising the educational process, including the requirements for the professional training of teaching staff, particularly in terms of economic competence. The Law defines the key directions for modernising education, particularly through the integration of contemporary economic knowledge into teacher training programmes.

The State Standard of Basic Secondary Education (2018) and the Law of Ukraine 'On Complete General Secondary Education' (No. 463 IX, dated 16 January 2020) describe in detail the educational standards, including the requirements for developing learners' economic competences through the teaching of subjects within the technological cycle. They define the foundations for organising the educational process, including mandatory competences related to the economic management of production processes.

Teacher training programmes in technology education approved by the Ministry of Education and Science of Ukraine contain specific recommendations for the implementation of economic education and the development of product cost calculation skills within educational projects, which are mandatory components of the professional training of future technology teachers.

Overall, the studies of scholars such as Haidarzhynska O., Koverha D., Verhun V., Tsvek O. and others confirm the importance of developing product cost calculation skills in future technology teachers. They propose effective methods and approaches that facilitate the integration of economic knowledge into the training of students in pedagogical specialities. The regulatory and legal framework also plays a key role in ensuring a systematic approach to the development of economic competence in pedagogical practice. It should be noted that further research should focus on improving methods for developing students' economic skills through the use of educational projects and the implementation of innovative approaches to economic education.

The development of product cost calculation skills is an important aspect of training future technology teachers, as it enables future educators not only to understand the economic aspects of technological processes but also to apply this knowledge in practice. In the context of integrating technological and economic knowledge in education, the use of educational projects as a method is of particular importance, as it allows students to solve practical tasks related to product cost calculation using real examples. Such an approach ensures not only theoretical understanding but also the development of practical skills that will be necessary in the future professional activity of a technology teacher [7; 8; 9].

Educational projects serve as an important tool for developing product cost calculation skills, as they allow students to apply theoretical knowledge in real conditions. The issue of product cost calculation is often complex and multifaceted, as it includes numerous factors that should be taken into account during the production process, such as the costs of materials, labour, energy, equipment depreciation and many other aspects.

The development of product cost calculation skills is an important part of the training of future technology teachers, as these skills not only enable educators to understand the fundamentals of economic processes but also to teach

technological disciplines effectively. In particular, one of the main challenges is how to equip students with the ability to assess production costs correctly and calculate the cost price of products. This issue is especially relevant in the context of studying the course ‘Developing the economic competence of future technology teachers’, where one of the main methods for addressing this issue is the use of educational projects [7; 8; 9].

While completing educational projects, students have the opportunity not only to acquire theoretical knowledge but also to apply it actively in practice. For example, students may be involved in a project in which they are required to plan the production of an item, taking into account all stages, from the selection of materials to the determination of production costs. In this context, students are given a conditional task, for example, to make a work table or a decorative photo frame. This task enables students to gain a deeper understanding of how economic calculations related to the production of items are carried out in practice.

The first stage of such a project is the selection of the necessary materials, such as wood, varnish, metal fittings and so on. Students must determine how much material is needed to produce one item and also estimate its cost. For example, they may calculate the cost of one wooden board or determine the expenses for paints and varnish for coating. During this stage, students learn to calculate the cost of each component of the item and to identify the most suitable options among material suppliers.

The next stage is the calculation of the costs associated with the use of tools and equipment, such as a saw or a sanding machine, which are necessary for processing materials and assembling the item. This enables students to estimate how much time and how many resources are required to use each tool. In addition, an important aspect is accounting for equipment depreciation, since tools used at each stage of production have a certain service life and value that must be taken into account in calculations. This allows students to understand how to assess

correctly the costs of using the tools required for production, which is important for understanding the overall costs of manufacturing.

After students have determined the costs of materials and labour, they move on to calculating the cost price of the item. Students must take into account all costs, including materials, labour, the use of tools and equipment depreciation. This enables them not only to calculate the exact cost price of the item but also to assess the economic efficiency of production. After calculating the cost price, students must compare this value with the market price of the item. This task gives them the opportunity to evaluate how profitable the production of this item is under real market conditions.

In addition, an important aspect is taking into account economic factors such as competition and market demand, which may significantly influence pricing. Students should also assess the extent to which changes in production conditions or materials may affect the final cost of the product. This learning task helps them understand the importance of the economic component in manufacturing and teaches them how to make well-grounded economic decisions.

The integration of modern information technologies into the project implementation process is another effective way of improving product cost calculation skills. The use of software such as Microsoft Excel makes it possible to automate the process of calculating product cost. Students can create tables in which they enter material prices, the number of units of each item and the time required to complete each stage of the work. The software automatically calculates the total costs of producing the item, which enables students to obtain accurate economic data quickly. Such tools help students understand how to automate the calculation process and ensure accuracy of calculations in real conditions.

In addition, students may be taught to create more complex calculations using specialised production planning software such as Costimator or ProEst, which are used in enterprises to estimate product cost. The use of such software

allows students to become familiar with real tools applied in industry for calculating cost price and to increase their competence in solving real economic tasks.

Through the use of such methods within educational projects, students not only acquire the necessary economic skills but also develop the ability to make rational decisions guided by economic efficiency and market conditions. This makes it possible to develop strong economic competence in future technology teachers, which is extremely important for their further pedagogical activity.

Thus, addressing the issue of developing product cost calculation skills in future technology teachers through the implementation of educational projects is an effective approach to student training. The use of real examples, tools for cost calculation and economic analysis, as well as the integration of modern technologies, allows students not only to acquire the necessary theoretical knowledge but also to gain practical skills that will be useful in their professional activity.

An integral component of the training of future technology teachers is participation in research activity, which significantly contributes to the development of their product cost calculation skills. This process enables learners not only to become familiar with the theoretical aspects of the economic management of production processes but also to acquire practical skills necessary for assessing costs and production efficiency. Participation in research projects allows learners to gain a deeper understanding of how economic calculations are carried out in real conditions, as well as how production processes can be analysed effectively.

One way of achieving this goal is to involve learners in research projects within which they can study and analyse real production processes. For example, learners may take part in a project aimed at analysing the costs of furniture production. They would need to investigate and compare different methods of cost

accounting in furniture manufacturing, as well as calculate costs for different types of furniture, such as tables, chairs, cabinets or shelves. This task enables learners to understand how to determine correctly the costs of materials, labour, tool depreciation and energy resources required for furniture production.

In the course of such research, learners must take into account various factors that may affect the cost price of products, for example the choice of materials, production technologies, the number of working hours, energy costs and equipment depreciation. They may also compare the cost price of furniture production under different production schemes and assess which of them are more economically efficient. For instance, they may compare options for manufacturing furniture manually and through automated processes, and determine which method makes it possible to reduce costs and increase productivity.

Such an approach enables learners not only to acquire theoretical knowledge of cost calculation methods but also to gain practical skills in conducting economic analysis and decision-making. They learn to work with real data, apply cost calculation methods based on contemporary economic principles and models, and perform economic calculations, all of which are extremely important for their future pedagogical activity. By taking real production conditions into account, such research enables learners to understand how to apply these skills in teaching pupils who are preparing for careers in the field of technology.

Overall, participation in research projects gives learners the opportunity not only to consolidate theoretical knowledge but also to experience the real challenges and opportunities that exist in an actual production environment. This enables future technology teachers to develop important professional skills that will be useful in their future pedagogical activity, as they will not only teach pupils technological processes but also provide them with essential economic knowledge needed for the effective solution of tasks in real production.

Conclusions. Thus, addressing the issue of developing product cost calculation skills in future technology teachers while studying the course 'Developing the economic competence of future technology teachers' is possible through the integration of theoretical knowledge with practical tasks. The implementation of educational projects, the use of modern software tools for cost calculation, as well as participation in research projects, enable students not only to acquire knowledge but also to develop important practical skills for their future professional activity. Only through active practice, the integration of economic knowledge and real projects can a high level of economic competence be achieved in future technology teachers.

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