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FORMATION OF DESIGN COMPETENCE IN TECHNOLOGY EDUCATION WITHIN THE COMPETENCY-BASED PARADIGM

Abstract

The article addresses the issue of forming design competence of students within the framework of modern technological education. The relevance of the study is the transformation of the educational paradigm towards a competence-based approach, which emphasizes not only knowledge acquisition but also the development of practical skills, creativity, and the ability to apply knowledge in real-life situations. In this context, special attention is paid to the role of technology lessons as an effective environment for the development of students' creative potential and project thinking.

The purpose of the article is to substantiate theoretical foundations and identify effective methods and pedagogical conditions for the formation of design competence in students. Design competence is considered as an integrative personal characteristic that combines creative, technological, analytical, and project-oriented skills necessary for the development of functional and aesthetically valuable products.

The study highlights that project-based learning plays a key role in the formation of design competence. It enables students to go through all stages of product creation, from idea generation to implementation and presentation. Particular attention is given to such methods as morphological analysis, functional-cost design, stylistic adaptation, and project modeling, which ensure the integration of theoretical knowledge with practical activity.

The article also emphasizes the importance of developing soft skills, including creativity, critical thinking, decision-making, planning, and presentation skills, which are essential for successful professional realization in modern society. It is noted that the formation of design competence contributes to students' professional self-determination, increases their motivation for learning, and prepares them for the demands of the labor market.

Furthermore, the role of the teacher is defined as crucial in creating a supportive educational environment, selecting appropriate teaching methods, and guiding students through the process of creative project activity. The necessity of combining theoretical knowledge with practical tasks and using modern digital tools is also substantiated.

The findings confirm that the formation of design competence is a complex and multifaceted process that requires systematic implementation of innovative teaching methods and integration of interdisciplinary knowledge.

Keywords: design competence, technology education, project-based learning, creativity, soft skills, competence approach, design methods, technological education, decorative and applied arts.

Problem statement

Contemporary dynamic changes in the social and economic spheres necessitate the modernization of approaches to the quality of education. Within the framework of a learner-centered educational paradigm, particular attention is paid

to creating conditions for the full realization of each learner's internal potential, their self-determination, and continuous self-development.

The competency-based paradigm directs the educational process toward the acquisition by students of a set of abilities necessary for future life, learning, and professional orientation. Unlike the traditional model focused on the reproductive assimilation of knowledge, this approach emphasizes the development of readiness for practical action and the creative application of experience in non-standard situations. In this context, the position of N. Nahorna is relevant, as she argues that the priority is not merely an individual's awareness, but their ability to effectively solve emerging problems [5]. Such a shift in emphasis enables the teacher to transform their role from a transmitter of information into an organizer of the educational process. Furthermore, we share the view of V. Khymynets regarding the effectiveness of this model, as it ensures that graduates meet the demands of a dynamic labor market and facilitates their rapid social and professional adaptation [9].

We also support the position of D. Kudrenko concerning the implementation of the competency-based approach in the educational process. The researcher rightly notes that this approach transforms the training of learners by shifting the focus from the mere accumulation of knowledge to the development of the ability to act in real-life conditions, make effective decisions, and master modern technologies. According to this perspective, the competency-based paradigm becomes the foundation that enables education to become truly practice-oriented, encouraging learners to adopt an active social position and engage in continuous self-development [2].

Analysis of recent research and publications

The issue of competence formation in the educational space is currently highly relevant and is reflected in numerous scientific studies, particularly in the works of such scholars as N. Bibik, L. Vashchenko, I. Ziaziun, V. Kremen, O.

Pometun, O. Semenoh, S. Sysoieva, and others. The problem of forming competence in the field of design and technological education has been investigated by O. Boichuk, V. Danylenko, V. Zaporozhchenko, S. Milchevych, L. Orshanskyi, O. Fursa, and other researchers.

A significant contribution to the development of project technologies, particularly the project method, has been made by foreign scholars such as S. Haines, J. Dewey, D. Reinhard, T. Hutchinson, W. Kilpatrick, and M. Knoll. The issue of applying project-technological activities in labor training and technology lessons has been extensively covered in numerous scientific works by Ukrainian researchers. In particular, the general principles of design and the methodology of using the project method in lessons have been examined in the works of T. Antoniuk, V. Bondar, N. Borysenko, O. Kyrychuk, M. Kobernyk, H. Kondratiuk, V. Kurok, N. Matiash, Zh. Toshchenko, Ye. Polat, V. Sydorenko, S. Tkachuk, T. Khoruzhenko, and others.

Purpose of the article

The purpose of the article is to provide a theoretical substantiation and to identify effective approaches and methods for the formation of design competence in students during technology lessons in specialized secondary education institutions.

Presentation of the main material of the study

The formation of design competence in technology lessons is an important component of modern technological education, as it contributes to the development of learners' creative potential, project thinking, and practical skills. Within the competency-based approach, such lessons go beyond purely technical training and acquire the character of integrated activity that combines aesthetic, functional, and technological aspects of product creation.

Design competence is defined as the ability to create original and aesthetically appealing design solutions using a variety of tools, techniques, and

approaches, as well as the ability to understand and effectively perform tasks related to project activities in the field of design. It is an essential component of professional training in many fields, particularly in art and design, and can be purposefully developed in the learning process, especially in technology lessons [4].

The importance of developing design competence lies in its capacity to enable students not only to reproduce existing models but also to independently design new objects, taking into account user needs, ergonomic requirements, environmental factors, and current design trends. In this process, such personal qualities as creativity, critical thinking, decision-making ability, planning skills, and the ability to present the results of one's work are developed. These belong to soft skills that ensure effective social interaction, self-realization, and professional mobility [7].

Technology lessons create favorable conditions for the implementation of a design approach through project-technological activities, which involve all stages of product creation – from the initial concept to the final product. It is in this process that students gain experience in working with form, color, and materials, and master the fundamentals of composition and color theory, which form the basis of design competence.

Moreover, the development of design competence contributes to students' professional self-determination, as it enables them to try themselves in various types of creative and project-based activities. This increases motivation for learning and prepares young people for the challenges of the modern labor market, where innovation, flexibility of thinking, and the ability to generate new ideas are highly valued.

An undisputed leader in the formation of design competence is the project method, introduced in the first half of the twentieth century by the American philosopher J. Dewey. This method involves learning through experience, taking

into account learners' active personal interest in acquiring knowledge that will be useful in their future lives. According to M. Tymchenko, the advantage of the project method lies in the active development of essential skills required for professional realization, including the ability to plan one's work with effective use of large amounts of information; to analyze, synthesize, and generalize knowledge necessary to transform an idea into a final product (object); to make constructive decisions in a team regarding modifications of individual elements and correction of design errors; as well as to present one's own project and provide a balanced and meaningful evaluation of one's activity [8].

The final product of students' design activity in technology lessons should be functional items that combine compositional integrity, ergonomic feasibility, and aesthetic expressiveness. However, such activity is not limited to the creation of objects; it is part of broader socio-cultural processes and largely depends on the individual qualities of the student – their talent, inclinations, and worldview. Therefore, from the stage of specialized secondary education, it is necessary to form in learners a holistic worldview that serves as an internal instrument of aesthetic control. Such a system of views and principles enables individuals to critically evaluate and adjust each stage of the design process – from initial sketches to the detailed development of the final product [10].

The role of the technology teacher in developing students' design competence lies in creating favorable conditions for the development of their creative and technical abilities in the field of design. The teacher must possess a sufficient level of professional knowledge and practical experience, as well as the ability to apply a variety of methods and approaches that facilitate the formation of relevant competencies. An important aspect of the technology teacher's activity is the clear definition and justification of learning objectives and tasks, taking into account students' level of preparation and the current demands of the labor

market. Equally significant is the selection of effective teaching methods and tools that ensure the development of both creative and technical skills.

Particular attention is paid to the planning of the educational process. The teacher must carefully prepare for lessons, design their structure, and organize students' activities, including supervising the implementation of creative projects and monitoring the stages of their realization. In the learning process, it is also important to foster a creative personality capable of self-expression, analysis, critical thinking, and the search for new ideas.

The effective development of students' design competence involves the integration of theoretical and practical instruction. The teacher determines the sequence of learning, taking into account students' age, individual, and social characteristics, and prioritizes practical activities that contribute to the development of real design and project skills.

An essential component of the educational process aimed at developing design competence is also the creation of an assessment system that enables a comprehensive evaluation of the level of competence formation in both theoretical and practical dimensions.

The effective development of design competence in students of specialized education involves the use of a set of methods, among which a significant place is occupied by mastering visualization tools, studying proportions, color theory, and graphic elements, as well as acquiring the basic principles of design.

According to the views of I. Yurchenko, the central place in design is occupied by the method of form generation. It is based on a system of design categories, including idea, image, function, ergonomics, aesthetics, and morphology (material, construction, technology). This approach allows transforming an initial concept into a concrete form that is not only original but also meets current sociocultural demands and fashion trends [11].

To organize learning in accordance with Yurchenko's concept of form generation, it is advisable to use a combination of methods in technology lessons that ensure the transition from theoretical analysis to the production of a tangible object. In particular, at the initial stage of project-based technological activity, it is appropriate to apply the method of morphological analysis, which allows for a detailed examination of the structure of a future product through the prism of its material, construction, and manufacturing technology. Students learn to perceive form not as a static object, but as the result of the interaction of engineering and technological solutions.

It is also important to apply the method of functional-cost design, where the emphasis shifts toward combining utilitarian function and ergonomics. This method represents a technology of systematic analysis of the design object aimed at optimizing the ratio between its consumer value and implementation costs. Within design activity, this approach considers a product not merely as a material structure, but as a set of functions intended to meet specific user needs. The core logic of the method lies in maximizing product value, where functionality and quality are correlated with production cost.

The application of this method begins with the analysis of the functions of the designed product, during which all characteristics of the object are classified into primary, secondary, and excessive. This makes it possible to clearly define design priorities and eliminate elements that increase production cost without adding practical or aesthetic value. The next stage involves searching for alternative solutions, where the learner experiments with materials, constructions, and processing technologies to find the most effective way to implement the idea. Such an approach stimulates creative thinking, as the focus shifts from external appearance to constructive feasibility. The process concludes with an evaluation of economic and qualitative components, ensuring that the object meets ergonomic requirements and contemporary sociocultural demands.

Within the system of technological education, the method of functional-cost design is particularly valuable, as it teaches students to avoid excessive design and to create harmonious forms in which idea, morphology, and function are balanced [6].

The method of stylistic adaptation helps integrate the aesthetic component and current fashion trends into the design process. When applied in technology lessons, it enables learners to transform an abstract idea into a visually appealing and contemporary artistic image. This method fosters an analytical approach to creativity, teaching students not merely to reproduce ready-made samples but to reinterpret them through the lens of modern sociocultural trends and their own authorial style.

At the core of this method lies the learner's ability to identify stylistic features of an object (such as characteristic lines, color harmonies, proportional relationships, or ornamental motifs) and integrate them into a modern form without direct copying. An important component of the method is the transformation of traditional elements in accordance with current technological capabilities and ergonomic requirements, which allows archaic or specific forms to be turned into universal objects that meet the needs of the contemporary consumer. In the context of ethno-design in technology lessons, this method serves as an effective tool for working with national heritage, as it enables the transfer of symbolism and aesthetics of folk art into modern product design while avoiding artificiality or excessive decoration.

An important place in project-based technological activity is occupied by the method of project modeling, which involves the direct creation of physical models or digital prototypes of the designed products. It is at this stage that the synthesis of all categories, from idea to concrete morphology, takes place. During modeling, a critical synthesis of all design categories occurs, where the initial concept and artistic image are combined with real physical parameters such as

material morphology, structural strength, and technological feasibility. The use of prototyping in technology lessons allows for the practical testing of the ergonomic properties of the designed object, the identification of potential proportional errors, and the adjustment of the interaction between individual components and elements [1].

In the modern educational and professional environment, this method is often implemented through three-dimensional modeling tools, which enable complex engineering calculations and the visualization of the aesthetic qualities of a future form with a high degree of realism. Project modeling not only records an intermediate result of the design process but also stimulates further development of the concept, as working with three-dimensional forms reveals new perspectives that are not accessible at the sketching stage. Thus, this method ensures the integrity of the design process, transforming disparate requirements of function, aesthetics, and economics into a harmonious and viable technological object that fully corresponds to a defined sociocultural purpose.

An important component of the educational process in technology lessons, as the final stage of project-based technological activity, is the organization of discussions and analysis of the products created by learners. This contributes to overcoming creative barriers and stimulates students' creativity. Such reflection enables students to perceive their work as a holistic design object with a certain sociocultural value. During collective analysis, learners develop the ability to justify their design decisions, explain the choice of materials, and substantiate the correspondence between form and the selected idea or ethno-design motifs.

Public discussion of results creates a space for constructive criticism and exchange of experience, where each student can receive feedback not only from the teacher but also from peers, which significantly increases the level of self-criticism and responsibility for the quality of work. This helps transform possible

failures into valuable learning experiences, reducing the fear of mistakes, which often becomes a major barrier to creative self-expression [3].

Moreover, comparing different approaches to the same designed product clearly demonstrates the variability of creative thinking and encourages the search for non-standard solutions in future projects. Thus, the final stage of design and the concluding lesson on the topic become not merely a formal assessment of students' work, but a powerful tool for intellectual development, fostering the ability to analyze modern fashion trends, ergonomic requirements, and the aesthetic appropriateness of created objects in a real-life context. The development of such analytical discussion skills prepares students for professional activity, where the ability to present and defend one's project is no less important than the skill of its actual production.

A significant role in the formation of students' design competence in technology lessons is played by a dialogic approach and open communication. They ensure active interaction between students and the teacher, promote the exchange of ideas, and foster the development of critical thinking and communication skills. Open discussion stimulates creative activity, cultivates respect for others' opinions, and contributes to the development of social competence.

In addition to the methods mentioned above, the formation of design competence in learners during technology lessons also requires:

– the development of creative thinking through special exercises, including techniques aimed at overcoming psychological inertia, such as brainstorming, the method of focal objects, and morphological analysis. These methods are focused on generating unconventional ideas, identifying non-standard associations, and developing the ability to see new possibilities in ordinary things, which is fundamental for creating original design solutions;

– the formation of drawing and composition skills, which serve as a basic component for visualizing creative ideas. Drawing functions as a tool for analyzing form and space, while knowledge of compositional principles helps organize elements of a product into a harmonious structure that evokes a positive emotional and aesthetic response from the viewer or user;

– mastering graphic editors, which allows the design process to be transferred into a digital environment and meets the demands of the modern industry. Learning vector and raster graphic tools enables students to create high-quality sketches, technical drawings, and prototypes with high precision, significantly accelerating editing processes and the preparation of design documentation in accordance with modern technological standards;

– the development of infographic thinking, which involves the ability to structure large volumes of complex information and present it in a concise and visually comprehensible form. This is particularly relevant in the design process, where it is necessary to clearly demonstrate the logic of idea development, the search for creative solutions, the interaction of design elements, the stages of production, or the functional advantages of a product;

– interaction with professional practitioners, which ensures a direct connection between theory and real production. Communication with professional designers, engineers, or craftspeople in decorative and applied arts allows students to learn about aspects of the profession not covered in textbooks. Such experience helps better understand current market trends, quality requirements, and the specifics of working with various materials in real conditions.

In the process of teaching design in technology lessons, it is advisable to combine theoretical preparation (the study of design history and principles) with practical activities (drawing, modeling, and working with digital tools). It is also important to develop project management and teamwork skills, which correspond to modern professional requirements [4].

An important direction in developing students' design competence in specialized secondary education is the analysis of design samples and familiarization with historical and contemporary trends. An individual approach to learners also plays a significant role: the teacher should consider students' interests and abilities, support their creative potential, and guide their development according to their personal capabilities. It is essential to cultivate a positive attitude toward learning, self-improvement, and professional growth.

In this process, the teacher should act not only as an organizer of learning but also as a mentor who helps students understand design as a continuous creative process that requires exploration, experimentation, and critical reflection on results. The teacher should encourage students to explore various styles, techniques, and design directions, teach them to evaluate their own work, and identify ways for improvement. In addition, the teacher must continuously update their own knowledge, stay informed about current design trends, and actively engage with the professional community. This will enable them to effectively influence the development of students' design competence and prepare them for successful activity in the modern environment.

Conclusions

Thus, design competence is a complex integrated construct that encompasses knowledge, skills, experience, and personal qualities necessary for the creative solution of design tasks. It involves the ability to create functional and aesthetically refined objects, effectively interact with others, and continuously improve one's professional level. The teacher's role in developing students' design competence is comprehensive and multifaceted. It includes organizing the educational process, stimulating creativity, developing practical skills, and fostering the ability for critical analysis, which together ensure students' readiness for independent activity in the field of design.

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