GRAPHIC DESIGN IN THE PROFESSIONAL TRAINING OF FUTURE SPECIALISTS

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Abstract: The attendance of a slowdown in the level of experiences and skills formed in grads from the actual practical expert context leads to the necessity to revise and transform the scholarly complex. Modern professional preparation of future specialists is characterized by the renewal of the methodological material and innovative technology and software tools, advanced technologies, methods, and forms of education. An essential element of educational innovations is the revision of professional competencies and a change in their content component. In this paper, on the example of training future specialists, the intensification of educational and methodological support and the formation of a graphic vector to develop acknowledged competencies are considered. A unique role is given to the development of visual competence as a response to the current pace of improvement of software and hardware for vocational training, the introduction of new information and communication training tools, and the professional sphere's needs in highly qualified specialists. The article examines the features of the use of traditional graphic tools and computer technologies at different stages of the project activities of future specialists. The analysis of thought processes accompanying tutorial project activities is given. The advantages of using computer technologies in the educational process at the final stages of design are shown.

Keywords: Educational and project activities, Future specialists, Graphic competence, Graphic design, Information and communication teaching aids, Professional training.

1 Introduction

Modern conditions for the development of the educational process are characterized by the introduction of innovative educational and methodological complexes and unified pedagogical models. A separate direction is occupied by the introduction of a communication model – distance learning. It is characterized by the ramified development of the lecture course of the theoretical presentation of educational material and modular implementation of educational tasks. These systems still have limited applications and fundamentally do not allow their full-fledged implementation in the preparation of a future specialist. Simultaneously, there is a significant complexity of already existing information and communication tools, especially software products, for creating graphic objects, developing design ideas, designing projects, and designing products. At the same time, mastering these innovative means is an important feature of professional competence.

Graphic activity is an important part of the design since drawing, drawing, sketch refers to the main means of expressing the result and the idea of solving a creative problem. Therefore, visual images, appearing and transforming in consciousness, are incessantly concretized and refined in accordance with the requirements of the tasks solved in the process of design planning [2, 4, 11, 20].

This process is accompanied by a mental change in the image of the designed object in space, its structural transformation, and the large-scale and proportional transformation of individual structural elements.

Since the university's educational process, students always face the problem of choosing the optimal solution to the artistic design problem, and it becomes necessary to fix a large number of design options for the designed object [25]. It is challenging to carry out this at the level of consciousness, even for professionals with highly developed spatial concepts and figurative memory. The visual image retained in consciousness changes, loses a number of features, becomes more generalized and unstable [13]. All this prompts the specialist to constantly re-encode figurative representations and emerging ideas into a graphic form. As a rule, in a drawing, sketch, drawing, more or less accurate images of the variants of the composition or design of an object created by the imagination are reflected. The imaginary structure of an object (predicted image) combines the totality of all the necessary qualities specified by the requirements of the artistic design task. Displaying the image of an object in a graphic form allows students to do the search for an optimal solution more economical, to focus on certain stages of project design activities. In this case, the thought processes accompanying design activities will be more productive [5].

In modern conditions of the development of the technosphere, the teacher is in the environment of the development of advanced educational technologies, to realize in his professional practice only the maximum educational capacities, to form meaningful motivation of students and be "above" their awareness in computer developments in a professional direction [30]. It should also keep track of new arrivals in interactive learning development and distance courses, expand the boundaries of interaction with students, and not be limited only to classroom lessons with a face-to-face model, build up a virtual learning network and actively involve Internet technologies.

The modern educational process should also not exclude the important role of the student in the organizational structure of educational interaction, provide him with an expanded area for manipulation, personal choice of the pace of perception, and the volume of educational material for high-quality mastering [19]. So, when future specialists study certain disciplines, the teacher should actively involve:

- Various forms of interaction between the teacher and students [7];
- Creating the possibility of remote mastering of educational material or conducting additional consultations on implementing independent, control, and modular work by students [24];
- Providing more comprehensive educational material and alternative sources of information [8]

2 Materials and Methods

Each stage of artistic study in design provides for the mandatory components of graphic activities due to specific graphic knowledge and skills [8]. For example, at the first stage of artistic design (studying the conditions of the project assignment and the requirements for the object), the graphic activity includes: correlating the condition of the design problem with the drawing and vice versa; re-coding the condition. This activity is ensured by the student's knowledge of the conventions of performing images on drawings, the ability to read drawings containing views, sections, sections, the ability to make measurements, sketches, sketches, and technical drawings, etc.

The second stage is developing of the general form of the object (the emergence of an idea for solving the problem), sketches of analogs, layout sketches, and visual images of design options for the designed object are performed, taking into account functional, ergonomic, aesthetic and technological requirements [6]. This requires knowledge of the methods of constructing axonometric and perspective projections and the ability to freely, according to representation and imagination, make sketches, sketches, technical drawings using various graphic means, using a variety of techniques.

The third stage - the formation of a hypothesis of the solution, clarification of the concept implies reading and executing drawings in orthogonal projections (containing views, sections, sections), the ability to build axonometric, perspective images etc [12].

The stages of design activity and the graphic knowledge, skills, and methods of constructing various images implemented at

these stages correlate with the identified functional components of artistic design – engineering and form-building. At these stages, not only the technical requirements for the product are implemented, but also through graphic knowledge and skills, the shape, design, proportional ratios, and dimensions of the product are determined by traditional visual means [24].

At the final stages of design activity, the chromatic and materials science components come to the fore, determining the color scheme, materials, and technological features of the product being developed. Therefore, at these stages, the use of computer technologies becomes more relevant.

In the studies of scientists from this scientific field, the stages of educational design are described in sufficient detail. They pay special attention to the methods of teaching project graphics, establish their significance for design activities [1, 3, 10, 22].

3 Results and Discussion

Considering the results of the analysis of these studies and our own experience, we will clarify the features of graphic activity at different stages of design creativity in modern conditions, defining the specifics of the use of traditional graphical tools and computer technologies in the educational process of the university.

The specificity of the graphic language is due to both the features of the project and the significant influence on it of all types of visual arts. At the stage of studying the prototypes of the designed object, its analogues, sketches, sketches are made, tracing paper is removed, and photographs are collected. At this stage, traditional graphic tools are successfully complemented by computer technologies: collecting information on the Internet, libraries of photographic images on CD, and scanning and digital photography. A comprehensive analysis of the original data, including the shape or function of products, can be carried out in parallel. Individual structural elements are highlighted in color [7, 9].

The stage of comprehending the initial information is followed by the stage of primary sketching, which practically represents the execution of sketches, technical drawings, sketches from the imagination [26]. At this stage, the specialist graphically shows his idea, the general shape of the future product, creating the main idea of the project, a new plastic image. Graphic searches for the form of objects of design activity help mentally and visually perceive the ideas arising in the imagination and present them in the form of a draft version intended for "internal" use, which has a conditional character. The excessive information content of the sketch at this stage sometimes interferes with the production of ideas since the image of the future object is concretized. In this case, the properties of traditional materials used for sketching help to graphically represent the shape of the product as generalized, integral, as necessary, indefinite. Sketches are performed freely so that their perception is active so that they can be "completed" with the help of imagination. In this case, the choice of graphic material is important, and the nature of its imposition and variety of techniques for design graphics and paper texture.

Means of computer technology at this stage of design can be used to search for composition, proportions, generalized spatial structure of the designed object. When working out the form, thinking through the project's specific details, graphics are characterized by linear and cut-off execution using traditional materials [11]. The choice of graphics and the use of color when sketching depends on the nature of the object and design tasks.

To select the most appropriate options for the shape of the designed object, a gradual increase in information content and clarity is required, the measure of which corresponds to the degree of completeness of the work [16]. In this case, the drawing is carried out on a particular scale in compliance with the found proportions, showing the main structural elements, using light and shade, tone, and color. When designing complex objects consisting of parts different in shape and volume (devices, vehicles, etc.), the search for the internal and external form of the product takes place almost simultaneously. The internal structure is shown using views such as sections and sections. In this case, the graphics are conditional.

Note that by means of computer graphics, the tasks of educational design-designing are solved much easier. On the one hand, the image is easy to edit. On the other hand, to compare options, it is enough at the same stage of work to save the project in different files or in one by repeatedly duplicating the object and making changes to each duplicate [19]. This is where the specialist gains a very important advantage. It is not at all limited by the area of a sheet of paper or a desktop. There is much more to offer ideas and options for the project than when using traditional graphic means since he does not have to redraw the contour of the object every time. It can be freely modified, slightly refining the form or transforming it into another. The advantages of computer graphics also include presenting a project in a form (close enough to its final presentation) by modifying any of the selected options to photorealistic quality. For example, when visualizing a project modeled in three-dimensional computer graphics, versatility is achieved in a natural way since objects are located in virtual space (in a specially specified environment).

At later stages of work, the result of the design activity is the final project, which should have maximum information about the design object and be expressive enough for perception. In the final project, in comparison with the sketch, the figurative and functional characteristics of the product are more pronounced: the shape, dimensions, proportions, and mutual relationships of structural elements, internal structure, color, and surface texture are more accurately determined. Information about the external and internal structure of the designed product is concretized on orthogonal projections and on visual images of an object (in axonometry or in perspective). The internal shape of the object is fully revealed with the help of cuts and sections. The use of scales in the drawing is conditional: on one sheet, there can be images made in different scales [29].

The choice of one of the traditional types of drawing (linear, linear-tonal, cut-off, polychrome) depends on the personality and creative intention of the specialist, as well as on the characteristic features of the designed object. The use of three-dimensional computer modeling of an object in artistic design greatly facilitates the work of a specialist since the formation of shadows occurs automatically when choosing a position in virtual space and parameters of a light source [5].

Graphically, the image of an object can also be presented in the form of a clause - a short-term aesthetically expressive completed project, sufficiently informative and visual, made using tone and color [14].

It should be noted that at the stage of the final project implementation, the use of computer graphics is most expedient. Due to the fact that the search problems have already been solved, and the aesthetic requirements for quality are high. This achieves:

- Harmony of color and materiality;
- Integrity and graphic unity of images;
- Visibility;
- The optimal combination of informativeness and decorativeness of project graphics [27].

Along with this, the use of computer graphics technology presupposes enrichment of the appearance of a design project due to a variety of textures, textures, environment, materiality, which cannot be obtained by traditional means. However, a future specialist should be able to use traditional materials, have well-formed artistic and imaginative thinking, concepts of pictorial and constructive modeling of volume.

Knowledge of the basics of descriptive geometry, drawing, and perspective is required, which contribute to the correct shaping, the choice of a point of view on the objects of the scene (camera

position), the free operation of projection windows in the process of three-dimensional computer design [18]. Thorough training in painting and drawing helps a specialist select parameters of materiality, color and texture, determination of saturation, direction, degree of diffusion, and shade of the light source.

In computer technologies, the results of design activities are recorded in the form of files with a graphic extension. They can be displayed on the screen at any time and are more informative than sketches and drawings made by hand or with drawing tools. At the same time, the relative ease of transforming objects allows you to create a larger number of possible options in the same amount of time [6]. Observing the specific results of project activities, the specialist gets the opportunity to evaluate them in advance and make the necessary adjustments.

Highly qualified specialists develop computer versions of models before launching them into production. For example, creating architectural models through computer graphics can be supplemented with an animated walk-through of the designed premises [17, 21]. This allows you to evaluate the proposed interior projects from different angles.

It is interesting that at the final stage of design activity, the use of computer tools sometimes completely solves the problems of prototyping [28]. With their help, a specialist can implement the most daring ideas. A high degree of reliability reflects both existing and non-existent objects in the real world in a fantastic environment and thus looks into the future. Following the final in production, a working project of the product is carried out. Note that the listed features of technical and computer graphics correspond to the content of design activities in relation to such types as industrial design, interior design, etc.

The activity of a future specialist in the design of graphic design objects in the field of printing, advertising, Web design, interactive computer graphics, communicative design using video editing and other means is almost completely accompanied by computer modeling. The use of traditional graphic means in these cases is advisable when forming the concept of the project, making sketches, sketches at the initial stages of design activity [30].

In addition, the use of computer graphics technology involves the enrichment of the appearance of the design project (including wood and wrought iron products) due to the variety of textures, textures, environment, materiality, which cannot be obtained by traditional means. However, the future specialist should be able to use traditional materials, have well-formed artistic and imaginative thinking, the concept of pictorial and constructive modeling of volume.

4 Conclusion

Observations of students' independent educational project activities made it possible to identify a number of difficulties arising among students due to the incorrect use of graphic means and computer technologies at the initial stages of the formation of a creative idea. Note that in 80% of cases, students ignore the sketching stage, immediately proceeding to computer modeling of design objects [4]. This leads to a violation of the processes of generating ideas, the lack of the formation of the variability of thinking, an emphasis not on finding solutions to design problems but on program functions and teams.

Graphical search is limited by not yet fully formed students' skills to use software capabilities [17]. In this regard, it seems necessary to correct the structure of students' project activities, form their understanding of the specifics and methodology of design, and professional knowledge of making images using traditional graphic means.

Having identified the features of the application and mutual combination of traditional graphic means and computer technologies in the process of design activities, we were convinced that each of the types of graphic means at certain stages has its own advantages. However, with the formation of an individual strategy for design activities, the order and methods of using various types of graphic tools become more and more subjective.

Modernization and development of new levels of information and communication environment by a student become an important factor in forming professional competencies, including graphic competence [18]. The future specialist is forced to master new professional skills, practically use the existing range of innovative tools, and carry out self-development to improve interaction in the educational team.

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