

Shaping of Arts and Crafts Objects Using Computer Graphics

Larisa Vladimirovna Shokorova

Altai state university 656049, Altai state, pr. Lenina, 61, Barnaul, Altai Krai, Russia.

Lyubov Nikolaevna Turlyun

Altai state university 656049, Altai state, pr. Lenina, 61, Barnaul, Altai Krai, Russia.

Abstract

Specifics of shaping of arts and crafts products are considered in the article, relevant not only utilitarian appropriateness, usefulness and high aesthetic requirements, but also traditional spiritual values of folk culture. The interpenetration aspects of the professional areas of folk art designers' and artists' work are identified. The process of interaction between creative hand work and modern computer technologies is described. The necessity of complex using of the traditional education tools and computer digital technologies in the professional design-education is proved. Conditions of forming professional competencies of designers on the basis of continuity and interconnection of artistic subjects are suggested.

Key words: folk arts and crafts, historical and cultural heritage, computer graphics, shaping, design

Introduction

Historical essence of folk arts and crafts objects.

Sociocultural transformations taking place in contemporary Russian society have a significant impact on the educational and cultural environment, which is one of the most important and dynamic aspects in the development of an active and creative personality [1]. Especially important is the training of specialists capable of changing the stereotyped forms of knowledge that have original thinking, able to be in demand in various fields and carefully preserving the historical and national-cultural heritage of the country. Formation of the object and space environment and its harmonization with the environment places new demands on the quality of training of designers who are able to quickly find imaginative ways to solve problems, think outside the box and creatively. Most vividly creative design thinking will be evident in the development of new design solutions forming products of arts and crafts, relevant not only utilitarian appropriateness, usefulness and high aesthetic requirements, but also the spiritual values of traditional folk culture. Folk arts and crafts is the most extensive area of human creativity and is an important part of traditional folk culture, which is accumulated and transmitted sociocultural experience of a particular ethnic group. Development of the national arts and crafts was directly linked to the way of life, nature, the laws of its renewal, the manifestation of its life-giving forces that comprehensively and multi-functionally reflected in the works of folk art [2]. Public demand for products of different purposes and for different purposes: for religious ministry, for the daily needs and requirements for the organization of social life defines folklore as syncretic, ie, combining different

functions of objects and associate them with the everyday way of life. There were practically no objects created specially for the purpose of decoration of everyday life in peasant art, and decorativeness was primarily due to practical and pragmatic purposes. This was most clearly reflected in the decoration of farmhouses. Openwork jambs of windows, forming the appearance of the home, in fact, designed to close the gap between the window frame and the frame of a house. The same function was performed in "pricheliny" decorating the gable of the peasant's house and at the same time protecting the roof from premature aging. Hence, on the one hand the product of folk art was foremost necessary to satisfy human needs. But, at the same time, all the household items have been decorated and looked festive, elegant and colorful. That's why it is impossible only from the standpoint of the need and usefulness to explain the existence of many things. Man not only created the necessary things but also decorated them and produced what appears to be unnecessary and even excessive from the standpoint of life-support-things that form a spiritual layer of culture-symbols, statues, ritual items. Therefore, the design of the material environment is the historical mission of folk arts and crafts, providing introduction of artistic, aesthetic features into an individual living space: into the objective world, the living environment, into equipment and facilities [3].

Specifics of shaping of products in the traditional arts and crafts.

Shaping objects of arts and crafts closely matched the intentions of their labor processes. For example, a form of a clay "krynka" that has an amazing circuit-a vessel with a large neck, is determined by the fact that when storing milk cream must be collected at the top, as well as the simple need to wash it inside, which determined the width of its neck-the size of a palm. Narrowed down the pot shape was necessary for putting wood around it, hitching up and carrying with a metal oven fork. Thus, the shape is not just a schematic design of the product, but also expressive, easy-to-use thing. Decoration of forms and surfaces using a special manufacturing, which includes the natural texture of the material, revealed the aesthetic features of objects, their artistic expression and spiritual significance. One of the important means of artistic manufacturing of objects in the peasant works is an ornament. "Patterns of ornaments usually completely cover the surface of the object, with the exception of its working parts. This abundant and comprehensive decoration of objects is one of the main design principles of the peasant household creativity" [4]. Ornamentation was not only the main carrier of beauty, but was a special sign, as it raised the object over his household purpose. The principle of ornamentation came

out of people's ideas and feelings about the world, an ancient religious symbolism, which had magical significance and reflected the beliefs of the ancient Slavs. Common motifs in the ornament are solar symbols that make up the ornamental system that has been worked out by the Slavic paganism and harmonically incorporated into contemporary arts and crafts. A stability of solar signs in modern ornaments is truly unique. These are six-raised roses or "sign of thunder"; an image of the horse as a symbol of a movement, prosperity and good luck; duck as an intermediary between the celestial moisture and terrestrial vegetation; wavy lines as a picture of moisture and fertility cult; various symbolic images of birds and snakes, mermaids, winged dogs, etc... Such a system of signs, passing on from generation to generation, became the basis of artistic tradition that formed the concept of beauty, colorfulness, decoration, design and form of products, understanding of the material and its features [5]. A beauty is an expedience, strong form, sonorous color, concise rhythm of repetitive elements, and their basis is an ornament. An ornament contains both ordered repetitive elements and arrhythmic structure, which include zoomorphic, anthropomorphic and floral motifs, always subdued to the surface or shape of the product. Traditional ornamental motifs, passing through the mythological and religious world, have lost their meaning and purpose of the semantics of forms, bringing primarily aesthetic perception of beauty and a stable form of a pattern to a modern man. Appropriateness, ease of use, design flexibility, hygiene, utilitarian usefulness and aesthetic significance are the necessary conditions of shaping objects of arts and crafts.

Characteristics of shaping in design.

The form in design is a special organization of an object, coming up as a result of activities of a designer to achieve an interconnected unity of all its properties—design, appearance, color, texture, technological appropriateness and so on. Constitution of the form is reduced to identifying and fixation basic properties of an object of design, ie, the content of the form, which is a way of its existence. Shaping products should have not "split" of the content and the form but the complexity, diversity of content, weaving a structure (internal form) of an object or complex and its image (conditionally external form). In this case, it means the creation of conditions for relatively full flow in the form of a process caused its appearance. "Relatively full"—because the functional requirements and rigid morphology of the object are always in some disorder even if at some point the designer has managed to achieve a perfect match of form and content of the planned: a life is changing but the shape remains unchanged [6]. The task of the designer—to be able to remove this contradiction, which is the driving force behind the search of forms of objective and spatial patterns in the design. The shaping (formgestaltung (-gebung)-Ger.) is the process of creating forms in the work of the designer in accordance with the general value orientations of culture and some requirements related to the aesthetic expression of the future object, its functions, design and materials used. The shaping is a crucial stage of design creativity; during it functional characteristics and figurative solution of design object are fixed. And it is important not to equate terms such as design, shaping and

composition, that leads to inaccurate presentation of theoretical issues of the shaping. Design is a process of creating something new, including new formal solutions, which can be individual or typical. In turn, the shaping is meaning of this process that means creating new content of the form. The composition is a part of the design process and the result, where the outcome of the organization of the form is fixed from the inside, by specific structuring of the material object of project activity [7]. Now certain changes in design associated with development of computer technology are identified. Particular emphasis is placed on the use of computer graphics and its capabilities in shaping objects of arts and crafts. In the scientific literature, computer graphics are considered as an area of computer science concerned with the production of various images (paintings, drawings, graphics, animation, etc.) on your computer. Computer graphics, that is a means of forming a special graphical information environment with the special tools, serves for developing imagination, creativity and aesthetic culture of a person [8]. The goal of this work is to identify distinctive features of shaping products of arts and crafts using computer graphics, the specifics of separation and the interpenetration between professional fields of creativity of folk art designers and artists.

Methodology

Aims and objectives of the discipline "The shaping".

Discipline "The shaping" according to the curriculum is a part of the cycle of industry professional training in the specialty 051000.62—"Professional education", section "Arts and crafts and design". Theoretical preparation of discipline is one of the very important points in vocational training that can lay a solid foundation for the practice of a designer. During education process students learn the structure of the shaping, reveal the basic graphical principles and properties, methods for constructing three-dimensional compositions of geometric forms, considering their relationship with each other, obedience and subordination to compositional center, the objective properties of the form and the basic principles of form construction based on tectonics. Students learn to graphically depict the basic elements of the shaping on the basis of artistic categories: proportion, scale, contrast, nuance, rhythm, color, shade and plastic. Discipline "The shaping" is divided into lectures and practical classes. The theoretical material introduces the role and value of the composition in the artistic design, composition techniques, factors influencing the shaping. Such concepts as dynamic, static, unity of the form sort, the relationship between tectonics and three-dimensional structure are learned. Graphic editors giving an opportunity to model projects and perform design work are considered. Practical exercises, prevailing in the discipline, aimed at expanding and detailing the theoretical knowledge, the developing and consolidation of professional activity skills. This discipline at Altai State University is divided into two sections: the traditional method of shaping objects and computer graphics' tools that facilitate this process. The traditional method presupposes the creation of objects' forms by hand, ie, drawing them by hand with the help of graphic materials. Using computer technologies is aimed at the

development of new forms in the graphic editors that indicates the importance of computer graphics in training of future specialist [9]. Methodology of training for discipline "The shaping" is based on the organization of search and experimentation activities of students that forms their intellectual and creative abilities, develops special depictive skills of students.

Means of computer graphics in the construction of traditional ornament

Particular emphasis in shaping using computer graphics paid to the construction of traditional ornament. A high level of development of specialized automated equipment, including machine tools, based on the software, allows you to fully automate the reproduction of the ornament in the material. Currently ornamental graphic design of industrial products is first created on a computer monitor, using graphic editors for vector graphics, such as AutoCAD, Adobe Illustrator, Corel Draw. Computer construction of ornaments in vector graphics is similar to the traditional construction of ornamental motifs—the same geometrization of shapes and forms, the use of different kinds and types of symmetry, the frequent repetition of the same elements and fragments that make up the complex artistic structure. Artistic expressive means of vector graphics include laconicism of art form, flattening of space, bringing together the plans, concise use of chiaroscuro, sharpness, clarity, contour, silhouette of image, the lack of aerial perspective [10]. Vector graphics are mathematically calculated, it is built on the lines, and the line in the ornament acts as a graphical design tool and as a basis for programming of automated equipment. Peculiarity of the lines that depict the ornament is the form that was precisely found in the process of design and artistic search. The traditional method of creating folk ornaments useful to combine with computer technology. Manual creating of forms and lines for ornaments on paper is almost entirely dependent on the skill of the artist to manage graphic materials. Creating a line of the desired shape using a computer mouse is different from drawing on paper. There are certain restrictions in creating a line of desired shape to be determined by the method of analytical description and visualization of lines using mathematical procuring of computer graphics. More common than a mouse or trackball is a computer analogue of brush and pencil looking like tablets with pens. This drawing is practically identical to the traditional manual, obeying the same laws and principles: only the tools and media modified. Creating a line of ornament of desired shape by traditional manual method is carried out in the process of selecting the best options for the line shape of several sketches. The infiltration of computer technologies in the creation of ornament can help artists who worked on the creation of new ornamental images to sort combinatorial options by adding or removing points and thus altering the line. Curved lines in a computer graphics are always created with the help of the mathematical apparatus, which describes their geometry by approximation with different functions or combinations of a set (chain) of specific functions [11]. As we know, each function has a set of defined parameters. Thus the choice of a particular function depends on the number and the parameter set. In other words, even the choice of the function determines the possible directions of

influence on the shape created by the line. Opportunity to influence the shape of the created line is determined by the ability to change parameters of the function that describes it. By assigning different concrete meanings of the functions' parameters, describing the line already created, you can get it on the basis of a line with a non-original geometric shape. Also, computer graphics allows you to manipulate fragments of prepared ornament by changing their location. This manipulation allows the artist to create more options for ready-made ornaments. A huge variety of ornaments created not only by the deformation of the lines but also by scanning the finished ornaments and converting them from raster to vector format with the tracing method.

The interconnection of traditional education and computer technologies on the example of a lesson "Creating ornament"

On the example of a lesson "Creating ornament" we can see how a work of traditional techniques and computer technologies are interrelated. The objective of this lesson is to create an ornament of planar composition. There are several solutions to this problem, which has students themselves choose the ways to solve it. The solutions are: 1. The creation of hand-made ornament, i.e. implementation of all elements by a pencil, etc.; 2. The creation of hand-made ornament with a combination of computer graphics, i.e. hand-drawn ornament elements are digitized and are repeated in computer graphics programs to produce planar ornament; 3. The creation of ornament completely in the graphic editors, ie drawing repetitive elements in the program without preliminary drawing and creating planar ornament. Thus, we can say that using these methods to solve this problem affected both traditional teaching methods, and alternative-computer technology, which, when used in combination facilitate work and help develop the skills of drawing hands (hand movements) and work in computer programs [12]. Computer graphics allows you to create a special graphic information environment by special tools. In graphics programs such as Corel Draw, Adobe Illustrator, Adobe Photoshop, you can do the following: copying items, quick transformation, formatting, creating textures (marble, wood, metal, etc.) and much more, thus you create new forms on the basis of individual images. The most important point is when students master the realized sense of harmony of form together with the technology of manufacturing and the material.

Results

Thus, the use of computer technologies in design education is one of the leading methods, techniques and forms of education aimed at forming professional competencies and skills of professionals to use in their professional activities in order to achieve quality and significant results. As a result of education future designers have to master the following competencies: practical, design, art-theoretical, pedagogical, research. Formedness of these competencies will identify the graduates' readiness for independent creative activity, for creating a highly artistic models of spiritual-material culture in the field of art design, mastering traditional and modern

tools, methods and technologies of realization of artistic and imaginative shaping of objects of spiritual and material environment [13]. Combining traditional hand drawing and computer graphics will allow not only freely navigate in the environment of modern advertising, communicative, production technologies, but also competently represent ideas, projects and the results of their creative process to meet modern standards. Shaping objects of modern material-objective environment was forming and improving over the development of a culture of human society. Folk arts and crafts as part of the historical and cultural heritage is a powerful tool in education that opens up opportunities for moral and aesthetic education and human development, recognizing and preserving its historical memory. Traditional stable form of ornamental pattern, though lost its meaning, but it is reflected in an individual living space and created an aesthetic environment decorating modern interior and exterior works [14]. Traditional ornamental art allows a completely different way to perceive the world of surrounding things from small items to architectural space. Artistic and imaginative content of products of folk arts and crafts reflects the view of the world and the natural environment, time and contains a rich tradition of national historical and cultural heritage. The study of traditional ornament contributes to the continuity of forms, techniques of material manufacturing, enrichment and improvement of experience and is an important means of creating a diverse creative interests promoting the comprehensive development of an individual [15].

Discussion

Interaction between manual labor and computer technologies in the creation of objects of folk arts and crafts

The use of computer technologies in the shaping of arts and crafts is ambivalent. On the one hand, in this global modernization manual creative work, which traditional techniques passed down from generation to generation, is losing its spirituality, its life-giving juices, coming from the distant past, breaking the continuity between the generations. Mass reproduction of objects of arts and crafts removes them from the sphere of traditions, and as a consequence, a failure or an disengagement leads to deep transformations of art in the modern era. Walter Crane said: "In the midst of the full tide of mechanical inventions and unprecedented ingenuity, we want to return to the hand as the best part of the machine. We feel appendage of the machine, we found that we lose our sense of beauty, our artistic sense that our daily work loses interest and romance, for which we pay a huge price as a life without happiness inside" [16]. On the other hand, technological modernization reveals several advantages in relation to traditional hand drawing. Considering the process of creating products of arts and crafts in a phased sequence should be noted that the inability of computerization characterizes only directly the very birth of the artistic image of the object intended. This author's creativity is an integral process of artistic activity as a process that creates a qualitatively new material and spiritual values with artistic and imaginative exploration of the world. Vygotsky defined creativity as "human activity that creates something new,...

Creativity is wherever man imagines, combines, modifies and creates something new, no matter what may seem a grain of this new compared to the creations of genius" [17]. The uniqueness of the results of creativity is the main criterion that distinguishes it from the manufacturing process. Only a creative person is able not to repeat and memorize an existing pattern, but to transformate the world actively in any kind of activity, particularly in the field of folk arts and crafts. The following steps of shaping arts and crafts, such as graphic design of idea's sketch and the physical embodiment of the sketch into the material are possible to implement with the use of modern digital computer and technical innovations that have no significant impact on the artistic value of the product to be made. In particular, it may be a duplication of rapport of ornament, depicting reflections of graphic elements, scaling sketches and more, made in the graphic editors. This will help to speed of the creation of ornament, to reduce the complexity and to increase the accuracy and precision in implementation, possibility to take into account features of the technology of reproducing an ornamental lines in different kinds of material. Thus, we efficiently save time and artistic means: optimal manufacturing methods and combinations of materials with a minimum of money spent.

Objects of folk arts and crafts as design objects

This problem should be solved in the interpenetration of spheres of creativity of designers and artists of arts and crafts, aimed at creating objects of public and domestic purposes with the use of machinery. The more that once traditional handicraft products have been manufactured in mass production for long. These are a different fabric, furniture, lamps, dishes, clothes and shoes. Types of objects of arts and crafts, an approach to their creation, determined by social and cultural role of certain things in the subject's environment, of course, share the artistic creativity of designers and artists of arts and crafts. In shaping of the design prevail elements of constructivity, manufacturability, economy of mass production with a small variation in shape, color in various models of one product type [18]. Whereas in the arts and crafts priority remains with the individualization of artistic design of products, as well as various methods and techniques of their implementation and finishing, that is just the author's solution of shaping the product. These items are made in a single copy, and are intended for exhibition exposure. To divide what items of arts and crafts can only be design objects or objects of arts and crafts is difficult. Computer technologies and modern equipment allow you to design and produce a fairly complex forms of products that were previously available to only a unique master of folk art. An example is the carved works of different levels of complexity. This is furniture, outdoor decor, iconostasis, the manufacture of which took years no matter how perfect were skills of the carver. Even a complex form of carving as bulk or sculptural from the standpoint of machine carved works now quite feasible using computer graphics and new mechanized technology. Product made in this technique is artistically treated on all sides-dimensional figure, completely torn off the background-the finished sculpture can be seen from all sides. Three-dimensional model of the bulk product of irregular shape is designed with special programs of 3D-graphics

(Rhinoceros, 3DMax). For producing three-dimensional sculptures created by the three-dimensional model of the product is used as CNC machines, and three-dimensional printers are cheap and fast way to create prototypes [19]. It should be noted that the machine can not fully bring the product to perfection due to the impossibility of manufacturing of "dead" zones where the tool movement is impossible. Therefore, a manual revision of the product and, ergo, the master's hand. Manufacture of machine sculptures requires an excellent knowledge of special computer programs, a great experience, a set of different tools and, of course, artistic flair from the master [20].

Conclusion

Thus, based on the foregoing, it must be concluded that the socio-economic changes in society have led to significant changes in professional education and have contributed to the implementation of new pedagogical ideas. It is now widely revived the tradition of arts and crafts and handicrafts, dictated not just narrow national objectives but the need to preserve the historical and cultural heritage of Russia, to raise the ethnic identity of the people. Folk art, being an integral part of the traditional culture of Russia, has a great importance in the formation of the younger generation, opens opportunities for deep moral and aesthetic education and human development, recognizing and preserving its historical memory. The motifs of the national arts and crafts are reflected in many areas of surrounding space. This is design of cafes, tourist complexes in the Russian style, clothes and shoes with elements of traditional paintings, various advertising banners. A quilt, composed of a variety of types of Russian folk art, design became the basis of all the Olympic Sochi. This have become possible due to the rapid development of computer technologies and modernization of production. The interpenetration of spheres of creativity of designers and masters of folk art is taking place. Development of new methods of teaching arts and crafts is almost impossible without an integrated use of traditional educational means and tools of information technologies. Development of the technical capabilities of the software and hardware is available to artists of folk arts and crafts, contributes to a significant reduction in the complexity of the work they do by automating certain stages of production, but it does not thereby leading to decreasing of the artistic value of the final product, as well as eliminates the need for routine work of the artist. The use of computer technologies in shaping objects of national arts and crafts is not a process that displaces manual labor but contributes to its improvement and effective functioning. Failure of any type of improvement in production will lead to a further decrease in production, and subsequently complete extinction. The use of computer technologies in the learning process helps to prepare for independent productive activities in the information society, to form operational thinking, creative and communicative abilities, skills of research activities. The use of computer graphics in shaping products should be reflected in the interdisciplinary curriculum connections and build on the previously obtained skills in the study subjects "Drawing", "Painting", "History

and Theory of Design", "Fundamentals of composition", "Arts and Crafts".

Continuity of disciplines, a close relationship between them will provide the formation of creative thinking of future specialists skills based on the formation of the original traditions of the past, ability to transfer skills to the specific form of the material, do yourself a product of arts and crafts at all stages of the creative process. This is especially true in connection with the changed attitude towards manual labor, which has ceased to be a major value in life of young people-a priority choice of profession is to become office worker with a stable salary. Now we have much more those who is seeking to become a professional designer than those who want to study in the framework of the direction of arts and crafts. Master's status becomes today something nominal, and therefore the skills are perceived as the inability to get more comfortable in life. Synthesis of folk art, arts and crafts and information technologies help make learning crafts for younger generation especially interesting and attractive, fosters their skills' development. According to the authors for a successful reform of the higher education system in artistic professions, particularly in design education must be more tight and close cooperation of all the special disciplines, aimed at training professionals able to correctly and harmoniously form the subject-material environment in the future.

References

- [1] I.V. Chernyaeva. "Sources of funding of cultural institutions in Russia at the turn of the XX-XXI centuries", *Terra Sebya*. № Special Issue, pp. 147-159, 2014.
- [2] M.A. Nekrasova. "Modern folk art". Leningrad, 1983.
- [3] L.V. Shokorova, L. N. Turlyun, "The Problem of Synthesis of Traditions and Innovations in the Art of Woodwork", *World Applied Sciences Journal*, vol. 27 (3), pp. 408-412, 2013.
- [4] I.A. Boguslavskaya. "Issues of traditions in the modern folk art. Artistic problems of modern folk arts and crafts. Collection of articles".-Leningrad: Khudozhnik RSFSR, 1981.
- [5] N.G. Mikhailova. "Folk culture in modern conditions. Objective-materialistic world of traditional folk art in the conditions of modern". Moscow, 2007.
- [6] V.B. Ustin, "The composition in design. Methodological basis of compositional and artistic shaping in design art: Tutorial".-Moscow: AST, Astrel, 2007.
- [7] T.V. Matveeva. "Formation of professional culture of designer in educational process of high school by the means of composition", *News of Russian Pedagogical University of A. I. Gertsen*, vol. 14, no. 37, pp. 277-281, 2007.
- [8] L.N. Turlyun. "Computer graphics as a special type of modern art".-Barnaul: Altai State University, 2014.

- [9] V.P. Bepalko, "Elements of pedagogical technology".-Moscow: Pedagogika, 1983.
- [10] E.A. Grigorian. "Elements of composition in practical graphics". Yerevan, 1986.
- [11] G. Krasilnikova. "Automatisation of engineering and graphic works". Saint-Petersburg, 2001.
- [12] I.P. Bozhko. "Stages of creation of decorative work. Almanac of modern science and education", Tambov: Gramota, vol. 4 (59), pp. 32-33, 2012.
- [13] O.V. Arefieva. "Diagnostics of project thinking of students-designers", Problems of high artistic-pedagogical education: the content and technologies: materials of All-Russian scientific conference (April, 20-24).-Toliatti, pp. 235-239, 2007.
- [14] O.D. Baldina. "Tastes and preferences of modern artistic market of Russia".-Moscow: Astrel, 2002.
- [15] V.F. Maksimovich. "Traditional arts and crafts and education". Moscow: Flinta, 2000.
- [16] W. Crane. "The claims of decorative art".-Cambridge: The riverside press, 1903.
- [17] L.S. Vygotsky. "The psychology of art". Moscow, 1968.
- [18] A.N. Bykov, T.A. Kostryukova. "Forming of professional and subjective position of students in the process of practically-oriented activity", Almanac of modern science and education. Tambov: Gramota, vol. 2 (81), pp. 26-29, 2014.
- [19] V.V. Amalitsky. "Woodworking facilities and tools: Tutorial for professional education".-Moscow: Academy, 2002.
- [20] L.V. Shokorova, "Folk arts and crafts of Altai".-Barnaul: Altai State University, 2012.