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ON THE ENVIRONMENTAL DESIGN ILLUMINATION: TEACHER'S ATTITUDE

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For ye were sometimes darkness, but now are ye light in the Lord: walk as children of light (Ephesians 5–8)

ABSTRACT

As a special professional discipline the design of lighting is a part of learning program of the department of Environmental Design in Moscow State Stroganov Academy of Design and Applied Arts. The training of designers working with light and lighting equipment requires the special methodize, and the elaboration of such methodize becomes more and more urgent in modern school. We see solution in the combination of traditional art studies and environmental design with modern digital design technologies. All the factors of the lighting content of our environment such as lighting technique and technologies are considered during the learning process. Those branches of professional training are closely connected with the whole design culture and that gives us an opportunity to use a multidisciplinary approach.

The study in the lighting design takes one term. That's enough for the concept of the fragment of urban environment including the elements of the lighting content. The basics of art and the skills of creative thinking also help to achieve a high level of final design and to develop aesthetic skills of students.

The new horizons of the lighting design are opened with the new profile of education on our department: a Multimedia Design providing an extensive digital ground for design process.

All these means can help us to create a unique ground for the design education, for the contacts between students and possible customers, and also to attract some new, talented tutors.

Keywords: lighting design, environmental design, educational design, educational methods, art education, light installations, interdisciplinary approach, project concept, environmental approach

1. INTRODUCTION

Being relatively new field of design, lighting design is even younger in the area of design education. The development of a new subjects on the department of Environmental Design in Moscow State Stroganov Academy of Design and Applied Arts requires a new methodology.

The area of the learning design concerning lighting design is based on such specialities of the creative process as innovative design that requires a lot of scientific and technical research.

The mostly used themes of the learning projects besides lighting equipment is the highly dynamic urban environment, especially during festivities, dramatized shows, sport events or promo actions. That means usually the design for a re-creation-

al exterior space for urban inhabitant. That task is developed up to the stage of design concept inside some fragment of an urban environment including the lighting content. The use of a conceptual approach becomes on our department an educational model for future lighting designers.

Analyzing the practice of contemporary European design (which is strongly oriented on the customer's need) we can see the leading role of conceptual design [1]. Conceptual design as an example of non-linear process different from traditional "good" design means a multidimensional coverage of environmental themes – especially in such visually and technically complicated fields as lighting design. Lighting design as well as architecture is neither an art nor a science but is derivative of both [2].

Defining the strategy and tactics of the domestic school of lighting design it's necessary to remember the "interdisciplinary nature of that discipline standing at the intersection of art, design, architecture and lighting technologies, its dialectical origin and integration character" [3]. But any school as a professional integrity is always focused on the reproduction of knowledge and activities, and its status would not be complete without the support of professional education.

The strategy of educational design of the Department in the field of lighting design is based on the best achievements of the theory and methodology of the development of the light environment. Like the principle of "expensive Opera" methods in "amateur art", that task is one of the tasks of non-existent professional education of lighting designers" [4].

First experiments of light architecture in town planning (N.M. Gusev, V.G. Makarevich) have found valuable methods in fundamental works of Professor N.I. Shchepetkov [5] (who taught the course of lighting design at the department of Environmental design in the 2010s) and a number of authors of textbooks on the design of architectural [6] and interior [7] environment.

The problems of semiotics (M. Chervyakova) and semantics (P. Volchok) of the light tectonics of the architectural object were included in a number of methodological recommendations for the improvement of night time urban environment, especially in the cities with vivid historical pattern (A. Prikhodko). Stages of creation of "lighting model" of architectural object [8] are defined within the concept of a lighting panorama of the city (V.E. Karpenko). The professional competence of lighting designer outlines the design process on stages of conceptual design, detailed project and supervision (D. Makarov) [9] more fully with the transition to the stage of forecasting the development of the profession of lighting designer (S. Sizyi) [10].

An integrated approach to the formation of the urban lighting environment [11] (N.V. Bystryantseva) and the interdisciplinary nature of lighting design allowed to consider this field as an important factor of public communication and urban "scenography" (M.N. Bulygina, N.L. Korzun) similar to the spatial composition of paintings, movie screen, theatre stage and architecture [12]. The openness to innovation of the adjacent forms of visual art and science becomes the best and promising design methodology in the work with the lighting content. At the intersection of architectural lighting design and synthetic arts some innovative forms of the environmental objects of the modern light-art are emerging in the format of lighting installations, art objects and land art (E.V. Karpenko), luminous clothes (Yu.V. Nazarov, T.S. Vasilyeva), theatrical costume with such technical innovations as miniature light fixtures and power supplies; Hussein Chalayan's "architectural" approach to the design of clothing with a commitment to new technologies [13].

2. MATERIALS AND METHODS: THEORETICAL BASIS

Educational design at the Department of "Environmental design" is an interdisciplinary model, closely related to scientific and technical innovations. Openness to novelty allowed creating artistic environmental concepts with various elements of lighting design. The principle of conceptual design provides an approach to the environment as a "process", where the main participant becomes a spectator, similar to the methods of artistic theatrical realization of space, based on the classical method of "scenario modelling" (V.F. Sidorenko). The scenario makes a stable nature of the light environment visually more dynamic. The design of lighting content lies outside the methods of classical morphological formation and is still in the process of its formation. The importance of a theatrical scenario lies in the possible visualization of a disembodied, naturally virtual lighting environment, which immerses us in the world of illusion. (The first one who laid the basics of the use of technical lighting sys-

tems in the design of a full-scale urban environment was a well-known theorist and practitioner of lighting design, N.P. Shchepetkov.) This study is limited to the analysis of exclusive objects of the urban environment and does not including the widest area of special environmental contexts such as industrial or interior spaces.

The study projects of dynamic lighting environment changed our department's focus aiming it on socially significant design. According to John Maeda "design isn't just about beauty; it's about market relevance and meaningful results" [14].

Project of light environment for music festival "COS.MOS" on the territory of the Moscow Exhibition Centre is an example of a large-scale project of lighting design – a conceptually new, spectacular, technically equipped event that meets the obligatory conditions of successful event marketing ("event marketing", Fig.1). One of the tasks the festival "COS.MOS" has to achieve is to solve the actual problem of territorial branding of an exhibition area by the means of outdoor advertising and special decoration.

"One of the main features of modern light installations is a combination of polychrome LED light and web-technologies that allows you to control lighting effects and dynamics at a remote distance" [15] to develop a project scenario and timing of the event taking into account the time of the day with its natural lighting. The concept of "Space Geometry" is based on the visual image of the hexagon: the images of the Solar system, the North Pole, and Saturn, the crystal lattice of carbon – the most common element in the Universe. The hexagon module includes the entire environment complex from graphic style and up to lighting installations, to lighting navigation and video mapping with the developed plot and scenario on the facade of the Cosmos pavilion; from the design of the lighting system up to the architectural illumination of the main buildings of the festival and the lighting design of the stages.

Three Festival stages are equipped with LED IPX8 strips. Illumination of entrance groups consists of LED strips and LED-lamps. Daytime installations are illuminated at night with LED lamps and ribbons. Media content consists of 3DLP projectors. Large-scale projection is achieved using Christie's RGB laser systems, the Christie® Freedom™ light system with a adjustable laser light source equipped with a fibre optic projection head. Pandora's Box system allows you to synchronize all video and audio sources in real time. Phoenix EP system is installed directly on compatible Christie displays, which serve as a power source and are connected to the network via CATx cable. Screens mounted in interactive stands can be either Secure Touch or Thru Touch type.

Some student's training studies turned into a field of prognostic design, Fig.2. "Another situation is possible when designers developing an idea of a new product are ignoring the technical

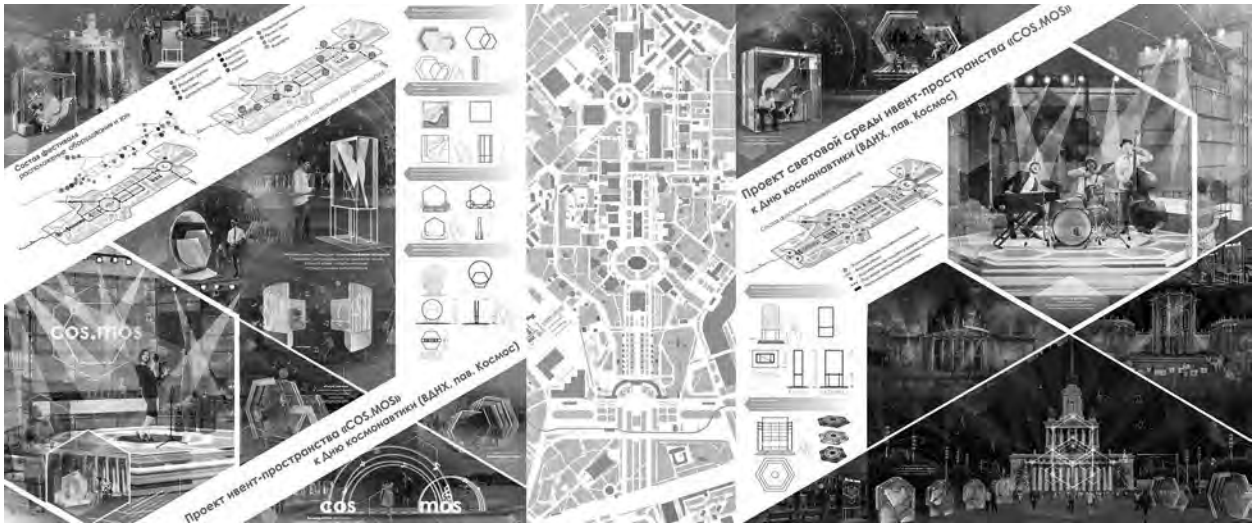

Fig.1. Project of lighting environment for "COS.MOS" event at Russian Cosmonautics Day (Moscow Exhibition Centre, "Space exploration" pavilion)", 2018
(Lighting installations, 3D mapping techniques, architectural lighting of buildings are used for creating a unique atmosphere of the music festival. Graduation project, bachelor course, department of Environmental Design. A. Galstyan, E. Gozhaya. Tutors: Prof. E.A. Zaeva-Burdonskaya, Prof. E.I. Ruzova)

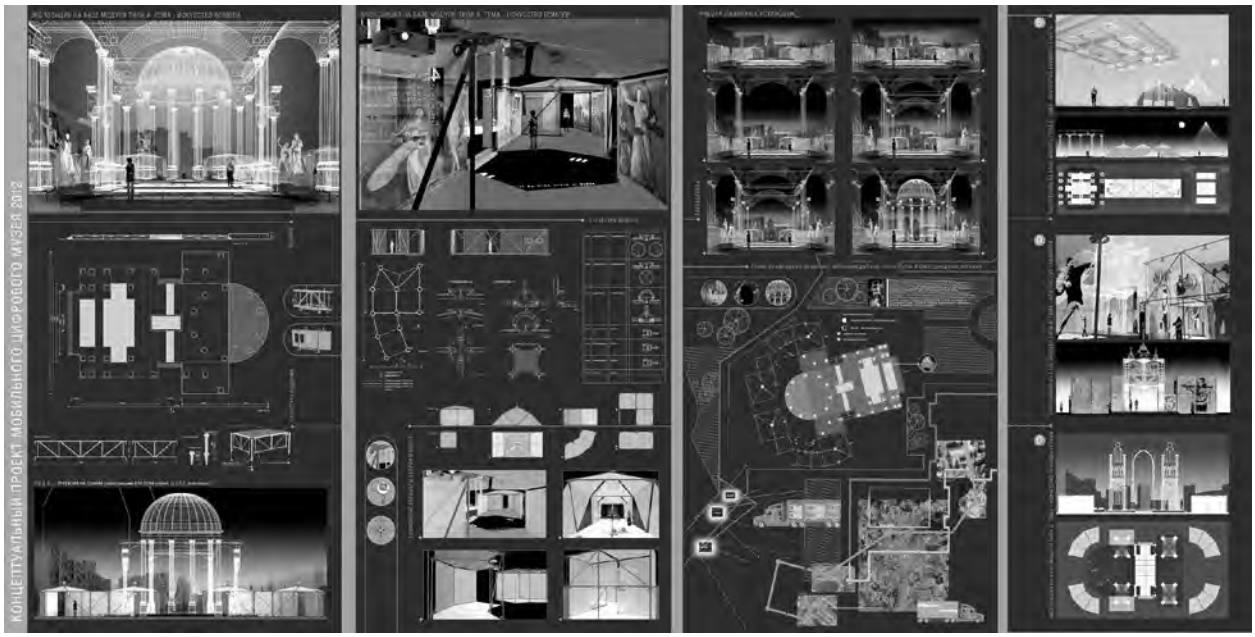

Fig.2.Conceptual project of the mobile digital Museum – 2012", 2008
(Technologies of holographic architectural structures creation in the urban environment are designed for the use of equipment planned for development and implementation in 4 years after the project presentation (2008). Graduation project, Specialist degree, department of Environmental Design. O. Simatova. Tutors:
Prof. E.A. Zaeva-Burdonskaya, Prof. E.I. Ruzova)

and technological capabilities and create a promising project (new function), which turns out to be unrealizable or expensive. In this case, design becomes an incentive for the development of new technologies, for the search of solutions for possible implementation of the project [16]. National Institute of Advanced Industrial Science and Technology, AIST (Japan) has developed a device that uses lasers to create three-dimensional images in open space. The device creates realistic three-dimensional images using a laser beam focused by lenses at the points of space above the projector. The laser operates in the invisible range of light to the human eye and the resulting plasma emission of nitrogen and oxygen causes a bright glowing effect. Due to the limited duration of the projection, the device is able to reproduce three-dimensional shapes by moving the focal point. The number 2012 in the name of the project is not accidental, fixing the year of creation of this equipment designed for large-scale projects in the urban environment.

The light component in contemporary visual art often appears in the format of lighting installations forming the visual environment of the event. "One of XX century's innovations is an introduction of such concepts as art object and art installation. Initially this experiment with a departure from the utilitarian object… consists in the ultimate sharpening of the "idea of an object" and the ideal correlation of function and form in it" [17]. One of the most beautiful places in Moscow, Vorobyovy Gory, gained a new look thanks to the lighting art objects in the figurative concept of the festival environment "Christmas light-2018" under the motto "Ornament as the language of cultural communication", Fig. 3. The ornament was presented as a symbolic system based on such geometric figures-symbols as Circle (beam, halo, spiral, etc.) and Square (triangle, cross, etc.). A single modular grid was developed for the construction of groups of ornaments with ethnic symbols and colour and composition characteristics. The spatial character of sculptural art objects is achieved with the help of multi-layering, or so-called "facade lamination"; of low objects – "elevating" elements from the plane into space at different angles (the "raised plan"). The modular principle allows you to adjust the size and configuration of the luminous arches and portals. The structure is to be built of aluminium grid, PET and PMMA sheets. Lighting technology: CHROMEX Steady LED rope lights (36 LED/m; Anti-UV treated). LED colours: White (051079), Blue (051082), Red (051083), Green (051081), Yellow (051084).

Lighting optical effects and illusions in the three–dimensional composition solved at the level of primary creative tasks are practiced in the frame-

Fig.3. Project of decoration of the festival “Christmas Light-2018” in Moscow”, 2017 (Customer: “Adline Project” company. The main project’s feature is the domination of imaginative and emotional ethno-design. Graduation project, bachelor course, department of Environmental Design. D. Korlyakova. Tutors: Prof. E.A. Zaeva-Burdonskaya, Prof. E.I. Ruzova)

work of propaedeutic courses, Fig.4. “Morphogenesis in environmental design as the method of stylization” program held on third year helps to solve the problems of adaptation of the historical stylistics to the modern problems of environmental design.

The quality of any project measures most often with its implementation. As a result the design has to adapt creative ideas to practice, to make technological innovations interesting to the spectator. Successful long-term cooperation of the Department with the company “LEBLANC RUS” in the framework of conceptual training projects and summer practical training has become a path to practical design in the field of lighting design. The project of the New Year’s animated light show in Gorky Park dedicated to the 100th anniversary of the “Christmas Tree” (1918) rhymes for children is based on the works of A. Benois and K. Chukovsky, Fig.5. The project included kinetic and fixed lighting installations (LED panels) equipped with motion sensors changing the brightness of light according to human movement; geo-plastics with interactive graphics for mobile games; kinetic furniture with LED strip lights, equipped with motion sensors; small architectural forms based on of the lighting panels and video mapping on the central entrance arch. The in-

Fig. 4. Design adaptation of the antique ornament. Meander. Composition, 2014
(Non-functional installations and art-objects as an example of innovative technologies creating an artistic image with the priority of semantics, emotional aspect of the artistic image with the priority semantics of form, the emotional sound, etc. “Morphogenesis in environmental design” program. Bachelor course, department of Environmental Design. A. Budaeva
Tutor: Prof. E.A. Zaeva-Burdonskaya

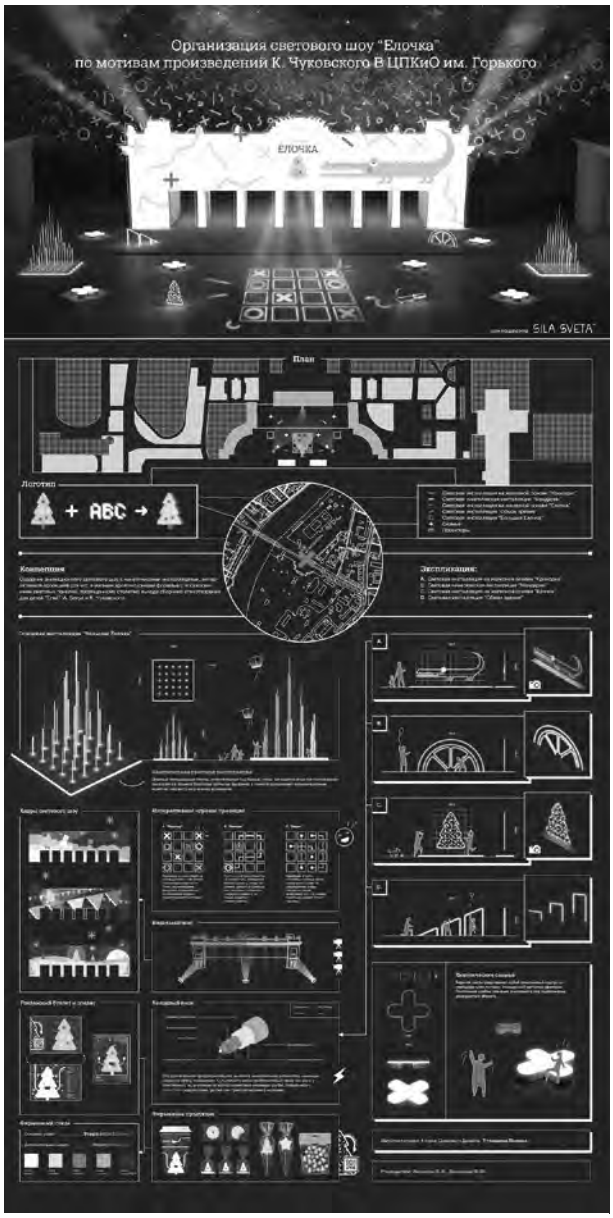

Fig.5. "The project of the "Christmas Tree" light show based on the works of K. Chukovsky in Gorky Park", 2017 (Customer: "LEBLANC RUS". Conceptual training projects based on manufacturer's orders open the way to practical design in the field of lighting design. Bachelor course (4th year), department of Environmental Design. P. Turisheva. Tutors: Prof. V.I. Ampilov and J, M. Hasanova

stallations use a professional linear lighting device (cold neon) Neon Flex (Voltage is the (90–120) V, Frequency is the 1 kHz).

The tasks of the practical training are limited to the preliminary study of the project. Technical, technological parameters and functional requirements for the object are defined by the customer in the specification. For the light installation of the parking space in front of the ocean-aquarium at the Moscow Exhibition Centre the image of the Wave is chosen – a dynamic symbol of the ocean tides carrying deep-water creatures (or the inhabitants of the marine aquarium) in their streams, Fig.6. Technologically the wave is made of perforated aluminium frame with a flat LED strip along the perimeter of the perforations. Fish sculptures are made of LED Tape-colour Ribbon. Equipment: CHROMEX lighting products catalogue "The white book of illumination" group Leblanc 2014–2016.

The Hermitage garden in Moscow was chosen as a platform for creating a light environment for the celebration of the 130th anniversary of S.Y. Marshak, the famous Russian poet. The project concept covered a series of lighting installations "Heroes of fairy tales" and a swing structure "Cat's House", supplemented with projection of Marshak's filmed works on the elevation of the Hermitage theatre building, Fig.7. One of light-art's directions is projecting of video or animation images on the facade surfaces of urban objects with the help of media systems, emphasizing or destroying the tectonics of the building, making environmental objects "open to interpretation" [18].

Taking into account the serious animation component, the project was held as part of the summer practical training on the basis of the department's new specialty – Multimedia Design. Different types of mapping: single projection, flat mapping, volumetric or 3D mapping allowed to realize the maximum natural volume of the surrounding space. As the basis for 3D mapping any existing 3D Show Platform can be used. The elaboration of the project is divided into following stages: building of a three-dimensional copy of mapping-space; the search for the best variant of arrangement of projectors and other equipment (lighting, laser and pyrotechnics, dynamic structures, etc.); creation of the textured scans of three-dimensional objects and the development of video content (motion-design); programming of video content according to script; the physical connection of the projection and other equipment; final correction and running the show. 3D models are assembled directly on the platform as a construction set. Complex objects are imported from external 3D modelling sources such as 3D Studio Max, Maya, Cinema 4D, Vector works, Autocad, etc. The placement of video projectors according to their physical characteristics is greatly relieved due to the fact that the mapping system takes care of the photometric correction of the given sur-

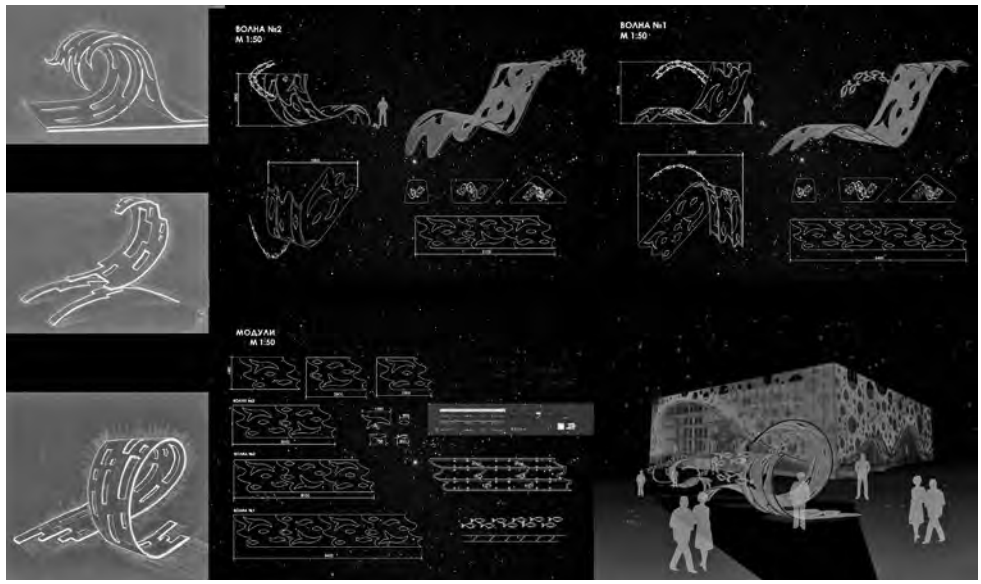

Fig.6. ""Wave" – the concept of light installation for the ocean-aquarium in the territory of Moscow Exhibition Centre", 201
(Customer: "LEBLANC RUS". The design is based on S-shaped modules performing a 3-dimensional sculptural animation. A. Kuznetsova. Tutors: Assistant Prof. N.P. Bogatova and A.I. Lobachova)

faces, compensating reflective properties of the materials and the possible overlay of the projections of each other. The design of light installations is determined by the corporative stylistics of Leblanc products. Equipment: CHROMEX lighting products catalogue "The white book of illumination" group Leblanc 2014–2016.

3. RESULTS

New methods of project training in a new field of design – the public environment – with the inclusion of lighting content at the department of Environmental Design in Moscow State Stroganov Academy of Design and Applied Arts does not balance between traditional design and digital programming, between "artistic and technical" but is based on a combination of these methods, using different expressive nature of each one. Classical principles of traditional image-style morphogenesis, innovative computer programming and immaterial achievements of research design methods are boiling in a single pot into conceptual design format. This method passes through the entire sequence of learning tasks: from propaedeutic courses and one-term projects to practical training and graduation projects. This allows one to work with a fairly wide range of urban spaces with different functional characteristics and scale. A single basic platform for all projects is the principle proclaiming "light as art", taking into account the most important ergonomic aspect of design: its orientation on the human person in his psycho-emotional diversity, dynamic perception of such environment where the person remains the main element. Basic training in arts, traditional art education retains its priority in the formation of professional taste and becomes a major factor in the formation of artistic and aesthetic criteria for the evaluation of the project. Textbook on creative three-dimensional arts will be of little help to the designer. The formation of visual sensations, skills and further fixation of such intellectual structures as "beauty" and "perfection" in the project result can be achieved only with personal handcraft skills. Computer modelling and software support of the project process are only the instruments of the incarnation of the image that emerges on the mental level. Those instruments can help to turn that mental image into "picture" but are not laying claim on the imaginative origin of creativity.

One of the most important aspects of the development of lighting design and methods of lighting designer's training is an opportunity to test the virtual design in a situation close to reality. This is only possible through experimentation. Analysis of domestic and international experience enriches the design with new experimental data, for example, virtual laboratories equipped with a facility with a breadth of 360 angular degrees. Some kind of "planetarium" for the lighting designer is neces-

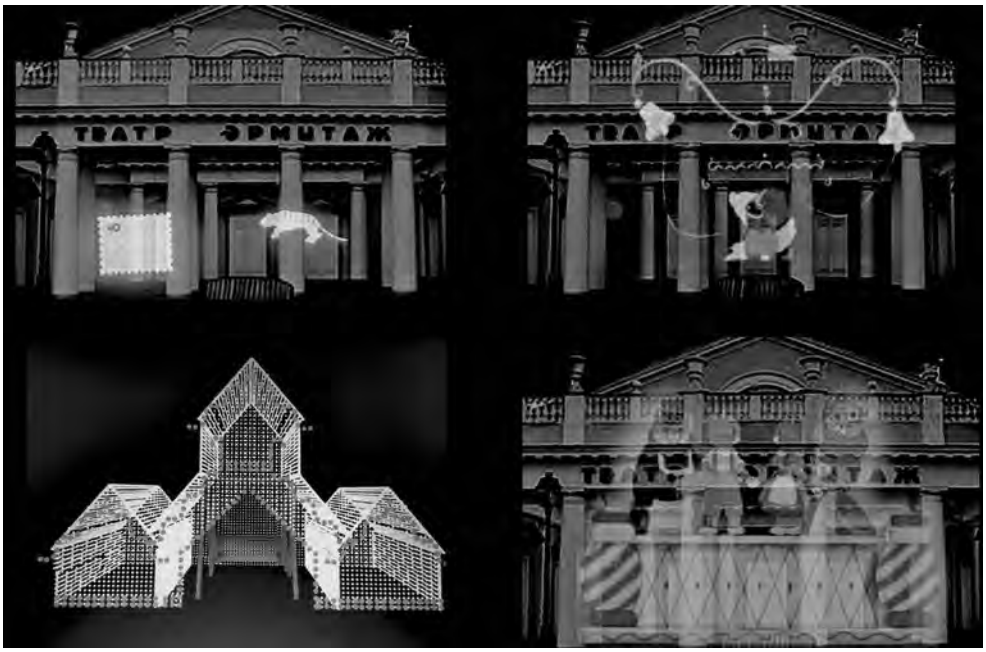

Fig.7. The concept of lighting installation for the 130th anniversary of S.Y. Marshak", 2017 (Customer: "LEBLANC RUS". The dynamism of thematic video projections based on animated images of Marshak's plays and poems provides the Hermitage garden with new qualities of visual illusion, continuing the theme of dematerialized architecture, reviving the images of familiar fairy-tale characters.Practical training. Bachelor course (2th year), department of Environmental Design, specialty Multimedia Design. V. Litvinenko. Tutor: Senior Teacher E.A. Kuznetsova)

sary – the device that could transfer the design model into the spherical space, allowing reproduce the real scale of the environment, brightness and contrast scale, i.e. to introduce the picture on the computer screen into the situation of reality. But this is the subject of a separate study.

Use of serious computer modelling in the educational process within the new specialty "Multimedia Design" allows creating of a virtual light environment with the parameters close to the real human vision, taking into account factors of seasonal changes, weather conditions, the stylistic context of the environment, etc. The main design principle remains the same: the constant search for ways to integrate artistic and technical principles which, unfortunately, remain still separate from each other. One can hope that the innovative design of the lighting environment in the new profile of training with solid support of traditional art education will transform into a separate area of design and will take its rightful place in the structure of the educational process of the Academy.

GLOSSARY

ENVIRONMENTAL DESIGN is the formation (design and implementation) of environmental situations, objects of urban, industrial and residential environment and systems, performed with the help of professional designers and manufacturers, purposefully looking for the specifics of life and especially the visual appearance of the environment. It is a complex multi-stage process (pre-project analysis, design of environmental components and the environment as a whole, taking into account changes in the environment in the process of operation and evolution of the environmental situation), requiring the involvement of specialists in various fields – from architects, designers and artists to technologists and economists [19].

DESIGN CONCEPT is the basic idea of the future object, the definition of its semantic content as an ideological and thematic basis of the design concept expressing the designer's artistic and design judgment about phenomena larger than this object; an integral ideal model of the future object, describing its main characteristics [19].

ARTISTIC IMAGERY in design is an ideal-sensual representation of meanings and ideas, works of design art arising in the process of formation of the idea, design process, creation and perception of final product; artistic model created by the imagination of the designer, expressing his attitude to reality [19].

COMPOSITION in DESIGN is the structure of design product, the relative location and interconnections of its parts according to their layout appropriate to the purpose and technical idea of this product and its artistic (imaginative) design, reflecting the consumer's emotional and sensual expectations of the product [19].

ENVIRONMENTAL CONCEPT considers the environment as a result human activity changing the surrounding world. Accordingly, human activity and behaviour are taken as a determining factor linking the individual elements of the environment in integrity. From that point of view the environmental concept serves as the main foundation of modern project thinking, as the principle of formation of our environment as an organic unity of the whole system of visual-sensual and functional specificity of the place [19].

REFERENCES

1. Design as a driver of user-centred innovation. Commission Staff Working Document, Commission of the European Communities, Brussels, 7.4.2009. http://www.lookatme.ru/flow/posts/books-radar/119799-tektonicheskie-sdvigi-v-dizayne.

2. ru.wikipedia.org'wiki/Lighting Deign.

3. Bystryantseva N., Lekus E., Matveev N. School of Russian lighting design: strategies and tactics. "Svetotekhnika", 2015, № 4, pp. 65–66.

4. Shchepetkov N. History and reality of Moscow lighting design. AMIT (39) 2017, MARCHI, pp. 239–252.

5. Shchepetkov N. Light design of the city, M .: "Architecture-C", study guide, 2006, 320 p.

6. Design of the architectural environment: Textbook for universities / G. Minervin, A. Ermolaev, V. Shimko, A. Efimov, N. Shchepetkov, A. Gavrilina, N. Kudryashev – Moscow: "ARCHITECTURE-S", 2006. 504 p.

7. Shimko V., Utkin M., Runge V. Architectural and Design of Interior (Problems and Trends). Moscow: ARCHITECTURE-S, 2011, 256 p.

8. Karpenko V. Light design of the urban environment. BULLETIN OF FEFU ENGINEERING SCHOOL, 2016, № 1 (26), pp. 78–93.

9. Makarov D. "Light design. The current state", LIGHTING EQUIPMENT, 2018, № 3, pp. 78–82.

10. Gray S. "The current state and prospects for the development of modern lighting design" LIGHTING EQUIPMENT, 2018, № 3, pp. 78–82.

11. Bystryantseva N. "An integrated approach in creating the light environment of the evening city" Ph.D. thesis, M.: Moscow Architectural Institute (State Academy), 2015, 27 p.

12. Karpenko V. Principles and means of light composition in modern art and environmental design. M.: MARHI, AMIT 2 (35), 2016, pp. 1–11.

13. Vasilyeva T., Nazarov Y. "Clothing Light Design" Moscow "Svetotekhnika", 2011, No. 4, pp. 42–46.

14. Design in Tech Report 2018. https://designintech.report.

15. Karpenko V. Principles and means of light composition in modern art and environmental design. M .: MARHI, AMIT 2 (35), 2016, pp.1–11.

16. Bazilevsky A., Barysheva V. Design. Technology. The form. ARCHITECTURE-S, 2010, 248 p.

17. Abakumov L.I., Dergach G.I. Art objects in modern environmental design. International Scientific Conference "XIX Tsarskoye Selo Readings", St. Petersburg, 2015, pp. 88–91.

18. Karpenko V. Principles and means of light composition in modern art and environmental design. M.: MARHI, AMIT 2 (35) 2016, pp. 1–11.

19. Minervin GB, Shimko V.T., Efimov A.V. and others. Design// Illustrated dictionary references. – M .: Architecture-C, 2004, 288 p. http://archizona.ru/disain_illustrirovanniy_slovar_spravochnik.htm.

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