



**Scientific-Analytical Approach to the State of Teaching Perspective
(Central Perspective Projection) in Different Types of Education in
Our Country**

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Abstract: *The rules for creating a perspective image are used in fine arts, architecture, theater and interior design, optics, and many other areas.*

Therefore, in our country, perspective (central perspective projection) is taught in preschool institutions, schools, vocational schools and higher educational institutions.

Today it is required to study the achievements and problems in teaching perspective, the content of materials related to perspective in ongoing research based on a scientific and analytical approach.

This article describes a scientific and analytical approach to teaching perspective in education and scientific and methodological recommendations on the appropriateness of its teaching.

Keywords: *central projection, perspective, perspective image, positional problem, metric problem, fine arts, painting, spatial imagination, thinking, logical thinking, types of learning, interactive method, pedagogical technology, information and communication technology.*

Introduction.

The new Law "On Education" entered into force in our country on September 23, 2020. Article 4 of it entitled "Main principles in the field of education" mentions "...the continuity and consistency of education"¹. In addition, Decree No. PF-6108 of the President of the Republic of Uzbekistan dated November 6, 2020 "On measures to develop the fields of education and science in the new development period of Uzbekistan" was issued. In paragraph 1 of this Decree, following statement is included: " Training of new generation personnel with high intellectual and spiritual potential, capable of coming up with new initiatives and ideas for the development of the country, forming the necessary knowledge and experience for the graduates of educational organizations to become modern professionals²". It can be seen that in our country, great attention is paid to education, teachers and mentors at the level of state importance. Responding to such attention and trust at the level of demand is an urgent issue today.

Providing quality education in each of the types of education available in the educational system of our country and bringing up the young generation that meets the requirements of the times is the first priority of every manager, professor-teacher.

The educational system is a set of all types of educational institutions operating on the basis of the main principles of the state policy in the field of education in order to educate the young generation.

¹ <https://lex.uz/docs/-5013007>

² <https://lex.uz/docs/-5085999>

Education system:

- state educational standards, state educational requirements, curricula and educational programs;
- educational organizations implementing state educational standards, state educational requirements and educational programs;
- organizations that evaluate the quality of education;
- scientific-pedagogical institutions that carry out research work necessary to ensure the functioning and development of the educational system;
- includes state management bodies in the field of education, as well as organizations under their jurisdiction.

The education system is uniform and continuous.

The continuous education system of the Republic of Uzbekistan includes pre-school education and upbringing, general secondary and secondary special education, professional education, higher education, post-higher education, retraining of personnel and improvement of their qualifications, non-school educational institutions, management bodies that control and regulate their activities.

Education in the Republic of Uzbekistan is carried out in the following steps.

1. Pre-school education and training.
2. General secondary and secondary special education.
3. Professional education.
4. Higher education.
5. Education after higher education.
6. Retraining of personnel and improvement of their qualifications.
7. Extracurricular education³.

The next task is to modernize the content of teaching in such educational institutions, to give it interesting content, to arouse great interest in subjects in pupils and students, and to prepare them for excellent scientific and creative activities.

In particular, the system of knowledge intended for students of "Fine arts and engineering graphics" includes a set of knowledge about seeing with the eye - the science of perspective, which is a method of depicting an entity on a flat surface or on a surface. This category is extremely necessary for artists - science. There is a need for a scientific-analytical approach to the state of education in perspective science education, today's problems and its solutions.

Literature review.

The science of perspective serves the development of architecture and visual arts (perspective is a separate subject in some educational institutions, drawing is taught as a branch of geometry in some). The perspective image is made on the basis of the central projection method and it is monoprojection. Because of this, students have a little difficulty moving from space to flat drawing or, conversely, from flat drawing to space.

In the middle of the 12th century, among the works of many famous oriental scholars, Gerardo from Cremona translated several books of Ali Hassan ibn al-Haysam al-Basri, including *Kitab al-Manoziri*, into Latin under the titles *De Aspectibus* and *Perspectivae*⁴.

³ <https://lex.uz/docs/-5013007>.

⁴ Абдурахмонов Ш. "Перспектива" илмий атамасининг расмий фанга кириб, унда қарор топиши хусусида. Узлуксиз таълим тизимининг чизма геометрия ва муҳандислик графикаси йўналишида педагог кадрлар тайёрлашнинг илмий-назарий асослари Республика илмий-амалий анжумани материаллари. ТДПУ, 2015. 84-85 бетлар.

These books were of particular importance in the development of scientists such as Bacon and Peckham, who were seriously engaged in the science of optics in Europe in the 13th century. The famous naturalist Roger Bacon (1214-1292), who grew up under the influence of Al-Haytham's books, conducted many experiments on light rays with the help of his camera obscura and the use of lenses of various shapes. He developed the theory of glasses. By the end of the 13th century, production of convex and then concave glasses was started in Italy⁵.

The Polish architect Vitello called his ten books on optics "Perspective" (Latin: "seeing from the inside"). In writing this book, he made good use of al-Haytham's collection of works on optics ("Opticae thesaurus").⁶ For example, al-Haysam corrected a Pythagorean misconception about vision held by many opticians before him and said: "Optical image is created with the help of light rays radiating from visible objects"⁷. It can be seen that many encyclopedic scholars served in the formation and development of the science of optics and perspective.

Today, a number of educational literatures on the subject of perspective is used in practice. For example, the first textbook on perspective was written by Ikrom Rahmonov⁸, honorary professor of TDPU.

Among our local scientists, Rahim Horunov⁹ was the first to defend his candidate's thesis. The "Perspective"¹⁰ section is covered in the textbook "Course of Drawing Geometry" of the scientist. The textbook contains only topics and materials of perspective science that are taught in HEIs.

The textbook, recognized as a classical literature on drawing geometry, was created in 1988 by a group of scientists headed by Professor Sh.K.Murodov¹¹. The perspective chapter of this textbook was written by P. Adilov. In this chapter, the theoretical materials of the perspective are briefly but qualitatively covered.

A. N. Valiyev's perspective textbooks¹², educational¹³ and methodical manuals¹⁴ were published during the period of independence. These literatures contain theoretical and practical materials of the science, but they contain only materials suitable for higher education programs.

In addition, the methodical manual "Perspective"¹⁵ written by professors E. Ruziyev and R. Latipov dedicated to graphic tasks and their implementation methodology is effectively used in practice. However, it did not include theoretical materials of the science.

I.Rahmonov is a leader in writing methodical works related to the teaching of drawing geometry and drawing.

I. Rahmonov and A. Valiyev¹⁶ explained the role of modern pedagogical technologies in teaching engineering graphics. These technologies can also be effectively used in teaching perspective.

⁵ Тарасов Л.В., Тарасова А.Н. Беседы о преломлении света /Под ред. В.А. Фабриканта. – М.: Наука, 1982.

⁶ Абдурахмонов Ш. Чизмалар яратишда қўлланилган хандаса илими. – Т.: "Fan va texnologiya". 2017-48-bet.

⁷ Гамалина Р.Б., Соколова Е.И. К истории геометрической оптики на Ближнем и Среднем Востоке и в Европе в средние века //Сб. Из истории точных наук на средневековом Ближнем и Среднем Востоке. – Т.: 1972. – С.: 72 – 76.

⁸ Рахмонов И. Перспектива. –Т.: "Ўқитувчи", 1973 ва 1993 йй.

⁹ Ҳорунов Р.Ҳ. Параллел проекциялашда яққол тасвирлар яшанинг баъзи бир масалалари, номзодлик диссертацияси. Ленинград, 1953.

¹⁰ Ҳорунов Р.Ҳ. Чизма геометрия курси. -Т.: "Ўқитувчи", 1997,218-260 бетлар.

¹¹ Murodov Sh, Hakimov L., Adilov P., Shomurodov A., Jumayev M. Chizma geometriya kursi. –Т.: "O'qituvchi", 1988-364 bet (ikkinchi nashri 2006, 2008 y.).

¹² Valiyev A.N. Perspektiva. -Т.: "Voriz-nashriyot", 2012.

¹³ Valiyev A.N. Perspektiva. -Т.: "Voriz-nashriyot", 2009.

¹⁴ Valiyev A.N. va boshqalar. Perspektivadan grafik vazifalarning metodik ishlanmasi. –Т.: "ZUXRA BARAKA BIZNES" MCHJ bosmaxonasi, 2017.

¹⁵ Ruziyev A. va R.Latipov. Perspektiva (grafik topshiriqlar va ularni bajarish metodikasi). -Т.: "TDPU rizografi", 2014.

¹⁶ Rahmonov I., Valiyev A. Muhandislik grafikasi fanini o'qitishning zamonaviy texnologiyalari. –Т.: "Navro'z", 2015-160 bet.

The first high-quality textbook in Uzbek on the methodology of teaching engineering graphics was published under the co-authorship of Professor E. Roziyev and Associate Professor A. Ashirboyev¹⁷. This textbook does not include information on the methodology of teaching perspective.

Although the content and materials of perspective science are detailed in the above literature, scientific and methodological recommendations on how to teach it in educational types have not been developed.

Research Methodology.

Perspective is closely related to fine art because it is based on the central projection method and is adapted to human vision. For this reason, the perspective is taught in the following higher education institutions.

1. Tashkent State Pedagogical University named after Nizomi in the following educational areas:
 - ✓ 60111200 – Fine arts and engineering graphics;
 - ✓ 70111202 – Engineering graphics and design theory.
2. In the following educational areas of the National Institute of Painting and Design named after Kamoliddin Behzod:
 - ✓ 5111000 - Vocational training (5150800-Color image machine);
 - ✓ 5150800 - Color image (default);
 - ✓ 5150800 - Color image (magnificent);
 - ✓ 5150800 - Color image (theater decoration);
 - ✓ 5150800 – Color image (picture solution of the film);
 - ✓ 5150800 - Painting (cartoon and computer reproduction);
 - ✓ 5151000 - Easel and book graphics;
 - ✓ 5151000 - Graphics (calligraphy and miniatures).
3. 210000-Art, 730000-Architecture and construction in the following educational directions of the Tashkent Institute of Architecture and Construction:
 - ✓ 60210400 – Design (by types);
 - ✓ 60212200 - Preservation of cultural heritage objects;
 - ✓ 60730100 – Architecture (by types);
 - ✓ 60730100 – Reconstruction and restoration of architectural monuments;

Now, above, we will analyze the state of education of perspective science in educational institutions. At Bachelor of Fine Arts and Engineering Graphics – 60111200, in Tashkent State Pedagogical University named after Nizami a separate large section is allocated to perspective in the subject "Drawing geometry"¹⁸ and the working program includes 32 hours of lecture and 32 hours of independent education, **a total of 64 hours** of classes separated. It teaches students the topics of constructing perspective images of geometric shapes and objects, methods of performing perspective images, determining personal and falling shadows of objects, constructing the perspective of reflected images, perspective restoration work, and perspective analysis of paintings.

In addition, "Practical perspective and theory of shadows"¹⁹ is also taught among elective subjects, and 60 hours of lecture and 60 hours of independent study are allocated to it in the curriculum, **totaling 120 hours** of classes. It explores the aspects and practical possibilities of perspective related

¹⁷ Ro'ziyev E., Ashirboyev A. Muhandislik grafikasini o'qitish metodikasi. –T.: "Fan va texnologiya", 2010-246 bet.

¹⁸ Ashirboyev A., Valiyev A., Tashimov N. Chizma geometriya (fan dasturi). 2022.

¹⁹ Ashirboyev A., Valiyev A. Amaliy perspektiva va soyalar nazariyasi (fan dasturi). 2022.

to fine arts and other sciences. For example, the practical significance of the rules of perspective in painting, the use of positional problems in determining the shadows of objects and objects and the construction of the perspective of reflected images, the role of metric problems in the construction of the object's perspective through previously given parameters are studied.

The subject "Theory of visual images²⁰" is taught in the specialty 70111202 - Engineering graphics and design theory (master's degree) of this educational institution. The content of this subject is made up of three sections; "Axonometric projections", "Technical drawing" and "Perspective". 30 hours of lecture and 30 hours of independent study, **a total of 60 hours** of classes are assigned to the perspective section. Here the scientific and theoretical aspects and practical significance of the perspective are studied, relying on the knowledge obtained in the bachelor's degree. Clearly, comparative analysis of solving positional and metrical problems in perspective with other projection methods, construction of object perspective on horizontal planes, problems of restoring the plans and facades of geometric objects, objects, interiors, etc., correct placement of light sources, possibilities of proper use of reflection image in construction and life are studied.

In the following educational directions of the **National Institute of Painting and Design named after Kamoliddin Behzod**, 32 hours of classroom and 28 hours of independent education, **a total of 60 hours** of lessons are set in the subject "Perspective²¹" working program in the direction of 5111000-Vocational training (5150800-Color painting machine). It teaches students almost all the subjects of perspective science and mainly the requirements of following the rules of perspective in painting.

In a number of undergraduate education courses of the **Tashkent Institute of Architecture and Construction**, the subject "Drawing geometry and perspective²²" includes 60 hours of classroom and 60 hours of independent education, **a total of 120 hours** of classes. In it, as in TDPU named after Nizamiy, students are taught the topics of construction of perspective images of geometric shapes and objects, methods of performing perspective images, determination of personal and falling shadows of objects, construction of perspective of reflected images, restoration works in perspective, and perspective analysis of paintings.

Above is the current status, it seems that there are enough hours. However, the integration of the perspective with other subjects is not paid attention to the level of demand. It is desirable that the mutual integration of fine arts and perspective sciences should be carried out in harmony not only in the science of perspective, but also in the sciences of fine arts (pencil drawing, painting, composition). Because a science never appears and develops independently, without being related to other sciences.

Now let's analyze the materials related to the content of perspective science in general secondary schools. The subject "Perspective" is not taught separately in school education. But in grades 1-7, the subject of "Fine Art" is taught, and the materials and rules of perspective are taught in its content. That is, in the process of realistic painting, it is recommended to follow the rules of perspective. For example, in the "Visual Art" school textbooks of the 2nd and 4th grades, it is said that *"perspective means that near objects are depicted in a larger picture, and distant objects are smaller."*²³ However, textbooks do not provide visual and instructional materials about the rules of perspective and its practical application during painting.

For example, the school textbook "Fine Art 5" shows the step-by-step process of making a still-life picture (image) consisting of geometric objects (Fig. 2.2.1)²⁴, and it is recommended to follow perspective reductions. However, no information is given about how these reductions can be made and the geometrical constructions that are performed in this process. In our opinion, it would be

²⁰ Murodov Sh., Ashirboyev A., Valiyev A. *Yaqqol tasvirlar nazariyasi (fan dasturi)*. 2022.

²¹ Umirzaqov R.R.. *Perspektiva (fan sillabusi)*. 2021.

²² Saydaliyev S.S. *Chizma geometriya va perspektiva (fan sillabusi)*. 2022.

²³ Sulaymonov A., Rahmonov I., Sulaymonov Z. *Tasviriy san'at 4*. -T.: "Sharq", 2015- y. 19-20- betlar.

²⁴ Qo'ziyev T., Abdirasilov S., Nurto'yev O', Sulaymonov A. *Tasviriy san'at 5*. -T.: "Sharq", 2012- y. 30-31- betlar.

appropriate to show the student the rules of perspective in drawing realistic paintings in visual arts textbooks. Even great artists have opinions about the close relationship between visual art and perspective²⁵.

In addition, the science of perspective and its rules are taught in painting, design, construction and other educational areas related to image making in vocational schools. However, separate educational literature on the perspective has not been published for them.

However, time does not stand still, progress does not stop. Therefore, it is necessary to engage in activities that are in tune with the times and meet its requirements. In the teaching of engineering graphics, it is necessary to look for ways to improve it using the existing potential, to eliminate existing problems.

Based on the above circumstances, there is a need to improve educational and regulatory documents and didactic support for teaching perspective science in various types of education.

Analysis and results.

We all know that in monoproduction, the image is made in one plane, and in orthogonal projection, the image is made in two or more mutually perpendicular planes. The central projection (perspective) of geometric shapes for the monoproduction of the image made in perspective has a uniqueness compared to its image in orthogonal projection. It is difficult for students to adapt to central projection. In general, there are a number of shortcomings and difficulties in teaching perspective in education. We will conduct an analysis of the state of education of perspective science in the types of education in our country, and present its results and methodological recommendations for eliminating the shortcomings listed below.

- Problems related to ensuring consistency and coherence in teaching perspective to students in higher education institutions, and improving the content of topics aimed at in-depth study of science in higher education institutions that train specialists. In the preparation of educational literature on perspective, it is necessary to ensure that each type of education is suitable for the age of pupils and students, and to write in a direction from simple to complex. It is necessary to form educational literature focusing on the subject of perspective or its topics and rules in general secondary and vocational schools, higher education institutions, paying attention to the child's age, potential, aspects related to visual arts.
- Problems related to the inability to understand the peculiarities in the perspective of geometric shapes and the inability to apply it in the solution of positional and metrical problems. For example, a straight line can be represented by a single drop point in perspective, or a plane can be represented by a single drop line in perspective. That is, the perspective of straight lines and planes is depicted differently from orthogonal projection. This, of course, requires a strong spatial imagination and thinking from the student in solving positional and metrical problems.
- Problems related to revision and mutual adaptation of the content of the perspective depending on the type of education in vocational schools. Vocational schools train professionals in construction, visual arts and design, mechanical engineering and other fields. Depending on the purpose and task of each direction, it is necessary to prepare educational literature that includes materials suitable for the direction of the perspective.
- Problems related to the existence of cases of non-effective use of advanced pedagogical and information communication technologies in the teaching of perspective science. In the teaching of perspective topics, it is necessary to be able to choose interactive methods and pedagogical technologies suitable for the topic, as well as to solve the issues of developing its practical application. For example, "Networking (cluster)" in teaching topics related to types of perspective or methods of performing perspective images, "Venn diagram" methods in explaining the topic of entering perspective and its reliance on central projection, practical use of

2.1 ²⁵ Valiyev A.N., Adilov P.A., Gulyamova M.X. Tasviriy san'at darslarida o'quvchilarga perspektiva qoidalarini o'rgatishning dolzarb masalalari. "Maktab va hayot" jurnali. 2016- yil, 4-son. 20-24 betlar.

"Case-study" technology in teaching solving positional and metric problems in perspective will be appropriate. In addition, the appropriate use of information and communication technologies, animation, and multimedia in the process of teaching perspective topics will have a very positive effect in order to develop spatial imagination and thinking of pupils and students.

- Problems related to the lack of showing the practical importance of the theoretical materials of the perspective taught in HEIs in life and technology through examples and problems. We can cite the following examples of solutions to such problems. For example, when teaching the subject of interior perspective, it is necessary to reveal its practical importance in construction and interior design. Or it is necessary to show the practical applications of perspective rules, positional and metrical issues for painting in visual arts.
- Problems related to the formation and improvement of the bank of questions aimed at developing the creative ability of students in HEIs from a perspective. In order to master the science of perspective in a qualitative and complete way, a student must have graphic literacy, be able to independently perform perspective images of objects and objects, and be able to solve positional and metrical problems that require logical thinking. For this, it is necessary to develop and put into practice a set of tasks, workbooks, independent work tasks of such a status. We are currently forming a bank of such issues and putting it into practice.
- Problems related to the training of specialist pedagogues for technical higher educational institutions from a perspective. Nowadays, specialists in "Engineering graphics and design theory" are being trained at the technical higher education institutions. Masters who graduated from it are teaching perspective science at higher education institutions. However, because of the lack of basic knowledge of perspective among undergraduates who have completed their bachelor's degree at a technical higher education institution, they remain a shallow pedagogue. This is a problem facing the specialist training departments.
- Problems related to the development of the integration of drawing geometry and engineering computer graphics in higher education institutions. In today's fast-paced world, the science of computer graphics (branches) is developing rapidly. Drawings of many buildings and structures, various devices and objects are designed using various graphic programs. In higher education institutions, the theoretical materials of drawing geometry are explained to students by hand drawing. Of course, the rules and theories of drawing should be explained in the traditional teaching method. However, it is necessary to carry out scientific research on how to use graphic programs to draw objects while teaching the theories of drawing geometry. That is, it is necessary to scientifically develop the integration and teaching methodology of drawing geometry and engineering computer graphics.
- Problems related to the lack of creation of modern educational resources from the science of perspective. Preparation of electronic textbooks, multimedia developments, and animations is the demand of today for students and students to master the science of perspective. This prepares the ground for the student not only to improve his knowledge, but also to save time and to be able to refer to electronic literature at any time.

Conclusion/Recommendations.

Ways to eliminate the shortcomings and problems indicated above in the education of perspective science and the training of quality specialists should be developed and put into practice. As a result, our pupils and students have quality knowledge and skills in perspective science. This will certainly serve the development of the education sector in our country and the training of competitive personnel.

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