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IMPROVEMENT OF DIGITAL GRAPHICS AND DESIGN TECHNOLOGIES BASED ON NATIONAL ART HERITAGE

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Abstract: This article examines the historical development of graphic arts, the integration of digital technologies into the educational process, and the role of computer graphics and animation in fostering students' creative potential. The communicative significance of graphic design, its applications across various fields, and its integration with modern pedagogical and innovative technologies in education are analyzed. Furthermore, the study highlights the relevance of harmonizing national art heritage with digital graphics in the context of New Uzbekistan.
Keywords: graphics, computer graphics, digital technologies, composition, design, animation, visual communication, digital art, pedagogy, creative thinking, national heritage, innovative technologies.

It is well known that the primary goal of modern higher education institutions is to ensure that students acquire deep and solid knowledge in their chosen fields, enhance their intellectual potential, develop innovative thinking, generate novel ideas, and gain the skills to apply them in practical contexts. In contemporary education systems, graphics-related disciplines have become a crucial component of the learning process, as the importance of graphics in marketing and advertising, education, healthcare, industry, entertainment, media, and many other fields continues to grow year by year. Because graphic information enables rapid, precise, and visually effective communication, it has become an essential communicative tool across nearly all areas of human activity.

The term "graphics" was initially used in the context of calligraphy and the art of writing, but by the late 19th and early 20th centuries, with the development of printing and the emergence of photomechanical technologies, it began to emerge as a distinct branch of visual arts [1]. Graphic art, based on its functional and aesthetic characteristics, can be categorized into print graphics, book, newspaper, and magazine graphics, poster art, as well as applied graphics [2]. The advancement of digital technologies in the 21st century has propelled graphic art to a new level. The term "computer graphics" refers to the creation, processing, modeling, and editing of graphic objects under the control of electronic computing devices. Computer animation, on the other hand, involves the "bringing to life" of sequences of images, i.e., the synthesis of dynamic visual representations, and has become one of the main directions of the modern media industry [3]. Today, graphics play an unparalleled role in almost every aspect of daily life, ranging from simple matchbox designs to large-scale advertising banners, movie posters, mobile application interfaces, virtual reality environments, and 3D modeling systems. Studying digital art, graphic design, vector imagery, three-dimensional modeling, and visual communication technologies has become one of the key factors defining the professional competitiveness of the younger generation.

In the context of New Uzbekistan, the fields of culture and art are being reassessed as one of the key strategic directions for societal development. The discipline of visual arts and graphics plays a significant role in aesthetic education, spiritual development, deep

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understanding of national heritage, and the cultivation of creative thinking. The introduction of modern technologies in art schools and higher education institutions, the development of new curricula, and the widespread use of digital tools contribute to the enhancement of students' creative competencies [4], [5]. The immediacy of graphic arts distinguishes it from other forms of visual art. For example, creating a large-scale painting requires considerable time and technical processes, whereas graphics allow for the rapid representation of changes in reality. At the same time, digital graphic tools further simplify this process and provide artists with unprecedented opportunities.

In Uzbekistan, the increasing number of visual art festivals, creative competitions, and exhibitions, as well as the establishment of new cultural spaces such as the "Centre for Contemporary Arts," serve to support young artists, expand national and international cultural connections, and ensure the innovative development of the arts [6], [7], [8]. The rapid development of digital graphics, computer animation, 3D modeling, web design, and virtual reality technologies demands from specialists not only technical skills but also artistic thinking, creative approaches, compositional reasoning, and the integrated application of information technologies [9]-[17]. This, in turn, emphasizes the necessity of employing modern pedagogical technologies in graphic education, fostering students' creative activity, and aligning their skills with the requirements of the labor market.

Overall, the integration of graphic arts and digital technologies is shaping a new pedagogical paradigm within modern education systems. This process significantly influences not only the development of the arts but also the intellectual, cultural, and aesthetic advancement of society as a whole. It is important to emphasize that training qualified specialists in graphic and computer graphics depends not only on technical knowledge but also on the application of modern pedagogical methods. The use of innovative pedagogical technologies in teaching graphic design, digital imagery, animation, visual communication, and other branches of art enhances the effectiveness of the educational process. Interactive methods, project-based learning, STEAM integration, design thinking, multimedia teaching resources, virtual laboratories, and 3D simulations serve as essential tools for consolidating students' knowledge and guiding them in practical exercises [9], [11], [16]. The study of graphics encompasses not only the process of creating images but also theoretical aspects such as composition, color theory, form and space, visual rhythm, and balance. These elements collectively cultivate students' aesthetic taste, visual thinking, and creative approach. In particular, a deep understanding of the principles of composition ensures that graphic works achieve both artistic and technical excellence. Contemporary research extensively highlights the role of composition in developing creative potential and thoroughly examines its pedagogical foundations [2], [3], [12]. The integration of digital graphics into the educational process supports students' self-development, independent research, and deepening of visual literacy [10], [17]. Additionally, virtual platforms, electronic textbooks, graphic editors, and AI-based design assistants provide students with extensive opportunities to rapidly execute creative projects and experiment with complex compositional solutions.

In today's era of globalization, graphic arts play a crucial role in strengthening intercultural communication, preserving and promoting national heritage, popularizing creative ideas, and fostering aesthetic taste within society. The historical traditions of the Uzbek visual arts school including national patterns, miniature art, and local painting schools continue to thrive in the field of graphics with new forms and content. This provides a solid artistic foundation for young artists and designers [7], [15]. Increasing young people's interest in

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graphic arts, educating them in the spirit of national values, and encouraging the reinterpretation of cultural heritage in contemporary forms are among the priority directions of Uzbekistan's educational and cultural policies. Various creative clubs, masterclasses, exhibitions, art festivals, and international projects serve to support the younger generation. In particular, competitions in graphic design, computer animation, and 3D modeling help students develop practical skills and create portfolios aligned with market demands [8], [9]. In the context of digital transformation, the field of graphic arts is increasingly intertwined with artificial intelligence technologies. AI-based design tools, algorithmic animation, and image generation through neural networks are opening new creative opportunities [10]. This process expands not only the technical capabilities of students but also their conceptual worldview, artistic thinking, and creative freedom.

Overall, the integration of graphics and digital technologies has become a key driver of transformative processes in modern education systems. The coordinated application of computer graphics, animation, 3D modeling, composition theory, visual communication, and design technologies elevates students' professional preparedness to a new level. This aligns with the educational, cultural, and innovation policies of New Uzbekistan and plays a significant role in realizing the creative potential of the younger generation.

The development of graphics and digital design is creating new pedagogical opportunities for students within the educational process. In particular, graphic editors, 3D modeling software, platforms for working with vector images, and digital painting tools have become integral components of the learning process, significantly enhancing students' ability to perceive and comprehend knowledge visually. In addition to traditional graphic techniques: such as etching, linocut, aquatint, and lithography the use of modern digital tools allows students to expand their creative experience, integrate various methods of graphic expression, and develop new techniques [2], [3], [11]. Furthermore, the psychological and pedagogical aspects of graphic arts hold particular significance. Research indicates that working with visual images enhances students' abstract thinking, imagination, analytical skills, aesthetic perception, memory, and emotional awareness. The integration of this process into educational activities promotes individual creative activity, encourages independent problem-solving, and stimulates the exploration of innovative approaches [4], [5], [12]. The effectiveness of such pedagogical processes is further strengthened by the modernization of visual arts education.

It is noteworthy that the communicative function of graphic design in society is steadily increasing. In an era characterized by high-stress information flows, graphic tools have become one of the most effective means of conveying concise, clear, and meaningful information. As a result, areas such as infographics, pictograms, corporate identity, UI/UX design, and visual identification are widely applied across all sectors of daily life. The growing importance of visual communication in digital environments demands that graphic designers demonstrate high professionalism, artistic sensitivity, psychological insight, and technical literacy [6], [8], [16]. Another significant aspect is the integration of national values into graphic and art education, which cultivates aesthetic taste, moral awareness, and respect for cultural heritage among students. Uzbekistan's rich art school including traditions of miniature painting, patterns, local painting styles, and national decorative arts harmonizes with contemporary graphic design, laying the foundation for the emergence of new visual styles. The reinterpretation of national motifs in digital graphics provides young creatives with broad opportunities and encourages them to continue national heritage in innovative ways [7], [9], [15]. It is also important to note that education in graphics and digital arts is increasingly integrated with artificial intelligence

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technologies. Processes such as image generation using AI, creation of automatic composition models, color harmony calculation, development of animation scripts, and automatic 3D object modeling save students' time and expand opportunities for creative experimentation. The application of AI in graphic arts fosters students' algorithmic thinking, teaches them to optimize visual solutions, and helps prepare them as competitive professionals in the modern labor market [10], [17]. Given the rapid development of graphic arts today, it is essential to improve its scientific and methodological foundations, enhance the quality of education, enrich the learning process with innovative tools, and align curricula with international standards. Reforms in this field occupy a priority position in the educational strategy of New Uzbekistan, supporting the training of a new generation of specialists in art and design. These specialists are capable of establishing themselves not only in the domestic market but also in the international design industry.

Thus, the integration of graphic arts, computer graphics, and digital technologies in modern education exerts a comprehensive impact not only on students' professional competencies but also on their intellectual, aesthetic, and cultural development. This further emphasizes the strategic importance of graphic education, positioning it as one of the key directions for the future of education.

The foregoing observations indicate that contemporary graphics and digital technologies are an integral part of today's educational system, playing a crucial role in the holistic development of individuals. The historical evolution of graphic arts, its modern interpretations, and the emergence of new directions such as computer graphics and animation have laid the foundation for the renewal of art in both content and form. The widespread introduction of digital tools into the learning process not only enhances students' creative potential, visual thinking, and technical competencies but also encourages independent thinking, innovative approaches, and practical creativity.

The discipline of graphics is not only a field grounded in artistic aesthetics but also holds significant importance as a strategic tool for effective communication in society. The increasing demand for graphic solutions across marketing, advertising, healthcare, education, industry, web design, media, and numerous other fields necessitates a modernized approach to training specialists in this area. The harmonious application of traditional graphic techniques and digital tools provides students with extensive creative opportunities and strengthens the integration of theory and practice. In the context of New Uzbekistan, the attention given to art and culture, the implementation of modern technologies in the educational process, and the modernization of art schools and higher education institutions contribute to enhancing the quality of graphic education. Moreover, the integration of national art heritage with graphic design fosters aesthetic taste among the younger generation and allows them to continue and develop cultural heritage in contemporary interpretations.

Overall, the rapid development of graphics and computer graphics plays an unparalleled role in forming innovative pedagogy, creative thinking, digital literacy, and cultural-aesthetic competencies. The deep integration of this field into the educational process serves to elevate the intellectual, technological, and artistic potential of future generations and remains a crucial factor in preparing them as competitive professionals in the modern labor market.

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