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Information Technology, Education, Law,
Psychology, Social Security and Work, Management

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CHAPTER 15. NEW TECHNOLOGIES FOR TEACHING COMPUTER GRAPHICS AND WEB DESIGN

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Abstract. The latest technologies for teaching computer graphics and web design in the context of the digital transformation of education are considered. The emphasis is on interdisciplinary and project-oriented approaches to training specialists. The role of visual thinking, creativity and digital literacy as key competencies is highlighted. The use of virtual reality tools, artificial intelligence, gamification, cloud technologies and open educational resources is revealed. Significant attention is paid to teamwork, flexible forms of learning, adaptive educational trajectories and interface testing methods. The experience of implementing modern platforms is presented and international certification practices are considered. The importance of digital ethics, inclusion, UX analytics and legal aspects of design are emphasized. The need for annual updating of curricula taking into account technological trends is substantiated. A conclusion is drawn about the strategic importance of visual education for the development of an innovative economy.

Keywords: computer graphics, web design, digital transformation, AR/VR technologies, gamification, cloud services, project-based learning.

Introduction. In the modern era of digital transformations, covering almost all spheres of life — from education to production, from healthcare to culture — the issue of updating approaches to teaching computer graphics (*Romanyuk O.N., Romanyuk O.V., Chekhmestruk R.Yu., 2023*) and web design (*Romaniuk O. N., Katelnikov D. I., Kosovets O. P. , 2007*) is of particular importance. These areas are not only an integral part of professional training in the field of information technologies, but also act as

separate branches of creative and technical activity that actively influence the formation of the visual environment of the digital era. Web design determines the logic of user interaction with information resources, and computer graphics tools provide effective visual representation of complex data, ideas and processes. Therefore, it is important that the teaching of these disciplines goes beyond instrumental learning, covering the development of aesthetic taste, design thinking and ethical design skills.

Given the rapid renewal of digital technologies, the methodology of teaching visual disciplines (*Romanyuk O.N. , 2025 and also Romanyuk O.N., Maidanyuk V.P., Romanyuk O.V., Chekhmestruk R.Yu., 2025*) should be flexible, innovative and focused on the independent cognitive activity of students. Traditional methods of transferring knowledge, which are focused on the mastery of certain software products, are gradually losing their relevance, because the tools of graphic design are constantly changing. In such conditions, the formation of universal skills becomes of key importance - the ability to critical analysis, self-study, adaptation and teamwork. Therefore, such educational approaches as project-based learning, the introduction of gamification, the involvement of elements of distance and blended learning, as well as the creation of conditions for creative self-realization become important.

Modern digital learning tools — cloud technologies, virtual and augmented reality, generative artificial intelligence systems — open new horizons for interactive and flexible learning. They change the very essence of the graphic and design process, which today is integrated with data analysis, programming, user experience and an inclusive approach to digital interaction. This, in turn, requires students to expand their competencies in analytics, interdisciplinary thinking, and understanding the social impact of visual solutions.

An additional factor in involving students in the educational process is practice-oriented forms of work: competitions, hackathons, real cases, internships, international projects. Such events not only increase motivation for learning, but also form professional qualities through direct experience in performing design tasks, presentations, and interacting with customers. The role of the teacher is transformed -

he becomes not only a mentor, but also an organizer of the educational environment, a mentor, a consultant, and a facilitator of teamwork.

The field of computer graphics and web design also performs an important social function - it serves as a means of overcoming barriers in communication, promotes inclusion and ensures the accessibility of digital content for different categories of users. This imposes additional requirements on curricula, which should include components of digital ethics, intercultural interaction, legal foundations and the psychology of perception.

Therefore, the task of effective teaching of disciplines related to visual technologies requires a comprehensive approach. It covers pedagogical, methodological, technological, socio-cultural and professional aspects. The purpose of this study is to systematize and analyze modern educational technologies in the field of graphics and design, determine the prospects for the development of teaching, and outline effective methodological strategies that can ensure the preparation of specialists for the conditions of a digital society.

Analysis of recent studies and publications.

Basic principles of modern teaching of computer graphics and web design.

The role of computer graphics and web design in the modern digital society is extremely important.

Computer graphics serve as a means of visualizing information, which is important for big data. Graphic elements - infographics, diagrams, 3D models, animations - allow a person to perceive, interpret and remember complex information faster. Thanks to graphics, data becomes visual, intuitive and emotionally expressive. This is especially relevant in education, science, medicine, engineering and business analytics, where accuracy, speed and clarity of information transmission are crucial.

Web design defines the way a user interacts with digital platforms. Through page structure, composition, typography, color scheme, and navigation logic, web design creates the first impression of a product, brand, or service. It provides functionality, intuitiveness, and aesthetics for modern interfaces. In the context of e-commerce, e-government, online education, or social media, the usability of the

platform, the efficiency of information search, and the user's overall trust in the resource depend on the quality of web design.

Computer graphics are also a basic tool of the creative industry - games, cinema, advertising, animation, digital art. It allows you to visualize ideas, create virtual worlds, convey emotions and form cultural images. It is thanks to computer graphics that the emergence of such directions as VR/AR, motion design, interactive art, visual storytelling became possible.

In technical terms, graphics and design are components of the user experience, which is formed through the interface. Every application, web resource or device interacts with the user through a graphical shell. It is the design that determines whether this interaction will be comfortable, accessible to people with visual impairments, and whether it will comply with the principles of aesthetic balance and ergonomics.

In the social dimension, computer graphics are a tool for inclusion, education, and participation. Visual messages overcome language and cultural barriers, making information accessible to wider audiences, including those with reading or text comprehension disabilities. Web design that meets accessibility standards allows people with disabilities to interact with the digital environment on an equal footing.

From an economic (*Tsikhanovska O., Romanyuk O., 2019*) point of view, graphics and web design are a component of the added value of a product. The visual identity of a brand, the quality of a site, the level of interface design directly affect consumer trust, sales efficiency, and the company's positioning in the market. All this emphasizes the importance of graphics specialists in marketing, SMM, advertising, business, and startups.

In a pedagogical context, computer graphics contribute to the development of visual thinking, creativity, and an interdisciplinary approach. It allows you to combine technology, art, psychology, communications, computer science, and even mathematics in one educational course. Graphics are also a powerful means of motivating students, as they allow you to create a tangible result in the form of a visual product (*Tsikhanovska O., Romanyuk O., 2019*) that can be demonstrated, published, or applied in a real project.

Graduates of the Computer Graphics major have a wide range of employment opportunities in the creative industries, information technology, education, media, marketing, and scientific visualization. Professional areas cover both technical and artistic aspects of visual modeling, design, and digital communication. The main positions that graduates can occupy are graphic designer, web designer, UI/UX designer, 3D artist, animator, motion designer, game designer, character designer, computer graphics engineer, visual effects developer, AR/VR specialist, illustrator, digital artist, educational content designer, scientific visualization specialist, and computer graphics teacher.

A graphic designer creates visual materials for brands (*Tsikhanovska O., Romanyuk O., 2019*), advertising, presentations, printed and digital media. A web designer is responsible for designing website interfaces, adhering to the principles of adaptability, typography, and navigation logic. A UI/UX designer develops user interfaces, taking into account convenience, accessibility, behavioral models, and aesthetics. A 3D artist creates three-dimensional models for games, architecture, and visualizations. A motion designer and animator create animated scenes, splash screens, and dynamic graphic elements for videos or advertising campaigns. A game designer works on the visual components of games, developing characters, locations, and interaction logic. A computer graphics engineer creates shaders, rendering algorithms, and integrates graphics into software systems. AR/VR specialists develop graphical environments for virtual and augmented reality, while illustrators and digital artists work on creating images for books, media projects, or mobile applications. Data visualizers create infographics, dashboards, and graphical panels for analyzing information in business, science, or healthcare.

Salaries for computer graphics graduates vary significantly depending on country, experience, project level, and specialization. In the United States, according to Glassdoor and the Bureau of Labor Statistics' official 2024 statistics, the average annual salary for a graphic designer is approximately \$58,000–\$65,000. A UI/UX designer earns an average of \$85,000–\$100,000 per year. 3D artists and motion designers earn an average of \$75,000–\$90,000. Highly skilled game designers or

graphics engineers can earn over \$110,000 annually, especially at companies like Google, Apple, Adobe, Ubisoft, Pixar, or Microsoft. The starting salary level (Junior) for designers in the US starts at \$45,000 per year, while specialists with more than 5 years of experience (Senior) can earn from \$95,000 to \$130,000 and more, especially if they have additional tools such as Unity, Blender, After Effects or Figma.

In Ukraine, salaries are lower, but growing dynamically, especially in the field of outsourcing and freelancing. As of 2024, according to the Djinni platform and the DOU survey, the average salary of a graphic designer is from 25,000 to 40,000 hryvnias per month. A UI/UX designer earns an average of 40,000 to 70,000 hryvnias, while motion design or 3D graphics specialists can earn from 50,000 to 100,000 hryvnias, depending on the complexity of the projects. Experienced professionals working for international companies or as freelancers through the Upwork and Fiverr platforms can earn from 1,500 to 4,000 dollars per month, which corresponds to the level of global rates. In the field of web design, mobile interface design and AR/VR graphics, Ukrainian specialists often work in international companies on a full-time or part-time basis, receiving payment in dollars or euros.

Thus, the specialty of computer graphics is not only promising in terms of creative realization, but also financially attractive, especially if you have knowledge of modern tools, programming languages, and English. A wide range of positions allows graduates to choose between working in studios, IT companies, educational institutions, media agencies, startups, or pursuing an independent career as a freelancer in the global market.

Teaching computer graphics and web design in higher education institutions is extremely relevant (*Romanyuk O.N., Chekhmestruk R.Yu., Romanyuk O.V., Denisyuk A.V., 2022 and also Romanyuk O.N., Maidanyuk V.P., Romanyuk O.V., Chekhmestruk R.Yu., 2022*) and appropriate in the context of the digital transformation of society, economy and education. These disciplines provide students with critically important skills necessary not only in the IT sector, but also in related industries - architecture, design, journalism, marketing, education, medicine and cultural industries. According to analytical data from international and national employment platforms, the demand

for specialists in the field of UI/UX design, digital illustration, web development and multimedia content is growing every year. Thus, according to the LinkedIn Jobs portal for 2024, the number of vacancies for graphic designers, web developers and user interaction specialists has increased by 38% over the past two years. In the national context, according to the Work.ua and Djinni platforms, over 6% of all IT vacancies in Ukraine relate to web design, visual content, or graphics work.

The industry's projected growth is supported by official statistics. According to the US Bureau of Labor Statistics, the number of jobs in digital design and web development is expected to grow by 16% by 2032, significantly exceeding the average growth rate for other professions. This indicator demonstrates a steady trend towards integrating graphic solutions into business processes, product promotion, and brand building.

The digital presence of companies is becoming particularly relevant, which creates an increased demand for specialists who can create adaptive, accessible and aesthetically attractive web interfaces. According to statistics from the State Statistics Service of Ukraine, as of 2024, more than 70% of small and medium-sized businesses in Ukraine have their own websites or are in the process of creating digital products. This indicates a real demand for the skills that are formed within the framework of computer graphics and web design courses.

In addition to the direct impact on employment, studying graphics and web design stimulates the general development of students' digital literacy, which is positively reflected in their interdisciplinary training. According to the results of the Digital Education Index Ukraine study conducted in 2023, students who took digital visualization courses performed 23% better on tasks within interdisciplinary projects than those who did not have such training. This is due to the development of critical thinking, the ability to visualize complex processes, and structure information.

Teaching graphics and web design also builds professional flexibility in students. Graduates have the opportunity to work both in the company's staff and as freelancers, remote developers or owners of small design studios. According to the Upwork platform, more than 30% of orders in the field of design are received by

specialists without formal education, but with a high-quality portfolio, which especially emphasizes the role of practice-oriented training in the formation of competitive professionals. In this regard, teaching graphics should include real cases, working with the customer, preparing presentations and analyzing other people's projects, which is already actively implemented in a number of universities today.

No less important is the impact of visual learning on the overall educational process. According to the Ministry of Education and Science of Ukraine, more than 60% of secondary schools already include elements of digital design in the subjects of "Art", "Technology" and "Informatics". This creates a demand for specialists who are able not only to work in the field of design, but also to teach graphics to future generations, integrating modern tools into school education.

An additional factor of feasibility is the contribution of computer graphics to the development of creative industries. According to a study conducted by the British Council in Ukraine in 2022, the contribution of the creative sector to the country's GDP is about 4%, with computer graphics being one of its main areas along with music, cinema and advertising. This sector demonstrates high potential for the export of services and the integration of Ukraine into global digital markets.

Thus, teaching computer graphics and web design provides students with skills that meet the demands of the labor market, promotes interdisciplinary integration, supports the development of the digital economy and stimulates the entrepreneurial activity of young people. This also improves the quality of higher education in general and makes it possible to implement the state's educational policy in the direction of digitalization, innovation and competitiveness of human capital. The validity and feasibility of teaching these disciplines is confirmed not only by theoretical considerations, but also by numerous statistical indicators, analysis of the labor market and the needs of modern society.

New directions for the development of teaching visual disciplines. One of the most dynamic industries that is rapidly changing under the influence of technology is the training of specialists in the field of computer graphics and web design. These areas require not only deep theoretical knowledge, but also practical skills in working with

modern software products, modeling tools, multimedia, coding and artificial intelligence. Educational institutions must adapt to new challenges, providing students with relevant knowledge, flexible competencies and opportunities for practical application of acquired skills in real conditions.

The transition of the educational process to the digital plane is important. This applies to both the forms of conducting classes and the content of educational materials. Students no longer perceive paper notes as the main source of knowledge. Instead, they use interactive textbooks, virtual laboratories, video lessons, online courses, simulators and platforms for testing knowledge. In the field of computer graphics, this means the active use of software such as Adobe Illustrator, Blender, Krita, and in the field of web design - HTML/CSS editors, graphic interface editors and prototypes, for example, Figma, Framer, Webflow.

One of the defining factors of effective digital learning is its adaptability. Students can learn at their own pace, return to difficult topics, and work on projects individually or in teams using cloud services. This approach increases motivation and promotes accountability for results.

One of the key innovations is the use of virtual (VR) and augmented reality (AR). In teaching computer graphics, VR allows you to create three-dimensional scenes and environments in which students can freely manipulate objects, change materials, lighting and angles. This allows you to better understand the basics of spatial composition, lighting and perspective. In turn, AR technologies allow you to overlay digital elements on the real world, which has potential in the design of interfaces, packaging, interior elements.

VR/AR integration allows for hands-on learning in conditions as close to production as possible. For example, students can create virtual models of architectural objects or interact with user interface elements in real time.

The use of game mechanics in teaching is a powerful motivator. Gamification in teaching graphics and web design includes the introduction of points, levels, badges, ratings, quests, mini-contests (*Romanyuk O.N., Romanyuk O.V., Kovaleva Y.O., 2025 and also Romanyuk O.N., Romanyuk O.V., 2025*) and team competitions. For example,

for completing homework or participating in a webinar, a student receives virtual bonuses that can be exchanged for additional materials or individual consultations.

Gamification helps build leadership and communication skills, develops strategic thinking, time management skills, and also allows for better consolidation of what has been learned through emotional engagement.

Classic exams are increasingly being replaced by project work. In the field of design, a portfolio plays a crucial role in a specialist's career. Therefore, teachers guide students to create their own projects with gradual complexity - from banners to full-fledged websites with animation, adaptive design, and interactive components.

Project-based learning covers the entire cycle - from the formation of technical specifications, research of analogues, creation of prototypes to implementation and presentation. At the same time, the review method is actively used - analysis of colleagues' projects, which promotes reflection and professional growth.

With the spread of cloud platforms, the educational process loses spatial and temporal limitations. For example, Figma allows several students to work on interface design simultaneously. Google Workspace, Miro, Notion - allow you to organize team interaction, structure knowledge, record results, and plan tasks.

Cloud technologies also facilitate the control and storage of learning outcomes, allow teachers to review each participant's contribution to the overall project, form individual educational trajectories, and provide prompt feedback.

In recent years, AI systems have become widespread in the educational process. They allow you to create images, animations, generate web page layouts, and HTML/CSS codes based on human language queries. For example, Midjourney or DALL·E can create a series of conceptual sketches for a game or website in a few seconds, which is especially useful for inspiration in the initial stages of a project.

AI is also being implemented in assessment systems. They can analyze student work against set criteria, detect plagiarism, and evaluate structuring and design based on usability principles, allowing teachers to focus on individual support.

In web design, there has traditionally been a boundary between the graphical interface and the software implementation. However, modern platforms such as

Webflow, Tilda, Wix offer integrated solutions that combine graphical layout and automatic code generation. This allows students to quickly test the functionality of their interfaces, change the structure or add interactive elements without in-depth learning of a programming language.

This approach promotes inclusion - involving people with different levels of training in development.

In the context of teaching web design, an important aspect is compliance with the principles of accessibility (WCAG), as well as the skills of creating adaptive interfaces for different devices and audiences. Students should be instilled with an understanding of the importance of color contrast, font size, navigation logic, and support for mobile versions. This is achieved through the analysis of examples, working with visually impaired audiences, and modeling user scenarios.

Platforms such as Coursera, Udemy, edX, Khan Academy offer courses in computer graphics, UI/UX, digital illustration, 3D modeling. It is advisable to integrate such materials into the learning process, in particular as independent study, thematic modules, and homework.

The use of MOOC platforms allows students to become familiar with international standards, tools, and approaches to solving practical problems.

It is impossible to introduce innovative teaching without modernizing the professional training of teachers. It is necessary that teachers not only know modern graphics and design tools, but also possess interactive learning methods, have facilitation skills, creative thinking, and critical reflection. It is worth stimulating the participation of teachers in hackathons, online courses, and exchange of experience between universities and IT companies.

A positive example is the involvement of teachers in the creation of original courses on national educational platforms and participation in the development of higher education standards in the field of design.

The modern approach to training specialists is focused on interdisciplinarity. Computer graphics and web design have long ceased to be isolated industries. Their tools are widely used in engineering, medicine, journalism, architecture, marketing,

education, psychotherapy and other areas. That is why an important trend is the integration of graphics courses into STEM/STEAM educational programs.

In the context of engineering, computer graphics allow you to model technical systems, create visualizations of complex processes, increasing clarity and accuracy. In medicine, 3D visualization is used to teach anatomy, simulate operations, and in psychology - to create simulated therapy environments.

This requires adapting curricula, flexible courses, and creating selective educational modules that allow students from different majors to master the basic tools of graphic design.

In visually-oriented courses, it is difficult to identify plagiarism or non-authorial solutions, especially when templates or AI-based generative systems are used. Therefore, the role of digital expertise is growing: teachers should teach students the principles of authorship, licensing, Creative Commons, respect for visual identity and authorial style.

In addition, it is important to familiarize yourself with the rules of fair use of stock images, templates, frameworks, and open source components, indicating the sources and authors.

The modular learning approach is becoming increasingly popular - breaking educational content into self-contained blocks that can be studied independently, accumulating results in the form of microcertificates (digital badges). This approach is convenient for those who study in parallel with work or want to master only certain technologies (for example, only vector graphics or responsive layout).

Microcertification is implemented through the integration of the educational process with online platforms (Coursera, Prometheus, Udemy), where students undergo verification, take exams, and receive confirmation of their qualifications.

Participation in international competitions (*Romanyuk O.N., Romanyuk O.V., Kovaleva Y.O., 2025 and also Romanyuk O.N., Romanyuk O.V., 2025*) in graphic design and web development, such as Adobe Design Achievement Awards, Awwwards, Behance Student Showcases, encourages students to develop their own style, create competitive projects, and form an online portfolio.

Also important are student academic exchanges, where graphics are taught in English, using the tools of the global IT environment. This develops not only technical, but also linguistic, communicative, and cultural competencies in students.

In recent years, the Open Educational Resources movement has been actively developing. Teachers are increasingly creating open textbooks, interactive presentations, and video instructions with free access. For example, some universities are posting full-fledged courses in computer graphics on YouTube, Moodle, and GitHub.

OER not only increase the accessibility of education, but also contribute to the standardization of knowledge, the formation of a global educational community of teachers and design practitioners.

Assessment in creative disciplines has its own characteristics. It is important for teachers to use combined models - to combine formative (current) and summative assessment, to take into account both technical and aesthetic characteristics of projects.

Modern practices include the use of digital rubrics, online portfolios, interactive defenses, peer review, mentoring, and self-assessment. This allows for a realistic picture of a student's progress.

To ensure high-quality training for students, teachers are guided by international standards (WCAG 2.1, ISO/IEC 24751, Adobe Certified Expert, Google UX Design Certificate, etc.). Some courses end with industry-recognized certification.

For example, Figma Certified Designer or Adobe Certified Associate certification allows a graduate to officially confirm their skills and increase their chances of employment.

The use of platforms such as Moodle, OpenEdX, Microsoft Teams, Zoom, and Discord for communication, checking work, and discussing projects has become standard. Some universities have 3D printing labs, VR zones, and design studios where students can implement their ideas.

IT companies often conduct training and certification programs for teachers. For example, the “Education + Technology” webinar series from Google, Adobe, and Microsoft provide an opportunity to learn about new trends and tools. Many

universities have established advanced training centers specializing in digital education.

Teachers increasingly act as facilitators, tutors, and curators of the educational process, rather than just lecturers.

Modern approaches to studying computer graphics are increasingly focused on teamwork, as real projects in the IT sector, design, game development and multimedia require collective solving of complex tasks, distribution of roles, integration of components, constant communication and mutual feedback. Team learning technologies allow students to develop not only technical, but also social and managerial competencies, in particular the ability to cooperate, take responsibility, present ideas, work under deadlines and adapt to changes. One of the most common forms of team interaction in the educational process is project learning, when students are combined into groups and work on a common graphic or interactive product, such as a mobile application, website, 3D model, animated video or interactive presentation. Teams usually have a division of responsibilities: one member is responsible for UX research, another for composition and typography, a third for technical implementation, and a fourth for testing and presenting the results. This approach is close to the format of a real production process and develops students' understanding of the full cycle of creating a graphic product.

Cloud and interactive technologies are used for effective teamwork. Online services such as Figma, Canva, Miro, Notion, Google Drive, and Trello allow you to work on shared layouts, plan tasks, monitor implementation stages, and provide comments in real time. In the teaching of 3D graphics and animation, platforms such as Blender Cloud and Autodesk Maya with support for collaboration via Git or shared repositories are actively used. For teamwork on video or graphic composition, Adobe Creative Cloud is used, which allows you to synchronize projects between different participants. In the context of distance or hybrid learning, Microsoft Teams, Discord, Slack, and Zoom are especially effective tools that provide screen sharing, discussion of layouts, joint review, and online defenses.

In addition to digital platforms, pedagogical technologies focused on team interaction are actively being implemented: the case study method, design sprints, brainstorming, facilitation sessions, joint testing of concepts. Teachers act not only as carriers of knowledge, but also as mentors, facilitators and moderators of team dynamics. The practice of peer-review is also widespread, when students evaluate and comment on the work of other groups, which stimulates critical thinking, exchange of experience and the development of reflection.

A particularly valuable component is interface testing in teams, when one student develops a design, and others check it for usability and accessibility. This simulates the real interaction of a designer, tester, project manager and client. In addition, project management methods - Agile, Kanban, Scrum - are actively used within the framework of teamwork, which form the skills of organization, planning, iterative improvement and public defense of results.

Thus, team learning technologies in computer graphics combine digital tools, pedagogical approaches, and project-based learning to provide students with key professional and communication skills necessary for successful careers in design, web development, the media industry, and digital art.

In the context of rapid technological changes and growing demands on the professional skills of computer graphics and web design specialists, teaching of relevant disciplines should be based on the principles of adaptability, interdisciplinarity, and project-based learning.

Among the latest educational technologies that are actively implemented in computer graphics courses, it is worth noting the use of augmented reality (AR) and virtual reality (VR) systems. Such tools allow students to interact with graphic objects in three-dimensional space, model scenes, feel the influence of perspective, lighting, and materials on the visual construction of an object. AR/VR applications allow not only to create an interactive environment for studying three-dimensional modeling, but also contribute to the development of spatial thinking and imagination.

In the field of web design, such methods as design sprints and collaborative interface testing have become widespread. Design sprints allow for a limited time

(usually five days) to go through the full cycle of creating and testing the concept of a digital product. For the educational process, this means the opportunity to teach students an iterative approach to developing UI/UX solutions, the logic of building a website's information architecture, and the integration of adaptive layout taking into account user scenarios. In addition, training in teamwork, brainstorming, and facilitation sessions develops not only technical but also communication skills.

Digital platforms such as Figma, Adobe XD, Blender, Unity, Canva for Education, and others are an integral part of teaching, as they allow students to work with real industry tools. In this case, it is important not only to demonstrate the technical capabilities of the software, but also to form design thinking - the ability to make decisions based on aesthetic, functional, and ethical criteria. For example, when studying interface design, it is advisable to offer students an analysis of examples of accessible design that takes into account the needs of users with visual or motor impairments.

Gamified approaches play a special role in learning. They allow you to turn the educational process into an interactive game in which students earn points, reach levels, solve quests or participate in competitions for the best layout. This stimulates internal motivation and creates an additional context for repeating theoretical knowledge in practice. Gamification elements are effectively implemented in LMS systems (for example, Moodle, Google Classroom) using applications such as H5P.

Another promising teaching technology is the use of neural networks and artificial intelligence in the generation of visual content. Thanks to systems such as Midjourney, DALL·E or Runway ML, students can analyze the principles of image stylization, automated object generation, adaptive palette selection, etc. This not only deepens the understanding of machine learning algorithms, but also forms an idea of the future of the design profession, where collaboration with AI will become the standard.

Coursework and diploma training in the field of computer graphics and web design is increasingly taking the form of project-based learning. Students create complete digital products - websites, branding concepts, game interfaces, visual

presentations, animated videos - in collaboration with real customers or within the framework of competitions (*Romanyuk O.N., Romanyuk O.V., Kovaleva Y.O., 2025 and also Romanyuk O.N., Romanyuk O.V., 2025*) and hackathons. This approach contributes to the development of creative thinking, independence, the ability to present one's own idea and adapt it to specific requirements.

Universities that are actively implementing modern learning models in these fields are moving to the concepts of blended and inverted learning. Students receive theoretical materials in the form of video lectures, podcasts, interactive presentations, and classroom time is spent on practical skills development, collective discussions and testing solutions. This approach allows for differentiation of learning, individualization of the trajectory of each student and promotion of deeper assimilation of the material.

Participation in international competitions, olympiads, workshops, and exhibitions plays a significant role in motivating students to study. For example, participation in competitions in digital art, UX/UI design, 3D graphics, or hackathons on web accessibility and mobile-first design allows students to test their own ideas, receive feedback from the international community, and compare themselves with colleagues from other countries.

It is also worth noting the role of adaptive educational analytical systems, which, based on the results of current assessments, activity in LMS environments and logs of interaction with educational content, form recommendations for the next steps in learning. This is especially relevant for personalized training of designers, as it allows you to flexibly adjust the pace and complexity of tasks. The integration of cloud technologies into educational processes, in particular Google Workspace for Education, Microsoft 365, Canva for Teams and Adobe Creative Cloud, provides a convenient environment for teamwork, sharing graphic materials, developing layouts and discussing solutions in synchronous or asynchronous mode. A feature of modern teaching is not just a demonstration of tools, but the formation of a culture of teamwork, where designers and developers learn to work effectively on a common product, adhering to the principles of responsibility, decision hierarchy and versioning.

An important component is the formation of skills for critical analysis of visual content. In the process of learning, students must learn not only to create visual images, but also to analyze examples of bad and good design, understand the psychology of color, composition, typography, and study user behavioral patterns.

Using eye-tracking research, user session recording, and click-through analysis, students can see real-world user reactions to web interfaces or graphical layouts. This creates a new learning paradigm – from “drawing” to “interaction modeling,” where each graphical element is viewed as a functional unit that has an impact on user behavior.

One of the trends of recent years is teaching using Open Educational Resources (OER), which make it possible to form modular courses, adapt materials to local contexts, and expand the range of examples and implementation options. Platforms such as OpenLearn, Coursera, edX, Khan Academy, and MIT OpenCourseWare offer a large number of materials for self-education that can be integrated into the learning process as additional or mandatory elements.

The use of the reflective portfolio methodology has a positive impact on the formation of students' professional identity. The portfolio records not only the results of the work performed, but also the thinking process, the choice of tools, alternative solutions, as well as self-reflection: what was successful, what should be improved, what was the feedback. Such portfolios are the basis for assessing progress, as well as a powerful tool for future employment.

No less important is the formation of interdisciplinary competencies. Since web design and computer graphics intersect with engineering, psychology, marketing, cultural studies, and communications, studying related subjects (for example, "Fundamentals of Web Analytics," "Digital Marketing," "Behavioral Patterns in the Digital Environment," "Creative Writing") contributes to understanding the context of application of a graphic product.

The development of adaptive design technologies, which change depending on the device on which the content is displayed, requires students to understand the technical aspects of media queries, breakpoint strategies, and the principles of a

mobile-first approach. For this, frameworks such as Bootstrap, Tailwind CSS, and Material Design are effectively used, which allows students to learn not only to style elements, but also to build a system visual language taking into account flexible modularity.

Analysis of teaching practices at leading universities in the USA, Canada, Great Britain, Germany and South Korea indicates the growing role of a studio-centric approach. Instead of traditional lectures, graphic studios are emerging, in which learning is built on a constant interrelation of iterative creation, demonstration and discussion of works. In this format, the teacher acts as a facilitator of the process, a mentor and coordinator, and not a source of ready-made knowledge.

Teaching the ethical aspects of digital design is becoming particularly relevant. Students should be aware of how visual content can manipulate user behavior, influence their decisions, create information bubbles, or mislead. Topics such as digital ethics, design for inclusion, and combating visual stereotypes are included in modern curricula as independent modules.

It is also worth noting the need to improve the qualifications of teachers who have to work with such technologies. Continuous training, participation in international workshops, certification programs, exchange of experience with other universities ensure not only the relevance of knowledge, but also allow adapting methods to rapid changes in the industry. Teachers who have modern tools for modeling, design and research of user interfaces can form an environment of trust, dynamics and creativity.

Special attention should be paid to the development of project management skills in the process of learning web design and computer graphics. Since most design tasks are implemented in a team, it is important to integrate knowledge of Agile, Scrum, Kanban, Trello and Jira into the learning process. Students should learn the basics of time management, role allocation, priority assessment and interaction in the development environment. The use of Agile models in design courses allows for iterative design development, retrospectives, integration of feedback and flexible adaptation of technical solutions.

The development of mobile technologies requires a corresponding update of educational programs. In particular, students should study the principles of Mobile First Design, the creation of adaptive mobile prototypes, and the optimization of graphics for mobile devices. Modern designers and design systems - Figma, Sketch, Adobe XD - allow you to create interfaces taking into account multiple screen sizes, the specifics of touch control, and the limitations of data transmission channels. Learning these technologies allows students to immediately focus on developing products that meet the realities of the digital environment.

Integrating accessibility principles into design is not just an ethical dimension, but also a practical necessity. When training future web designers, emphasis should be placed on creating interfaces that meet the requirements of WCAG 2.1 - ensuring keyboard navigation, using contrasting colors, adaptive fonts, alternative text for images. The practice of designing sites that are accessible to people with visual, hearing, or motor impairments develops social responsibility in students and increases the quality of the created product .

Case studies based on the analysis of real-world examples from design or development practice make a significant contribution to the quality of teaching. For example, examining visual campaigns from companies such as Apple, Google, IKEA, Canva, or Uber allows you to evaluate visual solutions in terms of functionality, recognition, and ease of perception. Students can not only recreate the design, but also create alternative concepts, conduct A/B testing, and simulate user experiences.

There is significant potential in teaching web design through involvement in the development of prototypes of socially significant services. Initiatives such as design for non-profit organizations, information support for charitable projects, and development of visual materials for public campaigns provide students with a deeper understanding of the impact of graphics on social processes. At the same time, they allow them to develop practical skills in a real environment without the risk of commercial liability.

The use of 3D graphics and animation in teaching opens up new horizons. Blender, Unity, Cinema 4D are not only tools for creating three-dimensional models,

but also powerful platforms for teaching the physics of motion, lighting, texturing, procedural generation and character animation. The combination of artistic vision with mathematical algorithms promotes interdisciplinary thinking, as well as the development of skills that are in demand in the gaming industry, AR/VR projects and cinema.

The integration of artificial intelligence into design tools makes it possible to automate routine tasks. Generative design systems, automatic alignment, content filling, image and text stylization become accessible even to beginners. However, it is important to teach students to critically analyze the results of AI work, understand the limitations of such systems and not lose creativity. The courses "AI and Creativity", "Machine Learning for Designers", "Prompt Design" form the basis for conscious work with the latest technologies .

The formation of soft skills in future designers is also important. Courses in public presentations, visual storytelling, psychology of information perception, and critical thinking contribute to the development of the ability to defend projects, argue decisions, and work with customers and client audiences. 21st century competencies (4K: creativity, critical thinking, communication, and cooperation) are integrated into high-quality web design and computer graphics programs at leading educational institutions.

In order to form a systems thinking, it is advisable to use educational maps (mind maps), dependency graphs, visual diagrams of interface structures, user scenario templates. Such tools allow you to see not only the result, but also the path to achieving it. For example, building a logical map of the site navigation allows you to assess the convenience and accessibility of the interface even before creating a visual layout. In combination with the user journey map technique, a holistic view of the user experience is formed.

As a result, new technologies for teaching computer graphics and web design form not only a set of skills, but a whole system of creative thinking, technical literacy, social responsibility and readiness to work in the multi-tasking environment of the digital economy. High-quality integration of technological tools, pedagogical

approaches and practice-oriented methods is the key to training specialists capable of innovative development of the visual content sphere.

Another important direction is the personalization of learning, which is implemented through the analysis of the student's digital footprint. Platforms such as LMS Moodle, Canvas, Google Classroom allow teachers to see the dynamics of material acquisition, activity in tests, the quality of completed practical tasks, the pace of lecture review. This makes it possible to build individual learning trajectories - for fast learners, offer complex tasks, for those who need support - extended explanations and additional practice.

Tools to support a personalized approach are also recommendation systems that analyze a student's previous experience and offer relevant materials. For example, a system can offer a student who often works with animation additional modules on timelines, motion curves, or procedural generation. The use of such systems brings the educational process closer to "learning on demand" models, which corresponds to the paradigm of continuous education .

Comprehensive teaching also requires the development of visual literacy. This concept encompasses not only the ability to create images, but also to critically interpret them, distinguish manipulative techniques, and evaluate the impact of a visual message on the target audience. Visual literacy is formed at the intersection of art theory, marketing, sociology of communications, and psychology of perception. It allows students to understand not only how to draw, but also why and to whom to address the image.

Integrating digital research into teaching also broadens horizons. Students can analyze graphic trends based on social media data, app ratings, portfolios from Behance, Dribbble, or Awwwards. For example, comparing popular UI styles in the period 2020–2025 allows us to see the rise in popularity of neomorphism, flat 3D, darkmode, or skeuomorphic renaissance. Such research forms a vision of the global context in students and allows them to anticipate future challenges.

With the development of AR/VR and meta-environments, the importance of teaching spatial UX design is increasing. Creating interfaces that exist in three-

dimensional space requires new knowledge about depth, movement, focus points, gravity, and gesture interaction. Students study interfaces for VR glasses, AR applications, and gaming helmets, which allows them to prepare for new formats of visual interaction in the fields of education, entertainment, medicine, and

The practice of implementing inter-university collaborations, for example through competitions, hackathons, joint courses on the Coursera or Prometheus platforms, allows students to work in a multicultural environment. They learn to adapt visual style to different mental models, cultural codes and expectations of audiences from other countries. This becomes a decisive factor in preparing specialists for the international design market.

It is necessary to pay attention to the role of visual thinking in solving applied problems. For example, in creating infographics for reporting or interactive dashboards, it is important to combine knowledge of composition, typography, information hierarchy and technological aspects of integration into web applications. Tools such as Tableau, Power BI, Google Data Studio are becoming an integral part of training within visual analytical design.

In teaching animation, it is advisable to apply the principles of the “12 laws of animation”, formulated by the Disney studio (*Romaniuk O. N., Katelnikov D. I., Kosovets O. P., 2007*). Their use in graphic projects allows to ensure smoothness of movement, recognition of characters, expressiveness of emotions. Students can implement mini-animations in the form of logos, screensavers, transitions between screens. The application of these principles in web design increases the overall aesthetics of the product.

Among the methods that have proven to be effective, it is worth noting reversible learning. Students are first invited to independently familiarize themselves with the material (for example, a video instruction on adaptive layout), after which they discuss difficulties in class, work on tasks, and create alternative options. This approach activates cognitive processes, promotes deeper understanding, and increases motivation for self-study.

A significant advantage is the creation of banks of templates (*Romanyuk O.N., Kovaleva Y.O., 2025*), modules, frameworks that students can reuse. This lowers the threshold of entry, allows you to focus on the concept, rather than on routine implementation, promotes faster prototyping and comparison of options. At the same time, such knowledge bases stimulate the development of an internal standardized style.

In parallel with the formation of professional skills, students need to develop a digital identity. Web designers and graphic designers actually create their virtual image through portfolios, publications, online communication, and participation in open projects. Training programs should include modules on digital reputation, the basics of building a personal brand, copyright protection, and self-presentation in a professional environment (LinkedIn, Behance, GitHub, Medium). This allows preparing students for work in a competitive market.

It is also important to understand the legal aspects of a designer's work. Students must learn the concepts of intellectual property, licensing of fonts, images, templates, copyright, rules for using open source or creative commons. Simulation tasks are effectively used in the learning process: for example, the student is offered a case of a conflict with copyright infringement or a situation of creating a licensed design for a client from another jurisdiction is simulated.

In teaching graphics and web design, it is worth considering not only digital technologies, but also elements of traditional design: working with color by hand, compositional solutions on paper, sketching. Such methods are especially useful in the early stages of learning, forming a connection between the physical and digital world, developing spatial thinking, the ability to concentrate on details. In a number of Western universities, there are still mandatory courses in academic drawing within the framework of digital media design.

Alternative forms of assessment are increasingly being used instead of traditional testing to assess academic achievement. These include project defenses, public presentations, peer-review, portfolios, essays, video reports, interactive tasks, and hackathons. Such forms provide an authentic test of skills, close to a real

professional situation, where the result is evaluated not only by the criteria of "right - wrong", but also by quality, argumentation, and visual perfection.

The importance of the mentoring approach is growing, when the teacher acts as an individual consultant, not just a source of knowledge. In groups, practices of joint brainstorming, weekly stand-ups, individual reviews, and recording feedback in the LMS are used. Emotional support becomes an important tool: design is a creative activity, and students often experience doubts, burnout, and loss of motivation. Systemic support in the mentoring format has a positive effect on the quality of the result.

The use of hybrid learning allows you to combine the advantages of online and offline forms. Lectures are held in video format or in the format of video conferences, practical classes are held in the classroom, and reviews of work, feedback, discussions are held in an online environment. This increases flexibility, allows you to work with guest speakers from other countries, saves resources, and at the same time ensures social interaction in the group.

One of the key conditions for success is the constant adaptation of the training course. Changes in the industry occur extremely quickly: new tools, standards, trends appear. Therefore, graphic and web design courses should be updated every year: new topics should be introduced (for example, prompt engineering, generative design), outdated practices should be removed, modules on ethical interaction with AI should be added. This requires an active position of the teacher, interaction with employers, participation in professional communities.

Professional learning platforms play a significant role: LinkedIn Learning, Coursera, Domestika, Skillshare. Students can take certified courses recognized by international companies. Integrating such courses into the curriculum, recognizing them as additional modules or replacing individual lectures forms a modern flexible education model. It is important to teach students to critically evaluate the quality of content and independently plan their own educational trajectory.

Generative content is increasingly used in the learning process: instructions created with the help of AI, design examples formed on the basis of algorithms,

visualizations that adapt to user behavior. This poses a new task for pedagogy - to form the ability to work with algorithms while preserving the human element in design: intuition, emotionality, contextuality. Learning must balance between automation and creativity.

Modern curricula increasingly integrate elements of cloud collaboration in real-time environments. Collaborative work in Figma, Miro, Notion, FigJam or Google Jamboard allows you to create concepts, discuss solutions, note errors and improvements directly during the creative process. Students learn to distribute roles – designer, editor, analyst, layout artist – and act as a real production team, simulating the conditions of professional activity.

Deep learning is achieved through the use of adaptive simulation environments, such as those for learning lighting, texturing, animation, or interface layout. For example, virtual labs allow you to change shadow parameters, lighting types, and material characteristics and see the results instantly. Such tools enable a “learning by doing” approach that is much more effective than theoretical explanations.

In the process of teaching, it is important to form digital ethics. A designer must understand how his product affects user behavior, what information it enhances and what it hides. For example, manipulative UX techniques (“dark patterns”), excessive stimulation through visual effects, dragging attention into endless scrolling – all this becomes the subject of ethical analysis. Responsible teaching involves discussing such issues in practical cases, developing skills for making ethical decisions.

Teaching web design should be accompanied by the formation of documentation skills. In professional practice, a designer not only creates layouts, but also draws up design systems, guidelines, technical tasks, and specifications for developers. Students should learn to document UI components, sign colors, font styles, and the behavior of elements during interaction. This improves the quality of teamwork and facilitates the transfer of the project to development.

It is also necessary to teach students how to work with user data. When creating personalized interfaces, adaptive systems or design for recommendations, it is important to adhere to the principles of GDPR, confidentiality, openness. Students

should know how to collect the minimum amount of data, how to explain the purpose of the collection, how to visualize analytics in a way that does not violate user privacy. These aspects are included in the programs as interdisciplinary blocks.

The field of computer graphics is closely related to the entertainment industry: games, animation, interactive media. Curricula that integrate game design allow students to create visual stories, develop characters, and implement gameplay.

In the context of an interdisciplinary approach, a promising direction is the combination of web design with linguistics, social sciences and cultural studies. Creating localized interfaces, adapting graphics to cultural features, working with content for different language communities - all this broadens the designer's horizons and gives the opportunity to enter the global market. Students should learn how to adapt the structure of the page, color scheme, and font design to another culture.

A successful element of innovative learning is the organization of intra-university design hubs, where students can work on real-world tasks for other faculties, administration, and social projects. Such a hub is a space for implementing initiatives, exchanging experiences, mentoring, and portfolio development. Participation in such projects motivates students and strengthens the connection between education and professional practice.

Summarizing the above, it can be stated that the latest technologies for teaching computer graphics and web design go far beyond the classical paradigm of "study - pass". They form a holistic personality: creative, ethical, technologically aware, socially responsible and ready for the challenges of the modern digital economy. The comprehensive integration of innovations into education allows us to train a new generation of specialists - not only performers, but also creators of the visual culture of the future.

Using open APIs and third-party integrations has become an integral part of training web designers working in the real world. Incorporating tools like Google Maps API, OpenWeather, YouTube Embed API, or Stripe into the learning process allows students to create fully functional interfaces with dynamic content. It also introduces

them to the principles of REST requests, JSON data processing, and ensuring API accessibility for the design system.

An important competency is the ability to work with layouts not only at the level of the visual component, but also taking into account the subsequent implementation - front-end and back-end integration. This means that the student must understand the limitations of HTML, CSS, JavaScript, the principles of adaptability, resource loading, SEO optimization, cross-browser testing. Close cooperation with programmers in the educational process allows you to form the skills of realistic design - one that is easily implemented in code.

The formation of eco-design principles is also gaining importance. It is about developing energy-efficient interfaces, optimized in terms of volume, colors, and refresh rate. Designers must know how to minimize the load on servers, reduce the number of requests, and adapt content to screens with low energy consumption. The study of sustainable design principles is becoming part of global digital ethics.

Today, the “studio-based learning” methodology is increasingly used, which involves organizing learning as a continuous process of creating, discussing, demonstrating, and refining solutions. Within the framework of this methodology, the classroom is transformed into a laboratory where students work on projects, receive real-time feedback, participate in reviews, and learn from the examples of colleagues. This approach promotes the development of critical thinking, public advocacy skills, and flexibility.

Significant attention is also paid to intercultural design. In today's world, digital products must embrace users with different cultural backgrounds. Students learn how colors, symbols, and composition are perceived in different countries, and how to adapt navigation or content structure to cultural scenarios. For example, right- or left-handed reading, vertical or horizontal page hierarchy - all of this depends on cultural codes that need to be taken into account when designing global interfaces.

A separate area of teaching is working with data. Visualizing information, building graphs, charts, and maps requires an understanding of statistics, structuring logic, choosing scale, color, font, and intervals. Graphics courses include topics on

data storytelling – storytelling using data. Students must learn not only to “draw a graph,” but also to tell a story, explain changes, and identify patterns.

There is a growing interest in emotional design. The principles laid down by Donald Norman are based on the fact that an effective interface evokes positive emotions – trust, sympathy, joy. Students analyze how the shape of a button, the smoothness of animation, humor in microcopy, background colors affect the perception of a product. Educational tasks include creating an “emotional map” of the interface or testing user reactions to a change in visual style.

Within the framework of digital inclusion, teaching the principles of universal design – design that is convenient for the widest possible range of users – is actively developing. For example, students learn how to create a website that will be accessible to users with color blindness, hearing impairments, motor skills, and cognitive disorders.

In the training of future designers, the use of augmented reality (AR) for the presentation of models is becoming increasingly popular. Students can demonstrate logos, 3D objects, illustrations in real space through the smartphone camera. This creates deeper audience engagement, allows you to evaluate proportions, effects of scale, light, context. AR applications serve not only as a visualization tool, but also as a channel for interaction with a potential client.

Under the influence of these new approaches and technologies, the role of the teacher is also changing. He is transformed from a knowledge carrier to a facilitator, curator, analyst, mentoring partner who supports student initiative, organizes a safe environment for creativity, stimulates reflection, growth and self-knowledge. Such a teacher must constantly update his skills, work in collaboration with industry experts, and participate in the development of the learning environment.

The modern system of training specialists in computer graphics and web design is at the intersection of education, art, engineering, ethics and information technology. Analysis of the latest educational approaches shows that effective learning can no longer be based exclusively on lectures, exams and demonstrations of tools.

The review of approaches demonstrates that the important role is played not so much by technological support as by the didactic logic and pedagogical thinking of the teacher. Only a teacher who is ready to constantly rethink his role, integrate new formats, and seek a balance between automation and creativity will be able to prepare a competitive graduate in the field of design.

Prospects for further development of this educational sphere include:

1. Expanding the use of artificial intelligence not only for content generation, but also for analyzing learning trajectories, building recommendation systems, and dynamic assessment.
2. The emergence of virtual collaborative design labs, where students from different countries will be able to work on joint graphic projects in real time.
3. Deepening inclusive practices with a focus on Universal Design, accessibility, language equality, and localization.
4. Stronger integration of design with social sciences – ethics, cultural studies, media studies – to form a critical view of the digital environment.
5. Involving students in the development of educational products (training courses, tests, mini-Lego lectures) as part of pedagogical collaboration.

The value of flexible learning design that adapts to the needs of the student, the industry context, and technological changes is increasingly recognized in global practice. This is especially important in the training of web designers and graphic designers, as this is an industry that is visual, emotional, innovative, and at the same time technologically deep.

Thus, the introduction of the latest technologies into the educational process allows not only to update the teaching tools, but also to rethink the very essence of educational interaction: from the transmission of knowledge to its joint creation; from instruction to dialogue; from template to research.

One of the effective means of developing these skills and at the same time a powerful motivational tool are competitions, which play an important role in the learning process and professional development of future specialists.

Computer graphics and web design competitions create conditions that are as close as possible to a real production environment. Through their participation, students get the opportunity to work with applied tasks that require a comprehensive approach to solving problems, creative rethinking of standard solutions, adherence to clear technical parameters and deadlines. Unlike conventional laboratory or coursework, competition tasks often have an open structure, which allows participants to freely experiment with ideas, combine different styles, interpretations and concepts. This contributes to the development of non-standard thinking and the formation of an individual design style.

Competitions are also an important channel for updating educational material. Teachers, analyzing the requirements of competitions, have the opportunity to adapt curricula, including the latest industry trends, such as interactive design, 3D graphics, animation, UX/UI design, adaptive layout, prototyping, etc. Competitions contribute to the active implementation of a practice-oriented approach, where students not only master theoretical knowledge, but also learn to apply it in real conditions. Participation in competitions forms in students the experience of working on projects that have a complete structure, logic of construction, and a clearly expressed goal .

The interdisciplinary nature of the competitions deserves special attention. Often, to achieve success in the competition, it is necessary to possess not only graphic design tools, but also basic knowledge of the psychology of perception, marketing, communication, as well as to have an idea of the peculiarities of working with color, composition, typography, digital security, and user interaction. Thus, competitions contribute to broadening the horizons, forming a systemic vision of project activities, and understanding the role of visual solutions in the context of the communication environment.

An important aspect is also the social and emotional component of competitive participation. The atmosphere of creative competition, public demonstration of works, exchange of experience with students of other educational institutions, participation in master classes and workshops, communication with jury members - all this builds self-confidence, stimulates the desire for self-development, increases motivation for

learning. Students who participate in competitions, as a rule, demonstrate a higher level of independence, initiative and responsibility for the results of their work.

No less important is the opportunity to receive material and non-material incentives - prizes, diplomas, certificates, scholarships, invitations to participate in projects, internships or educational programs. Often, competitions are held with the support or direct participation of companies that act as potential employers. This allows you to establish a connection between the educational institution and the labor market, increase the chances of students for successful employment in their specialty. The works of the winners become part of the professional portfolio, which is an important element of career growth.

Participation in international competitions allows students to compare their level of training with global standards, get acquainted with new approaches, technologies, and methods. In addition, such events open up access to international communities, increase the prestige of the educational institution, and promote the spread of innovative practices and knowledge transfer. Successful examples — the participation of Ukrainian students in the Adobe Design Achievement Awards, Behance Portfolio Reviews, International Design Awards, Ukrainian-American Graphic Design Contest, etc. — demonstrate the high competitiveness and creative potential of young people.

Competitions are also important as an element of career guidance work. School and regional Olympiads, festivals, exhibitions of student works make it possible to identify gifted youth at the stage of pre-university preparation, to form motivation for admission to relevant specialties, and to orientate in choosing a future profession. Active involvement of schoolchildren in competitive activities ensures the continuity of education, improves the quality of student recruitment, and creates a positive image of the institution in the eyes of the public.

Thus, computer graphics and web design competitions are a powerful tool for improving the educational process, increasing motivation for learning, forming professional competence and an active position of students. They combine learning with creativity, stimulate self-realization, provide contact with the professional environment and open up wide opportunities for further development. The introduction

of systematic competitive activities in educational institutions contributes to improving the quality of education, innovative approaches and competitiveness of graduates in the labor market.

The role of distance learning in training graphic design professionals is to integrate modern digital tools, expand access to knowledge, create a flexible, individualized educational environment, and increase the level of interdisciplinary interaction.

Involving leading experts in the format of online lectures, webinars, workshops or master classes opens up a unique opportunity for students to get acquainted with advanced world experience, modern trends in graphic and web design, practices that are actually used in top companies. This contributes to the development of students' critical thinking skills, adaptability, the ability to work with new technologies and navigate the global information space. Participation in remote meetings with famous designers, art directors, UX analysts or programmers allows not only to receive relevant information firsthand, but also inspires young people for their own development and career achievements.

One of the key advantages of the distance format is the ability to use modern visual and interactive technologies, such as collaborative editing of layouts in Figma, commenting on portfolios on Behance or Dribbble, reviewing interface codes in GitHub or CodePen, as well as demonstrating design processes through streams or recorded tutorials. This allows students to practically follow the logic of building a professional product, analyze errors and solution steps in real time. In addition, the ability to return to recorded lectures allows you to consolidate the material, better structure your knowledge, and master complex concepts at your own pace.

Another important aspect is the possibility of creating communities and network groups in which students can interact with each other and with teachers, receive feedback, participate in discussions, discuss projects, and share resources. This builds remote teamwork skills, which are extremely in demand in the IT design field, where a significant part of the work is done in a freelance or remote team format.

Involving specialists from different countries in distance learning also stimulates intercultural exchange and the development of a tolerant attitude towards other design traditions and approaches. Students have the opportunity to broaden their professional horizons, compare different schools of graphic thinking, master universal standards of layout, design, color, and content accessibility. In this context, distance learning contributes to the international integration of the educational space and the training of competitive specialists of a global level.

Conclusion. In the course of studying modern technologies for teaching computer graphics and web design, it was found that these disciplines occupy a key place in the educational process in the context of the digital transformation of society. Their study provides the formation of not only technical knowledge, but also creative thinking, aesthetic taste, the ability to interdisciplinary integration and adaptation to changes in the technological environment. Successful teaching of graphics and design is based on a flexible, adaptive approach that combines theoretical training with practical projects, group work and the use of the latest digital tools - from cloud platforms to artificial intelligence.

A significant role in the training of highly qualified specialists is played by such components as gamification, VR/AR integration, personalized educational trajectories, modular online courses, international certification, and participation in real cases. These elements contribute to increasing student motivation, ensuring the acquisition of practical skills, forming a professional identity and competitiveness in the labor market. Successful learning models require teachers not only to have professional knowledge, but also to be able to act as facilitators, mentors, and coordinators of team activities.

It should be emphasized that computer graphics and web design play not only a professional but also a social role, contributing to inclusion, knowledge visualization, information accessibility, and the development of digital culture. Curricula should cover topics such as digital ethics, intellectual property rights, interface accessibility, and visual literacy, forming responsible and creative professionals.

Thus, the introduction of innovative educational technologies in teaching graphics and design is not only advisable, but also a necessary step in preparing a new generation of specialists capable of working in a fast-paced, multidimensional digital environment. System integration of such approaches will allow to provide high-quality education that meets the demands of the labor market, the needs of society and the strategic goals of the digital development of Ukraine.

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CONTENTS

CHAPTER 1. LEGAL AND ORGANIZATIONAL SUPPORT FOR THE USE OF MODERN ROBOTIC COMPLEXES IN CONTEMPORARY WARS AND ARMED CONFLICTS BY SECURITY AND DEFENSE FORCES IN ENSURING STATE SECURITY.....	3
CHAPTER 2. METHODOLOGICAL APPROACH TO THE TRANSFORMATION OF THE MAIN BUSINESS PROCESSES OF PUBLISHING AND PRINTING COMPANIES AND EVALUATION OF THEIR EFFECTIVENESS.....	49
CHAPTER 3. NEW THREATS, NEW DEFENSES: THE MATERIAL ARMS RACE IN THE SKY	81
CHAPTER 4. BLOCKCHAIN AS A TOOL FOR RESTORING TRUST IN MANAGEMENT IN THEORETICAL AND PRACTICAL DIMENSIONS.....	117
CHAPTER 5. BENEFITS AND RISKS OF APPLYING ARTIFICIAL INTELLIGENCE IN ONLINE FOREIGN LANGUAGE TEACHING.....	153
CHAPTER 6. TRENDS IN THE DEVELOPMENT OF MODERN JURISPRUDENCE IN UKRAINE.....	185
CHAPTER 7. CONCEPTUAL BASIS FOR THE FORMATION AND IMPLEMENTATION OF MONETARY POLICY	218
CHAPTER 8. MARKETING STRATEGY AS A TOOL FOR INNOVATIVE DEVELOPMENT OF A HIGHER EDUCATIONAL INSTITUTION: THE EXPERIENCE OF BINPO DZVO "UMO" NAPS OF UKRAINE	254
CHAPTER 9. ACTIVATING STUDENTS' COGNITIVE ENGAGEMENT IN TECHNICAL ENGLISH LEARNING WITH AI TOOLS	295
CHAPTER 10. STRATEGIC LEADERSHIP IN THE ERA OF DIGITAL CHALLENGES AND TECHNOLOGICAL POLARIZATION.....	333
CHAPTER 11. COMBATTING CORRUPTION IN DEFENCE: A STRATEGIC IMPERATIVE FOR UKRAINE'S SECURITY AND PEACE.....	366
CHAPTER 12. INNOVATIONS IN INFORMATION SYSTEMS.....	398
CHAPTER 13. INTERNATIONAL SOCIO-LEGAL PRACTICES IN COMBATING DOMESTIC VIOLENCE AGAINST WOMEN: RESPONSE MODELS AND INSTITUTIONAL SUPPORT.....	427
CHAPTER 14. INTERNATIONAL CHARTER AND LINER SHIPPING.....	464
CHAPTER 15. NEW TECHNOLOGIES FOR TEACHING COMPUTER GRAPHICS AND WEB DESIGN.....	497

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