



# Digital Drawing and Painting in the Training of Bachelors of Professional Education: Experience of Blended Learning

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## ABSTRACT

The aim of the study is to solve the problem of insufficient training of specialists who are able to meet the growing demand for projects in the digital design and computer games industry. Based on the analysis of the content of digital drawing and painting, two elective courses were implemented. They are: "Digital drawing with the basics of composition" and "Digital painting with the basics of color" for Bachelors of Professional Education majoring in digital technologies. In order to properly organize the process of blended learning, which was caused by quarantine restrictions due to the COVID-19 pandemic, appropriate tools to be used in the process of studying these courses, were selected. The Moodle distance learning platform and cloud technologies (Google Docs, Google Drive) were used to present theoretical material and set tasks for practical study. For operative communication with students VoIP program Discord was used. To develop students' skills of drawing from life and high-speed drawing we offered such Internet resources as Line of action, Character designs, Bodies in Motion, Human anatomy for artist. Approbation of the developed courses in the institution of higher education in the conditions of blended learning and the results of the survey of students proved the effectiveness of the developed courses.

## CCS CONCEPTS

• **Social and professional topics** → **Computing education**; • **Applied computing** → **E-learning**; • **Human-centered computing** → **Visualization techniques**.

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## KEYWORDS

professional education, digital technologies, Bachelor's degree, digital painting, digital drawing, teaching methods

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## 1 INTRODUCTION

### 1.1 Problem statement

Professional training of Bachelors in Professional Education in the specialty "Computer Technology" ("Digital Technology" [4]) in Ukraine is implemented in accordance with the [2]. These areas include: 01 Education / Pedagogy, specialty 015 Professional education (by specialization), which is responsible for the International Standard Classification of Education [1] field 0188 Inter-disciplinary programs and qualifications involving education. According to the Standard of Higher Education of Ukraine [3], the training consists of two aspects: pedagogical training in teaching according to the specialization in the institutions of professional (vocational and technical) education, institutions of higher professional education (Bachelor's level) and professional (engineering) training. Professional training includes the courses aimed at mastering digital technologies for displaying, using, creating, processing, collecting, transmitting, distributing, storing, protecting and destroying information and data [8]. One of these technologies is computer graphics, which allows you to work with digital images of different formats (raster, vector) and type (two-dimensional, three-dimensional, animation, multimedia).

Computer graphics means have brought to life such new types of fine arts as digital drawing and digital painting, which lay the foundations for creating various types of digital visualizations, animations, illustrations, as well as graphic elements of computer games, virtual and augmented reality, design of web-resources, software interfaces and other digital design objects. Modern labor

market, digital design and computer games industry need specialists with such skills [6].

## 1.2 Problem state of the art

To identify the state of the problem of training Bachelors capable of implementing the tasks of digital drawing and painting and apply them in the field of digital design and computer games, we analyzed the Bachelor's curricula of the following specializations: "Digital Technology", 021 "Audiovisual Arts and Production (0211 Audio-Visual Techniques and Media Production) and 022 "Design" (0212 Fashion, Interior and Industrial Design). The analysis was carried out on the basis of open data and information resources of higher education institutions. We excluded from the analysis the curricula of those higher educational institutions, which official sites contained no complete information on the content of the curricula.

The analysis of curricula of Bachelors of Professional Education majoring in "Digital Technologies" allows us to state the fact that the curricula do not include courses which deal with the study of digital drawing and painting (table 1). The study of the content of the curricula and syllabuses suggests that some issues related to these new types of fine arts are covered in Bachelor's programs of this specialization, but they are not enough to develop the ability to design elements of computer games, virtual and augmented reality, software interfaces and other digital design objects.

The analysis of the curricula 021 "Audiovisual Art and Production" and 022 "Design" allowed us to identify which courses related to digital painting are studied by students (tables 2, 3).

Thus, the results of the analysis raise the problem of insufficient training of specialists who are able to meet the growing demand for projects in the digital design and computer games industry. Therefore, it is advisable to introduce digital drawing and painting in the process of Bachelors' of Professional Education training, due to the fact that they must have the appropriate knowledge and skills to teach students in the institutions of professional (vocational) education. They also should be able to design and create digital images of raster, vector and mixed types.

Therefore, there appears the urgent need to develop the content of courses on digital drawing and painting for the future teachers of professional education, who will specialize in teaching digital technologies in professional (vocational) institutions of higher education and apply these skills in professional activities.

## 1.3 COVID-19 pandemic challenges

During the COVID-19 pandemic, most educational institutions were forced to switch to blended and distance learning [13]. As a result, the learning process had to be quickly adapted to a new learning environment. It is not a problem if the university has a well-established distance learning system on the Moodle platform [12], both teachers and students have the experience in using it properly [14], and are aware of how to use video conferencing and VoIP programs [9] and cloud technologies [15], if they are able to present theoretical material and set tasks for practical work online. However, under these conditions it is not only important to identify the content of "Digital drawing with the basics of composition" and "Digital painting with the basics of color" courses, but also to select

the means of blending digital drawing and painting, as well as approbation of developed courses in the process of training Bachelors of Professional Education in a higher education institution in the conditions blended learning.

## 2 RESULTS

In order to analyze the content of teaching digital drawing, we searched for books in Scopus, ERIC and Google Books according to a search query "digital drawing". As a result of the search we have found 541 research works in Scopus (thematic sections: Social Sciences, Arts and Humanities, Computer Science), 25 – in ERIC, and 340 – in Google Books. Among them, open-access books and those materials that fully relate to the content of teaching digital drawing were singled out. In particular, the book "Drawing Shortcuts: Developing Quick Drawing Skills Using Today's Technology" written by Leggitt [10] was analyzed. In this book the author shows how communicating with hand drawings combined with digital technology can be ingeniously simple, presents practical techniques for improving drawing efficiency and effectiveness by combining traditional drawing methods with the latest digital technology, including 3D modeling with SketchUp.

Xu [19] in his book "Drawing in the Digital Age: An Observational Method for Artists and Animators", teaches a new observational method based on math and computer graphics principles, offers an innovative approach that shows you how to use both sides of your brain to make drawing easier and more accurate.

Amoroso [5] brings together contributions from some of the leading landscape departments in the world to explore the variety in digital illustration methods. In each chapter, leading lecturers, professors and practitioners in the field of landscape architecture explain a specific digital approach with the use of images from their department to show how each technique can be used in inspirational examples.

A modern view of drawing methods in architectural design and 3D modeling was proposed by Melendez [11]. The author offers to use digital means and computational processes to study digital tools, techniques, and workflows for producing architectural design drawings (plans, sections, elevations, axonometrics, and perspectives), using contemporary 2D drawing, 3D modeling design software and visual programming.

Analysis of the content of online digital drawing courses on such sites as Udemy, Skillshare, LinkedIn Learning, Artcraft, Domestika allowed us to conclude that the vast majority of them are aimed at the development of individual skills (drawing perspective, drawing fantasy portraits, drawing characters, Fashion Sketch, sketching, drawing anime, etc.) and mastering various graphic editors (Adobe Photoshop CC, Adobe Fresco, Procreate, SketchBook Pro, etc.). Several courses offer the basics of drawing. In particular, in the 3-part course "How to Draw and Sketch for Absolute Beginners" (Udemy) R. Grayson teaches drawing lines and shapes, promotes understanding of the basics of volume, light, shadow and composition, develops the skills of drawing the environment and objects in perspective, provides basics of isometric perspective, shading of objects, reproduction of light and shadow, surfaces and textures. B. Koshu's "Digital Drawing" course (Artcraft), which consists of 8 classes, reveals the following issues: primitive-based

**Table 1: The results of the analysis of curricula of specialization 015.39 “Professional Education (Digital Technologies)”**

No	Institution of higher education	Curriculum	Compulsory courses	Elective courses
1	National Pedagogical Dragomanov University <a href="https://kist.ipf.npu.edu.ua/bakalavr">https://kist.ipf.npu.edu.ua/bakalavr</a>	Computer Technologies in Management and Learning	Engineering and Computer Graphics	Descriptive Geometry and Drawings Computer Design Web Design
2	Lutsk National Technical University <a href="http://lutsk-ntu.com.ua/uk/osvitno-profesiyna-programa-pershogo-bakalavrskogo-rivnya-0">http://lutsk-ntu.com.ua/uk/osvitno-profesiyna-programa-pershogo-bakalavrskogo-rivnya-0</a>	Professional Education (Computer Technologies)	Engineering and Computer Graphics, Computer Design and Multimedia, Web Technology and Web Design	3D Modeling and Animation
3	Pavlo Tychyna Uman State Pedagogical University <a href="https://udpu.edu.ua/navchannia/osvitni-prohramy">https://udpu.edu.ua/navchannia/osvitni-prohramy</a>	Professional Education (Computer Technologies)	Engineering and Computer Graphics	Publishing Systems Web Technologies and Web Design
4	Ternopil Volodymyr Hnatiuk National Pedagogical University <a href="http://tnpu.edu.ua/nzhenerno-pedagog-chniy-fakultet.php">http://tnpu.edu.ua/nzhenerno-pedagog-chniy-fakultet.php</a>	Professional Education (Computer Technologies)	Engineering and Computer Graphics	3D Modeling, Animation and Video Editing Computer Design and Multimedia Web Design Technologies of 3D Printing Vector Image Processing Technologies (not available in free access)
5	Ukrainian Engineering Pedagogics Academy <a href="http://www.uipa.edu.ua/ua/educative-work/osvitni-prohramy/622-2011-12-09-21-56-46/osvitni-prohramy-2019/6480-zatverdzeni-osvitni-programi">http://www.uipa.edu.ua/ua/educative-work/osvitni-prohramy/622-2011-12-09-21-56-46/osvitni-prohramy-2019/6480-zatverdzeni-osvitni-programi</a>	Professional Education (Computer Technologies)	Engineering and Computer Graphics Technologies of Processing Text and Graphic Information	
6	Rivne State Humanitarian University <a href="http://www.rshu.edu.ua/navchannia/osvitni-prohramy/bakalavr/2029-op-bakalavr-2021-rik-vprovadzhennia">http://www.rshu.edu.ua/navchannia/osvitni-prohramy/bakalavr/2029-op-bakalavr-2021-rik-vprovadzhennia</a>	Professional Education (Digital Technologies)	Engineering and Computer Graphics, Animation and Video Editing	Publishing Systems Web Technologies and Web Design
7	Volodymyr Vynnychenko Central Ukrainian State Pedagogical University <a href="https://phm.cuspu.edu.ua/kafedri/kafedra-teoriji-ta-metodiki-tekhnologichnoji-pidgotovki-okhoroni-pratsi-ta-bezpeki-zhittediyalnosti/opp/profesiina-osvita-tsyfrovi-tekhnologii.html">https://phm.cuspu.edu.ua/kafedri/kafedra-teoriji-ta-metodiki-tekhnologichnoji-pidgotovki-okhoroni-pratsi-ta-bezpeki-zhittediyalnosti/opp/profesiina-osvita-tsyfrovi-tekhnologii.html</a>	Professional Education (Digital Technologies)	Engineering and Computer Graphics, Computer Design and Multimedia	Fundamentals of Design Multimedia, Animation, Video Editing Professional Work with Graphics Packages Computer Modeling and Visualization Technology for Creating Multimedia Web-program
8	Lviv Polytechnic National University <a href="https://lpnu.ua/osvita/pro-osvitni-programy/pershyy-riven-vyshchoi-osvity">https://lpnu.ua/osvita/pro-osvitni-programy/pershyy-riven-vyshchoi-osvity</a>	Professional Education (Digital Technologies)		Computer Graphics in the Professional Activity
9	Berdiansk State Pedagogical University <a href="https://bdpu.org.ua/opp/bakalavr/pb-2020">https://bdpu.org.ua/opp/bakalavr/pb-2020</a>	Professional Education (Computer Technologies)	Engineering and Computer Graphics	Computer Graphics Packages 3D Modeling and Animation
10	Vinnitsia Mykhailo Kotsiubynskyi State Pedagogical University <a href="http://ito.vspu.net">http://ito.vspu.net</a>	Professional Education (Computer Technologies in Management and Learning)	Engineering and Computer Graphics	(not available in free access)
11	Volodymyr Dahl East Ukrainian National University <a href="http://mdl.snu.edu.ua/course/view.php?id=434">http://mdl.snu.edu.ua/course/view.php?id=434</a>	Professional Education (Digital Technologies)		(not available in free access)
12	Kyiv National University of Construction and Architecture <a href="http://vstup.knuba.edu.ua/ukr/?page_id=5206">http://vstup.knuba.edu.ua/ukr/?page_id=5206</a>	Professional Education (Digital Technologies)	Engineering and Computer Graphics, Computer Design and Multimedia	(not available in free access)
13	National University of Water Management and Environmental Sciences <a href="https://start.nuwm.edu.ua/osvitni-prohramy/item/profesiina-osvita-kompiuterni-tekhnologii">https://start.nuwm.edu.ua/osvitni-prohramy/item/profesiina-osvita-kompiuterni-tekhnologii</a>	Digital Technologies of Distance Education	Engineering and Computer Graphics, Web Technologies and Web Design	(not available in free access)

**Table 2: The results of the analysis of curricula of specialty 021 “Audiovisual Art and Production”**

Institution of higher education	Curriculum	Compulsory courses	Elective courses
Private Institution of Higher Education “Kyiv International University” <a href="https://kymu.edu.ua/instituti-ta-fakulteti/institut-zhurnalistiki/audiovizualne-mistetstvo-ta-virobnitstvo/">https://kymu.edu.ua/instituti-ta-fakulteti/institut-zhurnalistiki/audiovizualne-mistetstvo-ta-virobnitstvo/</a>	Audiovisual and Production	Art –	Digital Technologies in Cinema and Television Directing an Animated Film Animation Computer Design
Kyiv National I.K. Karpenko-Karyi Theatre, Cinema And Television University <a href="https://www.knutkt.edu.ua/struktura/ekannymustectva/kino.html#ref04">https://www.knutkt.edu.ua/struktura/ekannymustectva/kino.html#ref04</a>	Directing an Animated Film	3D Animation, Theory and Practice of Computer Graphics	(not available in free access)

drawing, basic shape usage, auxiliary volume drawing and kinematic schemes, basic drawing principles, work with home tasks, main aspects of training, concept of an object’s shape and volume, structure of light and shadow in objects, main features and patterns in work with chiaroscuro, types of perspective, work with lines and color in perspective, work with light and shadow in perspective, basics of composition, sequence of work with a picture, methods, and options for creating fast sketches, quick solutions – 80% of the results in 20% of the time.

While researching the content of teaching digital drawing, we analyzed textbooks on academic drawing, methodological foundations of drawing, technical drawing, basics of composition and perspective, as well as graphic drawing for designers. It was done in order to find ways to transform the methods and techniques of traditional (non-digital) drawing into the process of teaching students digital drawing.

## 2.1 Analysis of the content of teaching digital painting

In order to analyze the content of teaching digital painting, we used the search query “digital painting”. As a result of the search we have found 67 works in Scopus (thematic sections: Social Sciences, Arts and Humanities, Computer Science), 50 – in ERIC, and 322 sources in Google Books. Among these sources we have analyzed open-access books and those that fully address the content of digital painting. In particular, in our opinion, the most meaningful are the books by Tonge [17] “Bold Visions: A Digital Painting Bible” [17] and “Digital Painting Tricks & Techniques: 100 Ways to Improve Your CG Art” [18]. In the first book the author goes through the core art techniques such as colour, lighting, composition, research, materials and stuff like that. These concepts are explained by great illustrations as examples, and the techniques and tips are presented in a pointer style as well as in the form of several step-by-step workflow screenshots. Another book provides all the advice artists need to transform their digital painting from brush, lighting and color basics to special effects, working with layers, and speed and matte painting. Author has divided the instruction into beginner, intermediate and advanced skill levels. This allows you to individualize the learning process, depending on the initial skills of students and their level of professionalism in digital painting.

An interesting approach is proposed in the book “Digital Character Painting Using Photoshop CS3” [16]. In this book, Seegmiller [16] combined training in character design and digital painting. The

subject is not only about the theory of how to make images in two dimensions but often how to create a specific effect in a specific application. The book is in three parts. Part I deals with character design and coming up with the ideas that are worth visualizing. Part II is a brief review of some traditional artistic principles that will improve your art skills when you incorporate them into digital painting. Part III shows you how to solve some of the visual problems that will always be present when you are painting digital art.

The book by Jackson [7] “Digital Painting Techniques” covers digital painting, editing, compositing and digital illustration. Each chapter is based on the knowledge learned in the previous chapter; thus, later chapters in the book stimulate readers to create advanced digital painting compositing pipelines, use alpha channels, masking, selection sets, blending mode, special effects, edit layers and similar advanced compositing tools. There is even coverage at the end of this book, regarding data footprint optimization, as well as creating digital image compositing pipelines using open source platforms such as Java, JavaFX, HTML5, CSS3, JavaScript, Scripting, and Android Studio.

As a result of the analyses of the content of online digital painting courses on such sites as Udemy, CG master academy, CG spectrum, Skillshare, Domestika, we concluded that there are courses for both beginners and professionals, as well as those that offer an introduction to the fundamentals of digital painting (“Digital Drawing in Photoshop for Beginners”, “The Ultimate Digital Painting Course – Beginner to Advanced”, “CGMA: Digital Painting”). There are also some courses that teach certain aspects (portrait painting, landscape painting, mastering lighting and shading, character painting) and those teaching digital painting tricks to develop the skills of a concept artist, illustrator, video game designer, etc. While analyzing the content of teaching digital painting, we analyzed textbooks on traditional painting and color science in order to find educational materials that can be used in the process of teaching computer graphics to Bachelors of Professional Education.

## 2.2 Development of the content of disciplines “Digital drawing with the basics of composition” and “Digital painting with the basics of color”

Today, the concept of computer art includes both works of traditional art, transferred to a new digital environment that imitates the original material carrier, and fundamentally new types of art works,



**Table 3: The results of the analysis of curricula of specialty 022 “Design”**

Institution of higher education	Curriculum	Compulsory courses	Elective courses
Interregional Academy of Personnel Management <a href="https://cutt.ly/EAbDOUo">https://cutt.ly/EAbDOUo</a>	Web Design	Computer Design	Basics of 3D Modeling; Animation Graphics
Kharkiv State Academy of Design and Fine Arts <a href="https://cutt.ly/oAbFNWM">https://cutt.ly/oAbFNWM</a>	Graphic Design	Computer Graphics	(not available in free access)
Borys Grinchenko Kyiv University <a href="https://cutt.ly/lAbDEOq">https://cutt.ly/lAbDEOq</a>	Graphic Design	Web and Media Design	Computer Technology in the Environment Design
H.S. Skovoroda Kharkiv National Pedagogical University <a href="https://cutt.ly/uAbFLwG">https://cutt.ly/uAbFLwG</a>	Graphic Design	Computer Technology (by specializations)	Picture in Animation Motion Graphics; 3D Modeling and Animation; Computer Simulation; Art Technologies in Motion Graphics; Web Design; Basics of Motion Design; UX/UI design
Zaporizhzhia National University <a href="https://cutt.ly/LAbD4G3">https://cutt.ly/LAbD4G3</a>	Graphic Design	Computer Technologies and 3D Modeling	Application of Computer Graphics in Project Activities; Web Design; Game Design; UX/UI Design; Concept Art
Luhansk Taras Shevchenko National University <a href="http://surl.li/ajlbo">http://surl.li/ajlbo</a>	Graphic Design	Computer Technology in Graphic Design, Digital Media Design	(not available in free access)
Kherson National Technical University <a href="https://cutt.ly/8AbFAhX">https://cutt.ly/8AbFAhX</a>	Graphic Design	-	Computer Technology in Design Computer Graphics and Animation
Zaporizhzhia Polytechnic National University <a href="https://zp.edu.ua/kafedra-dizaynu">https://zp.edu.ua/kafedra-dizaynu</a>	Graphic Design	Computer Graphics	Engineering and Computer Graphics; Introduction to Computer Technology; Fundamentals of CAD Technologies
Ternopil Volodymyr Hnatiuk National Pedagogical University <a href="https://cutt.ly/UAbDkjD">https://cutt.ly/UAbDkjD</a>	Design	Computer Graphics	Web Design; 3D Modeling; Motion Design; Game Design
Khmelnitskyi National University <a href="https://cutt.ly/PAbFEIB">https://cutt.ly/PAbFEIB</a>	Graphic Design	Computer Design-Graphics	Computer Formatting; Fundamentals of Computer Design
National Academy of Visual Arts and Architecture <a href="https://cutt.ly/TAbFYMc">https://cutt.ly/TAbFYMc</a>	Graphic Design	Computer-Aided Design	Computer-Aided Design
National Academy of Government Managerial Staff of Culture and Arts <a href="https://cutt.ly/LAbFaBN">https://cutt.ly/LAbFaBN</a>	Graphic Design	Computer-Aided Design	(not available in free access)
Kyryvi Rih State Pedagogical University <a href="https://cutt.ly/JAbDwMG">https://cutt.ly/JAbDwMG</a>	Graphic Design	Computer Technologies in Design	Multimedia Design
Oles Honchar Dnipro National University <a href="https://cutt.ly/4AbFtmJ">https://cutt.ly/4AbFtmJ</a>	Design	Means of Computer Design	Design of Logos and Layouts in Adobe Illustrator; Fundamentals of Print Layout in Indesign; Fundamentals of Drawing in AutoCad; Fundamentals of 3D Modeling in 3dsMax; 3D Visualization with 3dsMax/Blender
Mykhailo Boichuk Kyiv State Academy of Decorative-Applied Arts and Design <a href="https://cutt.ly/0AbSBjz">https://cutt.ly/0AbSBjz</a>	Design	Computer Technologies	Computer Technologies (by specializations); Web Design
National Aviation University	Design	Computer Modeling, Computer Design Practice	(not available in free access)
Kyiv National University of Trade And Economics	Design	Digital Technologies in Design	Web; Design and Web Programming; Animation and Video Design
Open International University of Human Development “Ukraine”	Design	Computer Technologies of Design, Information Technology in Graphic Design	(not available in free access)
Lutsk National Technical University	Design	Fundamentals of Computer Design	Computer Design of the Environment
O.M. Beketov Kharkiv National University of Urban Economy	Design	Computer Technology in Design; Foundations of Game Design; 3D Modeling and CAD Technology in Design; Digital and Analog Media Design	(not available in free access)

which main environment is a digital one. Based on this and the analysis of textbooks, manuals, books and online courses on traditional and digital drawing and painting, we have designed the content of two elective courses for Bachelors of Professional Education, majoring in digital technology. Both courses are interdisciplinary and multitematic, as they include concepts and theories of computer science (binary code, presentation of graphic information in digital format, types of computer graphics, graphic file formats, etc.), fine arts (basics of composition, basics of color), digital drawing and painting (computer graphics, digital art, interactive art, vector graphics, raster graphics, fractal graphics, three-dimensional graphics, concept art, pixel art, motion design, indexed color, chroma subsampling, bit depth, etc.).

Theoretical material of the course “Digital drawing with the basics of composition” is represented by the following topics: content, aims and objectives of drawing; digital drawing tools; graphic drawing for designers; types of perspectives; construction of various bodies and objects in perspective; concept of texture and structure; concept of composition in fine and digital art; principles of composition in art and design; types and categories of composition; drawing the figure, face and parts of the human body. The course includes the following practical tasks: creating sketches and line art, hatching, drawing 1-Point, 2-Point and 3-Point perspectives, drawing bodies and objects in perspective, drawing textures, displaying dynamics in the composition, 3D drawing, drawing a figure and a person’s face, drawing a fashion illustration, using the principle of “golden ratio” in drawing. The course offers students the following topics for their self-study: morphology of drawing theory, Adobe Fresco – a program for the latest styluses and touch devices, criteria for successful design, theory and practice of fast drawing, drawing figures in motion.

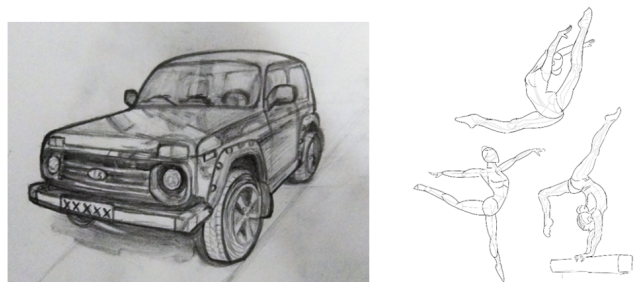
Theoretical material of “Digital painting with the basics of color” course contains the following topics: the essence, the specificity, types and styles of painting; digital painting as a new direction in art; materials and tools for digital painting; techniques of digital painting; color and light, color models in digital painting; color contrast and harmony; detailing and transmission of light and shadow in digital painting; concept and design of digital work; composition, perspective, proportions and scale in digital painting; texturing and reproduction of materials; images of human figures; painting the space and terrestrial landscapes; painting structures and vehicles. In practical classes, students are offered the following tasks: to create images with a mouse manipulator, to simulate watercolor painting, to master the skills of working with the shape and location of objects in space (still life painting), to master speed painting skills, to learn to paint in different styles and genres (marine, Chinese painting, vector painting, landscape, portrait). Topics for self-study include acquaintance with the works of foreign and Ukrainian digital artists, polygonal art, principles of painting realistic hair, portrait, air, ground and water.

### 2.3 Results of courses approbation

Two proposed courses in digital drawing and painting were tested in the second semester during the adaptive quarantine caused by the COVID-19 pandemic. Therefore, the learning process was carried out in the conditions of blended learning. The blended learning

model involved a combination of face-to-face classes and distance learning. The students get acquainted with the theoretical material not in the university but via the distance learning system on the Moodle platform [14]. Practical tasks were mainly performed in the laboratory, using graphic computer tablets and appropriate software (Adobe Photoshop, Adobe InDesign, Corel Painter, Gimp, Krita, Inkscape). Blended techniques were also used: students were not restricted in using traditional or digital drawing tools. If the epidemiological situation got worse and students were forced to perform practical tasks at home, they used the technical equipment available at home. Therefore, the requirement to perform practical tasks was not based only on the use of digital tools.

Assessment of learning outcomes of these two courses was carried out by evaluating students’ reports on the practical tasks fulfillment and tests. To receive a high score, the report should have contained step-by-step screenshots of the practical task, the file in the format of the editor used and the file in graphic format (GIF, JPEG, PNG, TIFF, SVG) (figures 1, 2). If students have not been presented in the classroom during the lesson, they sent a report by e-mail to the teacher.



**Figure 1: Examples of students’ practical tasks fulfillment in “Digital drawing with the basics of composition” course.**



**Figure 2: Examples of students’ practical tasks fulfillment in “Digital painting with the basics of color” course.**

In order to receive feedback from students during their studies and at the end of the course, the following questions were asked:

- Is the content of the course and its individual components (lectures, practical classes, tests) clear?
- Is the content sufficient enough to study digital drawing and painting? Which topic interested you the most?

- Is there enough time for practical tasks?
- Does the content correspond to the modern development of digital technologies?
- Can the course content and objectives be considered as practice-oriented ones?

Summarizing the responses of students who did these two courses, the following conclusions were made. The vast majority of students (80%) consider the content of the course and its individual components clear and sufficient for the digital drawing and painting learning. Students displayed no interest to the topics that reveal the issues of construction of various bodies and objects in perspective. The tasks of hatching and texturing, drawing fashion illustrations, figures, faces and parts of the human body and creating a drawing in the style of Chinese painting turned out to be difficult for the students. The majority of students (60%) noted that they had spent more time on some tasks than the teacher had planned, in particular, for digital painting. While responding to the question on the relevance of the courses content to the modern development of digital technologies the students' responses were distributed as follows: 20% of students responded that it was fully relevant, 60% of students said that it was mostly relevant, 20% – agreed partially. The majority of respondents (80%) consider the courses content and objectives to be practice-oriented ones. Thus, the results of the survey of students provide grounds for a positive assessment of the developed courses content and their further improvement, in particular in terms of their modernization and review of the time allotted for practical tasks.

### 3 CONCLUSIONS

The development of digital technologies and the needs of the labor market in computer graphics professionals capable of working in the digital design and computer games industry have highlighted the need to find ways to equip the students with modern tools for creating and processing digital images of various formats and types. Such new types of fine arts as digital drawing and digital painting are aimed at creating graphic elements of computer games, virtual and augmented reality, web resources, software interfaces, etc. The study of these contemporary fine arts industries by Bachelors of Professional Education majoring in digital Technologies provides a growing digital design and computer games industry with professionals. The analysis of the curricula for Bachelors of Professional Education majoring in Digital Technologies and Bachelors majoring in 021 "Audiovisual Art and Production" and 022 "Design" showed that insufficient attention was paid to the training of such specialists.

Therefore, the research solved the following tasks: 1) the content of the courses "Digital drawing with the basics of composition" and "Digital painting with the basics of color" was identified; it is represented by theoretical materials, practical tasks and questions for self-study; 2) software for the organization of blended learning (Moodle, Discord, Google Docs, Google Drive) was selected and students' skills of drawing from nature (Bodies in Motion, Human anatomy for artist) and speed drawing (Line of action, Character designs) in the conditions of blended learning were developed; 3) the approbation of the developed courses in the process of Bachelors'

of Professional Education training in the institution of higher education in the conditions of blended learning was carried out; the results of which by means of interrogation of students proved expediency of the developed content of disciplines and used software.

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