

Pedagogical Design of Digital Learning of Future Art Teachers in a Virtual Classroom

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Abstract. The pedagogical design of digital learning of future art teachers in a virtual classroom have been presented in this article. The development of the learning process of professional training of future art teachers of is guided through the creation of a multimedia and interactive path with instructions, references, activities and tasks both on computers connected to the Internet and on a variety of digital devices, such as mobile phones, tablet and laptop. In the first stage of study learners are gradually introduced into the digital didactics world, as they are required to deal with a set of digital tools and products. Additionally, they have to create some specific didactic products leading up to the second stage, where they will create their digital didactics project in a Mistakes Laboratory. The advantage of the proposed approach is that, what at the beginning of each session the digital expert uploads and shares chunks of the course of art history on the digital didactic platform. Then, learners autonomously explore the content, select and experience the activities they prefer. From time to time the digital activity is interrupted and students have share their ideas and discuss their doubts. Each session ends with the introduction of a short new chunk of blended and flipped learning path to be explored as homework on the platform. It will partially reveal the content of the following meeting. In this way the teachers are inductively engaged as much in the flipped lesson instructional strategy as in real samples of digital artistic didactics.

Keywords: Digital Artistic Didactics, TEDD educational model, Virtual Art-classroom, Mistakes Laboratory, blended and flipped learning.

1 Introduction

Over the last decades, there have been a number of research centers and educational institutions that have linked their activities to the development of digital direction in arts education. Among them are: Audiovisual Institute, Pompeu Fabra University, Barcelona, Spain; California Institute of the Arts, USA; Center For Research in Electronic

Art Technology, University of California, Santa Barbara, USA; Institut du Multimedia & Architecture de la Communication, Université Paris II, France; Institute for Electroacoustics and Experimental Music, University of Music and Performing Arts, Vienna, Austria; Media Lab, Massachusetts Institute of Technology, USA; Royal Conservatory of Music and Dance, The Hague, Holland; Technology in Music and Related Arts, Conservatory of Music, Oberlin College, USA; Utrecht School of the Arts, Holland.

However, the paradox of the situation is that the proposed performative concept focuses only on the egocentrism of the transformer, who once again seeks to open the "limits of being" in a new way, ignoring the person's gifted ability to transform his/her conscience and heart for personal disclosure. After all, "all the hardships of time can fit in the soul of the artist and be overcome not simply by creativeness, but only by creative innocence, because it leads to the light-truths" [1, p.136].

1.1 Setting of a problem

The widespread use and increasing dependence on Internet resources has put the research landscape of the discipline "Art History" at the epicenter of the dramatic transformations. Initially, this problem was perceived by experts as a success of the new paradigm of project artistic pedagogy, the essence of which is not the teaching of biographies of geniuses and the review of brilliant texts, but self-edification of the very process of their complex formation. The subject of the discussion was thus the creative practice of tracking the emulative dialogue of tradition and innovation, and consequently the preparation of new majors for the modern globalized art industry of rhizomatic precariousness (C. Bailey&M. E. Graham [2]; H. Ballon&M. Westermann [3]; J. Beaudoin [4]; R. Trish [5]).

Later, the causal spectrum of reflections on the subject expanded to the level of meta-oscillation. This is evidenced by the results of the 2011 poll initiated by the Samuel H. Kress Foundation and The Roy Rosenzweig Center for History and New Media at George Mason University [6].

The grounds for a critical look at the dialogue between digits and art were the projects of new media theorist L. Manovich [7], the mathematician K. Bender [8], and the philosophers J. de la Rosa and J.-L. Suárez [9], whose purpose was to reduce the epistemological analysis of the essential meaning of the artistic text to the statistical calculation of its formal versions (for example, determining the coefficients of visual similarity among six thousand paintings of impressionists; collaboration among 1,840 images of the figure of Aphrodite-Venus in the art, sculpture and graphics of the XX century; the study of the dynamics of changing the "canon of human beauty" on the material of 120,000 portraits created during the XIII-XX centuries). In justifying this state of affairs, digital humanist Alan Liu proposes "a tabula rasa interpretation - the initiation of interpretation through the hypothesis-free discovery of phenomena" [10, p. 30]. In this model, the computer reads texts / images algorithmically, with minimal human intervention. According to British art historian Professor Claire Bishop, these projects indicate that their authors have a limited awareness of critical debates within art history (such as the long-standing, and some would say long-dead, question of 'beauty'), but also limited grasp on how to frame a meaningful research question [11].

The reason for this disappointing trend, according to Jonathan Patkowski, Ph.D., and Nicole Reiner, Ph.D., is that, as a result of digital cartography, modern art is being transcoded into online tutoring and might well reveal empirical findings never before highlighted in art history, but this method also perpetuates uncritical assumptions about the intrinsic value of statistics, whose importance, is now gauged in terms of number of social connections (i.e., documentable acquaintances) rather than artistic innovations (12). Moreover, in his monograph 'Undoing the Demos', Wendy Brown argues that digitally-induced neoliberalism should be seen as a new system of governance in which "all spheres of existence are framed and measured by economic terms and metrics, even when those spheres are not directly monetized" [13, p. 10], and the liberal arts universities "toward a model of the student as self-investing human capital" [13, p. 23].

1.2 Analysis of recent publications

These examples signal a fundamental change in the nature of knowledge and learning, particularly in the arts. To what extent does the new "digital history of art" help to prepare future art critics and educators? Will students become better critics, researchers in the arts? Will the question of presence in the artistic text (actions, installations, happenings) of absolute truth be lost? These issues were addressed by F. Cassim [14]; M. Gasper-Hulvat [15]; J. Martikainen [16]; J. Parker [17]; J. Rintoul and J. David [18]; J. Sienkewicz [19]; D. I. Vanada [20]; S. E. Wilson and L. Zamberlan [21]; J. A. Yavelberg [22]. Judging by Liora Bresler's review [23], they were to be explored by members of Art Historians Interested in Pedagogy and Technology (AHPT) at the February 2016 College Art Association conference in Washington, DC.

In the context of the described situation, the need has arisen for maximum humanization of the process of digitization of artistic didactics, in particular the study of the course of art history. An interesting analysis of the discussions regarding this issue is presented in the collective monograph 'Teaching Art History with New Technologies'. Reflections and Case Studies' (ed. By Art Scientists at Santa Clara University, Kelly Donahue-Wallace and Geoffrey Simmins) [24]. One of the co-authors, Laetitia A. La Follette, Ph.D. Art and Archeology of Harvard-Radcliffe and Princeton University, [24, p. 44-57], summarizing ten years of teaching history of the arts, presents examples of intriguing anthropological tasks designed to be digitally executed.

The art historian Eva R. Hoffman also offers interesting variants of the implementation of an online art history survey course, explaining how she reconciles art history with traditional pedagogy with the potential of a computer-based course management system. This, in her opinion, promotes the interaction of alternative ideas to help students understand complex intercultural relationships [24, p. 79-98].

Eva J. Allen, Honorary Art Board Member in UMUC's Arts Program for Twelve Years, in the article Tradition and Innovation: Using New Technology in Online Art History Surveys, describes her own experience in developing a media center and digital implementation of the 'Creativity-Integrated Art History' concept [24, p. 98-109].

Case studies of the art historians Kelly Donahue-Wallace and Geoffrey Simmins are devoted to a causal analysis of the successes and failures of activating the motivating participation in Online Art History Courses [24, pp. 109-119; 119-130].

Duke University professor Caroline Bruzelius and multimedia analyst Hannah Jacobs in their report "Neatline: Syllabus as interactive visualization" examine the impact of Neatline – a visualization plug-in for the content management system Omeka which spatial, textual and other media forms for students to master artistic and historical material (that highlight spatial and temporal relationships across art historical narratives) [25].

In 2014, Carey Watson, professor of art history, and Anastasia Salter, professor of digital media and game design, collaborated to create a special computer game for use in a 20th-century art history course at the University of Central Florida. The course was designed for blended learning technology, where once a week for fifteen minutes, students meet for lectures and the rest of the material is transmitted online through Webcourses, a virtual-game-based learning management system. This, according to the authors of the project, provides the process of learning with the nature of design activities [26, p. 100-111].

1.3 Purpose

Taking into account what was mentioned above, the purpose of our study was to substantiate and experimentally test the effectiveness of the proposed pedagogical design of digital learning of future art teachers in a virtual classroom. We're talking about an experience of teaching a digital course of brief history of arts (DCHA) for bachelors in the specialty 014 'Secondary Education' (Culture and Art) at Ternopil National Pedagogical University named after Volodymyr Hnatyuk, Faculty of Arts [27]. The structure of our project aims to meet students needs through the combination of three basic components: metacognition, critical thinking and collaboration. The course involves students in various digital projects related to a wide range of genres and styles of academic and generative art.

2 Research results

2.1 Methodology

The idea behind the proposed Digital Course in Brief History of Arts (DCHA) is the Creativity-Integrated Art History. That is to say about the history of art **as a practical course of mastering the various of art technologies and their semasiological interpretation** for future using in the professional live. This process will involve a change in the paradigm through which art history explains products of creative achievement. The proposed educational approach aims to meet the need of students in the design process by combining its three main components: metacognition, the iterative divergent and convergent thinking and collaboration. It draws on a plural coexistence of diverse learning theories, such as connectivism, experiential learning and performative project-based learning.

The learning process is guided by the creation of a multimedia and interactive path with instructions, references, actions and tasks. Participants interact on computers connected to the Internet and on various digital devices such as mobile phones, tablets and laptops.

The course structure is open and flexible. At the beginning of each lesson, the digital expert offers a fragment of the content of art history on a didactic platform. Then students independently explore the content: interpret and even try to virtually create their own samples of genre and style phenomena of the era. The digital expert sets time limits, manages technical needs and provides individual support to participants, in the classroom and online. Every twenty minutes, digital activity is interrupted to implement active coaching strategies. Each session ends with the staging of a new performative project.

So, the methodology of digital pedagogy of creatively integrated art history is based on the following laws:

- enhancing the role of learning as a design activity (requiring a system of organizing the learning environment and the use of a set of digital tools for managing learning motivation);
- increasing the degree of intelligence and creative structuring of artistic activity;
- functional and meaningful reorientation of learning technologies and methods;
- the dominance of infographics, which, unlike narrative, better reflects the essence of an interdisciplinary, integrated approach to learning in the face of complex, non-linear logic;
- reducing the length of training courses.

The virtual nature and interactivity of studying the history of art as a history of artistic creativity are determined by the following principles:

- substantive synergies (honoring each individual encounter with the culture, style and genre of creativity in the context of a holistic vision of an era that unites students in research teams);
- enrichment of expressive means of educational artistic and creative activity;
- multimedia training;
- the growth of the interactive role of the computer program user in the process of artistic and creative learning;
- autonomy of the learning environment;
- inclusive evaluation.

In the situation of post-truth crisis caused by the process of digitization of the student's educational behavior, we have chosen to focus on changing the role and content of didactics: from providing to formation. The author's concept confidently implements the idea of "Learn in order to be!" (note: to be not just a person, and not a subject of the social process, but an identified personality). This ascent can be done only by an individual knowing love and loving knowledge, since to love means to be constantly willing to contemplate the Light of Truth (in every sphere of activity).

However, we must the teacher is not only a didactic, design engineer, information resources manager, capable of transmitting as much as possible actual and accessible information for the modern student with the purpose of its successful practical implementation. He/she seeks to be an artist, inspiring students to learn as creativity, and most importantly, through the incorporation of ICT resources, contributes to the modeling of pious digital citizenship. It is not about copying the affective but doomed rift of the main character of the movie "Sphere" (Dave Eggers, 2017) to make the transparent and controlled net-world "live for love". It is meant to be unobtrusive to create an environment not just of secure internet users, but of compassionate, inquisitive, responsible and respectful people and other online citizens. In the VUCA world, this encourages continuous learning to know, learning to do, and learning to be together, and with others in friendly communication with others. Otherwise, we will educate ironic artist educators, architects-nominalists of their own and other people's lives, who are guided by the motto "I want it my way".

2.2 Pedagogical design of the course

In this section, we wish to propose a framework to integrate creativity into the pedagogy of art history. This integration suppose the guiding of the learning process to the creation of a multimedia and interactive path with instructions, references, actions and tasks. Participants interact on computers connected to the Internet and on various digital devices such as mobile phones, tablets and laptops.

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Each module of course contents consist of short videolectures (8 to 15 minutes) with a wealth of illustrative material (e-bank course includts samples of different styles and genres of the art of Ideas or Genesis and a series of tasks involving both theoretical research and practical project content fulfillment). That is, students are offered a new-

generation electronic guide using computer programs to study the features of interpretation and the creation of texts that allow to improve the design activities in order to gain artistic competence. Presentation of educational content is provided by future artists-teachers in audio-video conferencing, -action, -performance formats, as well as using instant messaging and participation control tools, an online whiteboard for real-time mutual cooperation.

The pedagogical design of the course involves a sequence of traditional 5 steps:

- analysis (needs and competences of the target audience, goals and expected learning outcomes, methods and forms of their implementation, interactive training course tools);
- designing (selection and evaluation of a pre-test of the course and the audiovisual scenario of the course, tools and methods for supporting new versions of training);
- development (structuring of content, feedback forms, tools for summarizing practical work);
- implementation (peer-to-peer culture, adaptability and personalization of learning, uploading the course to the Learning Management System (LMS), facilitation of the chance of error);
- evaluation of efficiency (individual blocks and updated version of the whole course).

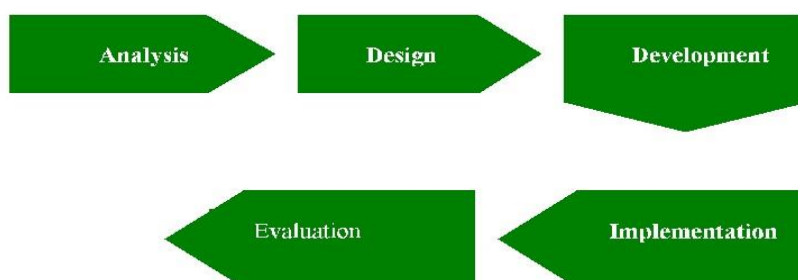


Fig. 1. Stages of pedagogical design of the course.

Effective realization of this stages proven that it logically combines the results of adaptive, flipped learning, micro-learning, gamification and new formats of full-time learning (meetup, learning journey) with VR-technologies and algorithms of artificial intelligence (chat bot). In order to efficiently use the benefits and reduce or compensate the disadvantages of each approach, the following principles of blended learning should be taken into account:

- organizing an environment of high achievements (the conscious movement towards the goals by the defined route that encourages learning activity);
- personalization of learning (the student him/herself determines (to varying degrees) where, how and why he/she will learn);
- full assimilation of the learning material (before moving on to the new material, the student seeks to fully master the necessary information from the previous sections);

- the sequence of learning (students' preliminary familiarizing with the material → understanding theoretical knowledge obtained from the teacher → practical approbation);
- audio and video formation of the methodological base (virtual seminars, content blocks of the course);
- practical implementation of the acquired professional competence;
- continuous micro-learning;
- tutor online support.

In order to provide each student with favorable conditions for the development of epistemological reflection, the designer should listen to wise advice: technology only sets the rhythm and creates music, and movements in dance are determined by pedagogy. With this in mind, we created students are specifically involved in a Mistakes Laboratory or MLab. It is an inspirational learning space, where they create, develop and share a didactics projects (according to their teaching goals and needs), supported by the digital expert. In the Mistakes Lab we active created Technology of the Educational Digital Devices (TEDD), which includes such installations as:

- Edmodo, www.edmodo.com;
- Doodle, www.doodle.com;
- Google Modules, www.google.com;
- Padlet, www.padlet.com;
- Coogle, www.coogle.it;
- Tes-Teach, www.tes.com;
- Survey Monkey, www.surveymonkey.com.

Below we present the **functional-structural model** of the proposed technology (tables 1, 2, 3):

Table 1. The structure of studying for each module of the course.

Session	Activities	Digital tools
1. Working together	Collaborate on a digital platform; define user profile; interact, comment, upload pictures, videos and texts; create a digital classroom; create, answer and share a digital calendar.	Edmodo; google modules; doodle.
2. Digital Tools Kit	Brainstorm ideas; collaborate and share; create a digital questionnaire; select, collect and organize resources; create a mind map.	Edmodo; Padlet; google drive; google modules; tes teach; coogle.
3. Mistakes Lab	Project-based work; Intermediate Digital Survey.	Digital tools kit; survey monkey.
4. Mistakes Lab	Project-based work	Digital tools kit
5. Mistakes Lab	Sharing Gallery Final test	Digital tools kit

Table 2. Classification of e-resources (platforms, modules, websites, programs) for pedagogical design.

e-resources	Pedagogical goal	Student project
Edmodo, Google Drive (Google Slides, Google Docs)	Setting creative cooperation	Organization of performances, happenings, actions, meetups, videoconferences
Doodle	Activation of initiative and entrepreneurship	Creating a digital schedule of events and meetings in virtual art class
Google Modules	Collection and epistemological analysis of art history information	Conducting digital questionnaires
Padlet Prezi	Generation of the process of allegorical, tropological and eschatological contemplation of artifacts	Realization of technologies of organization of art-reflexive action and anthropokinetic workshop
Coggle	Selection, classification and organization of resources	Creating an interactive web map
Tes-Teach	Selection and analysis of information resources	Application during seminars, practical classes, in the Mistakes Lab
Survey Monkey, Plickers, Kahoot, Quizizz, Google Forms	Assessment and analysis	Application for intermediate digital survey

Table 3. Implementation tools of this technological model.

Type of educational interaction	Forms of training	Technological means
“Student → Electronic Means of Education”	independent work; self-control; 'off-line' testing;	an interactive illustrations bank; electronic tests; portfolio; electronic dictionaries and encyclopedias;
“student ↔ student”	mutual evaluation; discussion of the task;	wiki-page; mailing list; e-mail;
“teacher ↔ student”	individual off-line consultations; differentiated control;	wiki-pages; guest books; bulletin boards; mental maps;

		mailing lists; a text forum; e-mail;
“teacher group” ↔	multimedia lecture; tutorials; virtual off-line seminars; electronic testing; video off-line lectures; off-line laboratory work;	"white boards"; blogs; guest books; bulletin boards; mental maps; e-mail;
“student group” ↔	individual off-line project presentations; off-line defense of the abstract;	a text forum; newsgroups;
“group group” ↔	webinar in on-line mode; virtual creative work in 'online' mode; intermediate lecture.	chats; videoconference; audio conferencing; web forums; wiki-systems.

2.3 Virtual Art Class Functions

This makes it advisable to create a virtual art class, a psychologically comfortable online learning environment that provides live interaction between students and the moderator, who guides the learning process and supports group activities and discussions. High interactivity of the virtual art class, instant synchronous communication directly in artistic activity and various forms of art practice (especially in combination with self-study platforms, positive and constructive feedback) contribute to the formation of a sense of community. A large selection of DCHA software for web design, interaction design, graphic design, document publishing, 3D modeling and animation, sound production and application development is available in the art class for DCHA students. In addition, the art class has a four-screen immersive projection system that is coupled with a nine-channel audio system. The AMax 8 patch can be downloaded as a template for outputting video / 3D environments to the four-channel projection screens, and can be downloaded as a template for outputting audio to the nine-channel surround sound system which includes a five-channel patch as well. This software is used by students in the classroom and during open laboratory hours. If the student is late or absent from the class, ADDIE's digital interface allows him/her to watch video demonstrations created with technologies such as a Chromebook or iPad. Thus, the virtual art class has created the conditions for the implementation of various forms of multimedia presentation of educational information. This helps to achieve the variability, flexibility and adaptability of its comprehension.

At the beginning of the course, a series of guided and semi-organized activities encourages students to become familiar with the use of a digital toolkit on the learning platform. Afterwards, students are specifically involved in the so-called Mistakes Lab, where they create and share didactic projects according to the set learning goals and needs with the support of a digital expert. The Mistakes Lab acts as a learning space where students and faculty can meet and collaborate, build their own "audiovisual bank", share new experiences and insights in a vibrant community of inspirational digital practices.

One of such practices of generative art was exemplified by the project "Mona Lisa: Beyond the Glass" created by Vive Arts using eleven HTC Vive Cosmos VR Headset (<https://www.admiddleeast.com/art-design/art/the-louvre-has-re-created-the-mona-lisa-in-3d-with-incredible-detail>).



Fig. 2. Mona Lisa: Beyond the Glass/ viveport.com.

Students online, along with other Louvre visitors, spent seven minutes alone with Gioconda and were able to learn more about Lisa Gerardini, as well as the artistic methods and history of the painting. In particular, Using X-rays, infrared imaging, and refractive data, the VR program digitizes the Mona Lisa in an exquisite level of detail, revealing aspects of Leonardo da Vinci's masterwork that would otherwise be invisible to the naked eye.

Below we present the Virtual Art Classroom available Tools of digital learning of future art teachers (see fig.3).

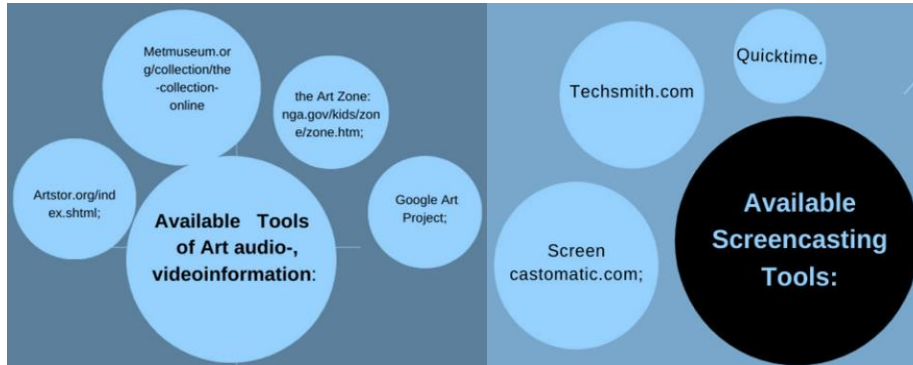


Fig. 3. Digital Tools of Virtual Art Class.

3 Results

3.1 Research Design

At the beginning of the study we developed a theoretical model of implementation of the pedagogical design of digital learning of future art teachers in a virtual classroom (see Figure 4).



Fig. 4. The theoretical model of implementation of the pedagogical design of digital learning of future art teachers in a virtual classroom.

The research design of digital learning for future art teachers in a virtual classroom includes such elements:

- defined the universe of research of digital learning of future art teachers in a virtual classroom;
- selected research base;
- organized target group or respondents;

- variables in the context of the research problem;
- direction of research;
- framework of research construction.

3.2 Pilot Study

Pilot Study I

A pilot study was undertaken. Structured questionnaires with relevant questions on the prioritized themes was identified. Three instruments were used:

- Stanford – Binet Intelligence test;
- Emotional Quotient test and finally the;
- Volition Quotient test.

Four analyses have been done – Reliability Analysis, ANOVA Analysis and Factor Analysis & Correlation Analysis. The Results arrived at are optimistic and as given in Results I - IV.

Result 1: The reliability co-efficient is very high indicating high quality data captured from the group of respondents.

Result 2: The curvi-linear behavior of respondents is evident under the ANOVA analysis.

Result 3: The Correlation analysis results are indicative of Volition being associated with Emotion. Many values of correlation coefficients are significant, suggesting a strong association between Emotions and Volition.

Result 4: On the basis of values of the component matrix statements which have a factor loading of 0.5 or more will be retained in the final questionnaire as per Factor Analysis.

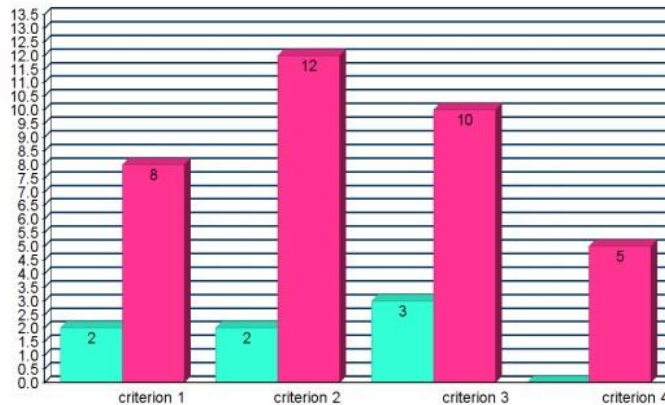


Fig. 5. Levels of formation of criteria for artistic and creative competence.

Pilot Study II

Final testing of future art teachers after studying the DCHA course revealed the level of gaining of their artistic and creative competence by the following criteria:

- ability for self-organization and self-education;
- ability to epistemologically comprehend and use basic information on art history, theory and methodology;
- ability to critically perceive concepts of different schools of art in methodology and historiography;
- the ability to apply specific artistic and pedagogical knowledge to create original creative projects.

The visualization below illustrates the level of artistic competence of the bachelors (35 people) by each of the criteria defined before and after the pedagogical interaction during the academic years of 2017-2019.

Thus, at the start of the DCHA course, nearly 44% of respondents found a lack of artistic and creative competence, which prevented them from properly pursuing their design initiative. In 36% of respondents, readiness for design activity was medium. 20% of respondents demonstrated superficial knowledge of art history, theory and methodology. Unfortunately, none of the students showed the highest level of readiness.

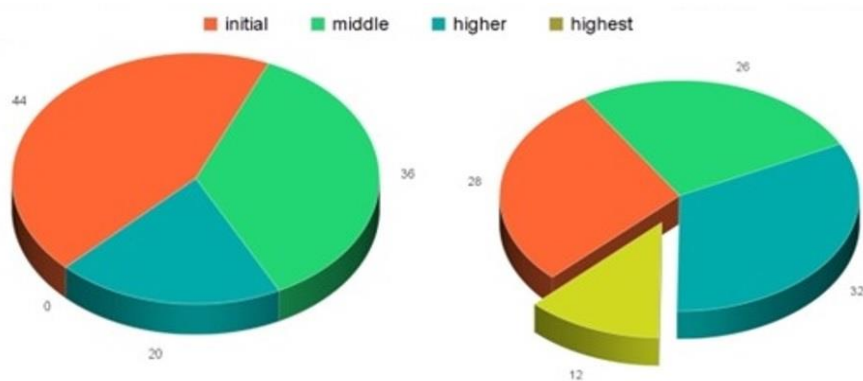


Fig. 6. Levels of formation of artistic and creative competence before and after pedagogical design.

After the pedagogical interaction, the respondents became more active in displaying the ability to organize themselves in the application of special artistic and pedagogical knowledge for the creation of original creative projects. As a result, 16% of respondents "rose" to the average, 10% - to a higher level, and 12% of respondents showed the highest level of readiness for artistic, creative and spiritual-educational activities.

4 Conclusion

The proposed methodology for the digital teaching of art history as a history of artistic creativity has a broad prospect of introduction into the process of professional training of teacher-artist for the school of generation Y. It provides students with a flexible

knowledge transfer tool that allows the recipient to be immediately and fervently interested in the novelty of the material. Moreover, it is about folklore, academic art and modern art practice of highly artistic samples - digitized in special audio formats (WAVIAIFF) and on video files (using a gigapixel camera). They are structured in the light of the continuity and methodological expediency in view of the process of contemplation of the 'deep invisibility of the visible' [1, p. 238] in the process of spiritual and educational activity.

Two priority areas for digital arts education are envisaged in the future:

- methodological, to extend the experience of the virtual art class, on the basis of which it is possible to continue the process of creating master's programs, bachelor's, advanced training courses and programs of professional retraining of teacher-artists;
- creative, which implies the creation of an effective educational environment for the introduction of a model of learning as a design activity of a person with metamodern psychology.

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