

CREATIVITY PROGRESS IN THE DIGITAL ERA

Toni Vasić

School of Architecture and Design, University American College Skopje
Skopje, North Macedonia

vasic.toni@gmail.com

Inci Derebey

School of Architecture and Design, University American College Skopje
Skopje, North Macedonia

inci.derebey@uacs.edu.mk

Elifa Drndar Mujević

University of Novi Pazar

Novi Pazar, Serbia

elifadrndar@hotmail.com

Abstract

The progress of digitalization has been a big game changer in the fields of art and design for decades. However, the key enigma lies in the future impact of the use of digital tools on the creative process. Having determined the benefits of using digital assistance over the last years, one of the key segments that needs to be explored is the influence of the use of digital assistance on the creative process. Creative motivation on one side and technical capability on the other, this study aims to analyze the degree of influence of digital assistance in the design process. Therefore, the paper aims to identify the attributes that match the research process, particularly from the ready-made design in the field of graphic design. The benefit of non-judgmental and creative thinking has led towards creating an experiment involving second-year design students by assigning a task related to a basic design monogram project. The project consisted of three stages. The first one was oriented towards research. The second stage involved an analysis of the hand drawing of the ideas, and the last stage was elaboration of the idea with digital assistance. The students' work was categorized according to its resemblance to ready-made work of the same task found through search engines, social media, and digital design magazines. The result of this experiment is a solid foundation for understanding the level of impact digital assistance tools have on the creative process by defining the attributes shared between the students' work and the research references.

Keywords: creativity, digitalization, attributes, design, reference

NAPREDAK KREATIVNOSTI U ERI DIGITALIZACIJE

Apstrakt

Napredak digitalizacije predstavljao je veliku prekretnicu u oblastima umetnosti i dizajna tokom poslednjih decenija. Međutim, ključna enigma leži u budućem uticaju korišćenja digitalnih alata na kreativni proces. Nakon što su tokom proteklih godina utvrđene brojne



prednosti digitalne asistencije, jedan od ključnih segmenata koji je potrebno dodatno istražiti jeste njen uticaj na sam tok stvaranja. Imajući s jedne strane kreativnu motivaciju, a s druge tehničke mogućnosti, ova studija ima za cilj da analizira stepen uticaja digitalne asistencije u procesu dizajna. Stoga, rad teži identifikaciji atributa koji odgovaraju istraživačkom procesu, posebno u okviru gotovih (ready-made) rešenja iz oblasti grafičkog dizajna. Koristeći prednosti nekritičkog i slobodnog kreativnog razmišljanja, sproveden je eksperiment u koji su bili uključeni studenti druge godine dizajna. Njima je dodeljen zadatak koji se odnosi na projekat izrade osnovnog dizajnerskog monograma. Projekat se sastojao iz tri faze. Prva faza bila je usmerena na istraživanje. Druga faza podrazumevala je analizu ideja izraženih ručnim crtežom, dok je treća faza obuhvatala razradu ideje uz pomoć digitalnih alata. Radovi studenata su potom klasifikovani prema stepenu sličnosti sa gotovim rešenjima istog zadatka pronađenim putem pretraživača, društvenih mreža i digitalnih dizajnerskih časopisa. Rezultat ovog eksperimenta predstavlja čvrstu osnovu za razumevanje nivoa uticaja koje alati digitalne asistencije imaju na kreativni proces, kroz identifikaciju zajedničkih atributa između studentskih radova i referenci korišćenih tokom istraživanja.

Ključne reči: kreativnost, digitalizacija, atributi, dizajn, referenciranje

INTRODUCTION

The technological improvement has been influencing many fields in the industry by providing easier, functional, economical, and many other beneficial processes. Observing the changes in the graphic design field has shown that there have been many transformations in the implementation process of design, influenced by the development of the technological era. Moreover, the creative thinking in the design process is defined in the art and design education, deriving from the proposed curriculum content developed by their professors (Brown, 2013).

Bearing this challenge in mind, academia adapts its syllabus according to the requirements of the design industry and recent literature findings (Kostov, 2016; Airley, 2010; Wheeler, 2006). Moreover, the challenging aspect of renewing the syllabus for graphic design each semester is provoked by novel findings in academia and the adaptation of industry requirements based on the students' capabilities. The constantly improving design industry has an influence on the use of drawing tools, and based on the time effectiveness for the drawing performance, the promoted programs (Adobe Photoshop, Adobe Illustrator, CorelDRAW, etc.) can be changeable.

Motivated by the previous research, the given project to the design students has shown that final success in creativity is reflected in the continuity of idea proposal drawings, bearing in mind that the programs used are only additional tools in this process (Vasić, 2006). The general idea behind the research has been to aggregate drawings based on the available tools for digitalization and printing at the educational level. This thesis has provoked additional research in design education covering the drawing performance and the adaptation to digital program knowledge. Therefore, an experiment to understand the level of digital era influence in the creative process has been prepared for this study. In that vein, based on non-judgmental thinking of young minds, we have chosen a group of students to participate in the experiment. The requirement for this experiment was a task where

students were asked to draw a sketch (an idea) based on their creativity and experience in design. Later, the gathered work from the students was categorized according to their resemblance to the ready-made work of the same task identified through search engines, social media, and digital design magazines. The categorized work and ready images were analyzed according to their resemblance.

The result of this experiment is a solid ground that could lead towards understanding the level of the impact of digital assistance on the creative process by defining the attributes found in the students' work and in the digital references on the market.

METHODOLOGY

The process of forming the task for this study was developed according to educational models prepared by academics and research into the graphic design practice in the real world. Genuine graphic design education originates from contemporary digital media design, where the focus is on achieving high aesthetic value in addition to learning the implementation of computer technology (Wei Zu, 2020).

The task that was prepared for second-year students from two universities, the University American College Skopje (UACS) and the University of Novi Pazar (UNP), in the graphic design course. The students were asked to create a personal monogram¹ which is a combination of the two initial letters of their name and surname. The result of this task was used towards addressing the graphic expression composed exclusively of two forms, i.e., both letters, by avoiding the use of illustrative elements, drawings, graphic symbols, etc. Apropos the required criteria above, the process of idea generation for the task resulted in various drawing sketches on paper. After the approval of certain drawings by the professors, submission of the monogram was requested to be aggregated on the Adobe Illustrator (AI) software in positive and negative space*. For students to understand the task result, an illustrative sample was presented, which was aggregated from previous students who had taken the graphic design course (**Figure 1**).

¹ A monogram is a motif of two or more interwoven letters, typically a person's initials, used to identify a personal possession or as a logo (Oxford Dictionary, 2024).

* Positive space refers to the subject or areas of interest in an artwork, such as a person's face or figure in a portrait, the objects in a still life painting, or the trees in a landscape painting. Negative space is the background or the area that surrounds the subject of the work (Kapundahigh, 2024).

Figure 1*Illustrative Sample of The Task Result*

Source: [Student work from UACS library](#)

DESCRIPTION OF THE TASK ANALYSIS PROCEDURE

After two weeks of evaluation and aggregation, the analysis and observation of the elaboration procedure and outcome are as follows:

The task was assigned to 30 students. However, 19 of them completed the task according to the approved drawings. Therefore, the evaluation procedure continued with 19 students, proceeding with digitalization of their approved hand drawings.

In the second stage of the analysis, 19 proposed and approved hand drawings were compared to the elaborated digital drawings in AI (Adobe Illustrator).

In the third stage, the digital drawings were compared with ready-made monograms on the market and grouped according to their similarity.

EVALUATION OF THE TASK

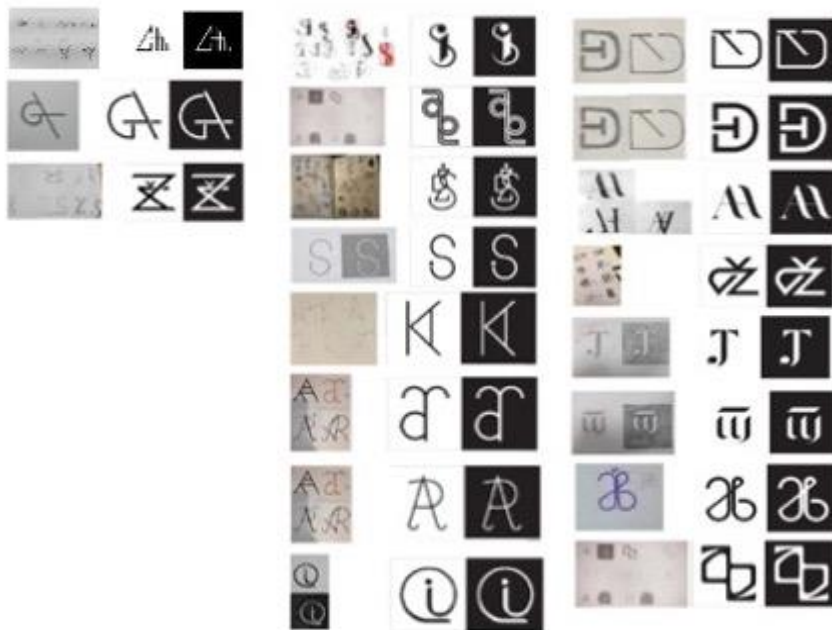
In the first stage, as mentioned above, the evaluation procedure was directed towards a comparison of the hand drawings and the vectorized AI drawings. The gathered hand and digital material from each student was categorized into two groups. The first group referred to the material that had a deviation between the hand and the vectorized drawing. The second group included the material that had the same transposing attributes between the hand and the vectorized drawings. The attributes of each group were analyzed thoroughly, and the result of each group is presented (**Figure 2**) in separate columns. The first column presents the work of 3 students, where the deviation between the hand and the vectorized drawings is obvious. The second and third columns present the second group, where the submitted material between hand and vectorized drawings is identical.

The second group includes the remaining 16 students who developed an identical drawing from the hand proposals as the digitalized version, acknowledging the professors' instructions that were given at the beginning of the task.

Figure 2*Comparisons of Hand and Vectorized Drawings*

Deviation in hand and vectoral drawing

Transposing identical hand drawing into vectorized



Source: Student work (UACS and UNP)

The second stage of the task analysis refers to students' vectorized drawings and their resemblance to the ready-made work in the graphic industry. The gathered work from the students' final submission was thoroughly checked in search engines, social media, and digital design magazines. The evaluation procedure for this stage was aggregated through search engines that provide results based on the similar attributes of the applied image. Each student task was transported to the photograph/picture field in search engines, and the most similar ready-made image that appeared was compared with the original material. Bearing in mind that the search engines absorb the images from various sources, such as social media, digital design media, etc., the results were thoroughly analyzed according to the published date and place. This phase of the third stage was the most challenging one due to the process of comparing the similarities and differences of the students' work and the ready-made monograms.

After the examination, the students' monograms were divided into two groups. The first group includes the students' monograms, which could not be matched with ready-made monograms on published media with the same attributes. Therefore, the presented figure above (**Figure 3**) displays the vectorized drawings of students' monograms (on the left side) and the closest match given by the search engines (on

the right side). The results demonstrate that out of the total 19 students, 12 of them pursued originality in their idea, without being affected by various sources on digital media.

The second group consists of the students' monograms that have similar attributes to the closest match resulting from the search engines. **Figure 4** displays students' vectorized monogram drawings (on the left side) and the closest match given by the search engines (on the right side). The results demonstrate that out of 19 students, 7 of them were affected by the published ready-made monogram in the media and failed to pursue originality in their idea.

Figure 3

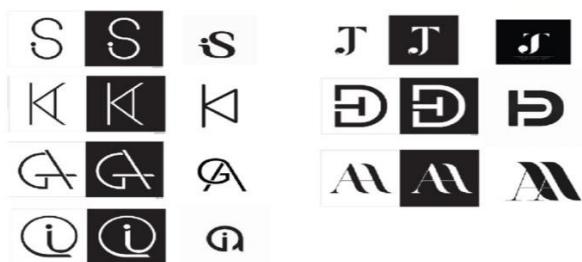
Students' Monograms which Have Not Been Matched with the Same Attributes with Ready-Made Monograms



Source: [Student work \(UACS and UNP\)](#)

Figure 4

Students' Monograms that Have Similar Attributes with the Closest Match Resulted From the Search Engines



Source: [Student work \(UACS and UNP\)](#)

DISCUSSION

In accordance with the procedure of this research, three stages have been elaborated and evaluated based on the influence of digital tools and media on creativity in graphic design. The first phase was focused on understanding the theoretical part of designing a monogram, researching references in the media, and basic knowledge of performing vectorized drawings in AI.

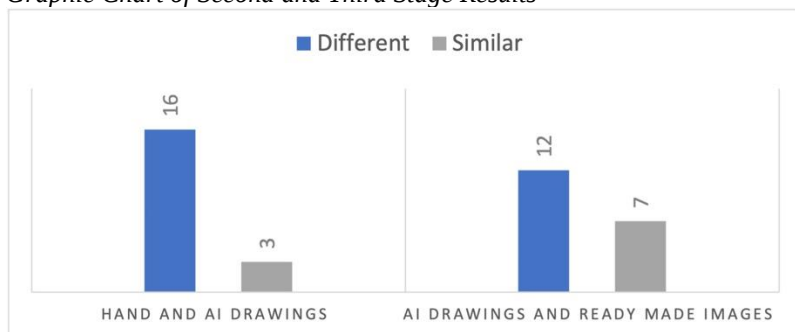
The second stage of the research was devoted to the process of creating the ideas on paper, encouraging the students to produce many proposals so that they could develop various ideas. This stage was the core of the theoretical approach, where the designers learn how to explain and describe their ideas through developing as many varieties as they can. (Baykal, 2011; Katz & Kahn, 1966).

The results reveal that 84,21 % of students' work was successfully matched with hand drawings to vectorized drawings. On the other hand, 15,79 % of students elaborated different vectorized drawings from the hand drawing (Figure 5).

Apropos of the second stage results, the examination process continued with the third stage, where the AI drawings were matched with ready-made images (Figure 3). The results demonstrate that 63,16 % of the drawings differ from the ready-made images found in various sources on the digital media and 36,84 % of them are the same or similar to the ready-made images (Figure 5).

Figure 5

Graphic Chart of Second and Third Stage Results



Based on the given graphic chart (Figure 5), more students simultaneously worked on the proposal idea, hand and vectorized drawing skills, rather than only working on one segment of the assigned task. The discussion stage was oriented towards the observation procedure of the students' progress during the design process, which included concept formation, drawing, and vectorizing the idea.

In the first stage of the research, the students were provided with a computer, books for design, and magazines as guidance for the expected outcome of the task. Insisting on the importance of time management in the design process, the students were asked to propose the concepts in their sketch book during the class. The observation included the research and idea generation in the sketch books, where students used the search engines for sources due to time efficiency.

The next stage focused on analyzing the design formation process through hand drawings, seeking attributes that lead to the evolution of the idea. At this point, students were assisted by the instructors, aiming to teach the fundamental approach to achieving the best alternative in aesthetics. At the end of this stage, approved drawings by the instructors were transposed to an AI vectorized drawing. In this process, the students were challenged to transpose the drawing as a vectorized one, which additionally contributed to the development of computer drawing skills. In this stage, most of the students successfully transformed the hand drawing into a vectorized one, revealing that they could simultaneously develop their hand and computer drawing skills.

The third stage was the most interesting and the most challenging stage of this research, having in mind that the students had access to various sources on the web. Additionally, the instructors had the benefit of detecting the originality of the students' work with the same digital assistance. This kind of advancement in the field of design is both a blessing and a curse for the students and the instructors, leading to a focus on the first stage of the design process that covers the essence of the research procedure.

Pointing out the general terminology of creativity, creativity is explained as a process designers use to drive their abilities towards making artistic innovations and technical ones (Interaction Design Foundation, 2025). Having that idea in mind, another aspect that is also important emerges. According to Wheeler (2006) the process of design and creativity needs to be continually monitored, ensuring differentiation and relevance.

On the other hand, design is not only based on reasoning, but on specific methods that lead to creative growth (WDO, 2025).

Therefore, this research monitored the influences of present knowledge and methods in design education in the presented task for the needs of this paper. Moreover, the visual examples of student work and the generated ideas from digital search engines contributed to the comparison segment of this study.

CONCLUSION

The contribution of this research is towards upgrading the curriculum for graphical design according to the technological progress in the field of design. From the beginning of this research, the aim was to understand the influence of technological improvements in design and their influence on the methodology of thinking when generating an idea. As mentioned in the discussion phase, the research process, which included the search engines, was more time and energy-efficient and gave better and newer visual results.

The second stage was efficient in determining the importance of developing sketching skills and vectorized drawing ability, as the first skill is indispensable for generating ideas. The second phase is needed for presenting the task in a professional manner as a method for printing a hard copy or posting it on the web. This outcome leads to the equal distribution of teaching the methods of research, hand drawing, and vectorized drawing in the graphic design curriculum. Bearing in

mind that all three methods are inevitable for acquiring successful results in the practice of design.

The third stage has contributed to the aspect of time management and energy efficiency for instructors due to the advanced technology provided by the search engines. The instructors analyzed the attributes of the final task of the students, similar to ready-made images. In this stage, the results revealed that the gap between the students who were influenced and those unaltered by the ready-made images on the web is not very big. Bearing in mind that students can be affected by digital media in the research process, an additional possibility for change in this segment, when working with digital assistance, is a trigger for further research.

In conclusion, the impact of digital assistance is present in the process of design and affects both positively and negatively the creativity of fresh minds. The question that arises for further research is what are the factors that increase creativity in the process of research with digital assistance for design?

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REZIME

Napredak digitalizacije u velikoj meri je transformisao umetničku i dizajnersku praksu tokom poslednjih decenija, menjajući same temelje kreativnog procesa. Iako su koristi digitalnih alata sve očiglednije, ključna enigma i dalje ostaje — na koji način digitalna pomoć utiče na tok i kvalitet kreativnosti? Ovaj rad ima za cilj da istraži taj uticaj, sa posebnim fokusom na polje grafičkog dizajna, kroz analizu koristi i ograničenja korišćenja digitalnih tehnologija u procesu stvaranja. Kroz identifikaciju atributa koji se prepliću između istraživačkog procesa i finalnog dizajnerskog rešenja, istraživanje se fokusira na studente dizajna na nižim godinama studija, koji su učestvovali u eksperimentalnom zadatku kreiranja monograma. Eksperiment je organizovan u tri faze: prva podrazumeva istraživanje i prikupljanje referenci, druga se odnosi na slobodno, ručno izražavanje ideja kroz skice, dok treća uključuje digitalnu obradu i finalizaciju idejnog rešenja. Dobijeni studentski radovi klasifikovani su prema stepenu sličnosti sa postojećim rešenjima pronađenim u pretraživačima, na društvenim mrežama i u stručnim časopisima iz oblasti digitalnog dizajna. Rezultati eksperimenta nude korisne uvide u to koliko i na koji način digitalna pomoć utiče na autentičnost i inovativnost u procesu kreativnog izražavanja, nudeći osnovu za dalje razmatranje uloge digitalizacije u savremenom obrazovanju dizajna.