



| Research Article / Araştırma Makalesi |

The Place and Importance of Op Art In Graphic Design Education With Its Interdisciplinary Art Education

Op Art Akımının Disiplinlerarası Sanat Eğitimi Anlayışı ile Grafik Tasarım Eğitimi İçerisindeki Yeri ve Önemi

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Abstract

Purpose: The aim of the research is to reveal graphically the convertibility of the Op Art movement into graphic design studies by students and how this transformation is interpreted.

Methodology: In this study, the 'Op Art' movement from Contemporary Art was preferred as an imaginary resource in graphic design education. The research was conducted in the form of action research, one of the qualitative research methods. The research is characterized as participatory action research, one of the types of action research. The research is limited to the 2nd year students studying at Kastamonu University Kastamonu Vocational School Design Department Graphic Design Program in 2016-2017, 2017-2018, and 2018-2019. The study was conducted with 458 students who took 'Visual Design, Publication Graphics and Typography' courses between in the specified academic years. Since it is not possible to include all student studies, 6 student studies have been included as an example. Student studies were analyzed descriptively.

Findings: As a result of the study, it was observed that the students were able to transform the Op Art movement into graphic design products, to interpret different types of works from a subjective point of view by considering the characteristics of the movement, and to create original graphic design works suitable for the composition they wanted to design.

Highlights: Contemporary Art, which is covered in the chronology of art history, emerges as one of the most fundamental disciplines in art and design theoretically. It is very important to benefit from different disciplines in graphic design education, to increase the interest in design courses, and to reveal original and creative designs. From this standpoint, it can be assumed that Contemporary Art can be one of the richest resources to be used in terms of art and design. In this study, Op Art art movement, one of the Contemporary Art movements, was used in terms of creating a resource for graphic design education courses.

Öz

Çalışmanın amacı: Araştırmanın amacı, öğrenciler tarafından Op Art akımının grafik tasarım çalışmalarına dönüştürülebilirliğini ve bu dönüşümün nasıl yorumlandığını grafiksel açıdan ortaya koymaktır.

Materyal ve Yöntem: Bu çalışmada, grafik tasarım eğitiminde imgesel kaynak olarak Çağdaş Sanat içerisinden 'Op Art' akımı tercih edilmiştir. Araştırma nitel araştırma yöntemlerinden eylem araştırması şeklinde gerçekleştirilmiştir. Araştırma eylem araştırması türlerinden katılımcı eylem araştırması olarak nitelendirilmektedir. Araştırma 2016-2017, 2017-2018 ve 2018-2019 eğitim öğretim yıllarında Kastamonu Üniversitesi Kastamonu Meslek Yüksekokulu Tasarım Bölümü Grafik Tasarım Programında öğrenim gören 2. sınıf öğrencileri ile sınırlıdır. Çalışma belirtilen eğitim öğretim yılları arasında 'Görsel Tasarım, Yayın Grafiği ve Tipografi' derslerini alan 458 öğrenci ile gerçekleştirilmiştir. Öğrenci çalışmalarının tamamına yer vermek mümkün olmadığı için örnek teşkil etmesi açısından 6 öğrenci çalışmasına yer verilmiştir. Öğrenci çalışmaları betimsel olarak analiz edilmiştir.

Bulgular: Çalışmanın sonucunda, öğrencilerin Op Art akımını grafik tasarım ürünlerine dönüştürebildikleri, akımın özellikleri dikkate alınarak farklı türde çalışmaları özne bakış açılarıyla yorumlayabildikleri ve tasarlamak istedikleri kompozisyona uygun özgün grafik tasarım çalışmalarını ortaya çıkarabildikleri gözlemlenmiştir.

Önemli Vurgular: Sanat tarihi kronolojisi içerisinde yer alan Çağdaş Sanat, sanat ve tasarım alanlarının teorik olarak en temel disiplin alanlarından biri olarak karşımıza çıkmaktadır. Grafik tasarım eğitiminde farklı disiplin alanlarından yararlanmak, tasarım derslerine yönelik ilginin artırılması, özgün ve yaratıcı tasarımlar ortaya koyulabilmesi açısından oldukça önem arz etmektedir. Bu açıdan bakıldığında Çağdaş Sanat'ın, sanat ve tasarım yönünden yararlanılabilecek zengin kaynakların en başında gelebileceği söylenebilir. Bu çalışmada grafik tasarım eğitimi derslerine kaynak oluşturması açısından Çağdaş Sanat akımlarından Op Art sanat akımından yararlanılmıştır.

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INTRODUCTION

Graphic design is among the preferred professions today. Therefore, raising a qualified graphic designer in higher education institutions can only be accomplished with versatile and good design education. According to the Turkish Language Association [TDK] (2011), design is defined as “the first draft, drawing, and design of a work of art, structure or technical product.” According to Ambrose & Harris (2017), graphic design is a visual art discipline covering many fields. Expressing that it also involves art direction, typography, page layout, information technologies, and other creative areas, he states that this diversity indicates a multi-part ground in which designers can gain expertise and focus.

Regardless of the application area, graphic design requires a dynamic expression. The driving force of this dynamism is communication. Communication, which can be defined as the flow of verbal and visual information among people, is the reason for graphic design (Kınık, 2015, p.12). Graphic design, like other art and design fields, needs original and creative ideas. ‘Creative idea is the cornerstone of graphic design. The design is built on the idea. If the work in question does not contain any ideas and creative thoughts, it cannot achieve its purpose. A work prepared in a way that cannot achieve its goal and cannot convey the message that needs to be transferred to the target audience cannot be defined as graphic design’ (Ertan & Sansarçı, 2016, p.132). According to Ambrose & Harris (2013), who state that every creative activity requires a source of inspiration, inspiration is the key to developing exciting design ideas, and countless sources inspire professional designers.

Many areas of inspiration for designers can be seen. Ambrose and Harris (2017) state that graphic designers are constantly inspired by other design fields such as furniture and interior design, and creative people do not see themselves limited to a single discipline. They also assert, as an example, that De Stijl and Bauhaus schools follow the common principles that will guide them in their work between painting, furniture, and materials.

Although graphic design is seen as a two-dimensional visual communication method, including new searches in graphic design, which rationally constructs technology in the production process, makes a significant contribution to the development of graphic design. Today, in an environment where every field of art is appraised collectively and fed from each other, the works in which the graphic design field, which is of great value as a visual communication tool, also benefits from many areas in terms of technology and materials, indeed, gains importance (Timur & Keş, 2016, p.657).

On the basis of graphic design education, it is aimed to train designers who can think original, creatively and produce qualified design products. Therefore, in graphic design courses, different disciplinary resources can be reflected in in-class activities with other methods and traditional practices. As Uslu (2017) points out, graphic design courses covering all other disciplines can be executed rich in content and method, versatile and practice-oriented.

It is very important to benefit from different sources in graphic design education, to increase the interest in design courses, and to reveal original and creative designs. When considering the visual arts course curriculum, it is observed that graphic design (MEB, 2007; MEB, 2013) or visual communication and forming (MEB, 2018a) application areas are included in the secondary school level, and graphic art studies (MEB, 2018b) under the title of shaping in visual arts in the secondary education level can be said to be located. Regardless of the school level, it is noticed that art education is combined with other disciplines, and interdisciplinary practices are organized in line with the achievements. From this standpoint, it can be assumed that Contemporary Art can be one of the richest resources to be used in terms of art and design. In Contemporary Art, it can be said that the Op Art movement has simple, geometric shapes and forms and also creates an imaginary source that prompts thinking with optical illusions. Therefore, the ‘Op Art’ movement has been preferred as a subject of application with a different method in graphic design education, since it encourages students to think, problem-solve, make decisions and reproduce through optical illusions.

Op Art

Op Art is an art movement that has a significant place in Contemporary Art. Op Art movement is seen not only in painting but also in different art and design fields such as printing arts, sculpture, installation, etc. “The term, which is an abbreviation for ‘Optical Art’ describes works that pave the way for optical effects that the viewer does not expect, such as the illusion of movement, depth, or vibration. Op Art refers to a group of painters praised for their geometric works, particularly since the 1960s” (Phillips, 2016, p.92).

Op Art is primarily an optical and highly graphic art form, although it can blend into three-dimensionality when used in paintings containing an element of relief. It is an extension and transformation of geometric abstraction developed in the early twentieth century (Ocvirk, Stinson, Wigg, Bone & Cayton, 2018).

The paintings of Op Art painters, which began to fly and dance in front of their eyes, were quite influential in the interior decoration and design world of the 1950s and 60s. The most important representative of Op Art is Victor Vasarely. The artist, who worked on optical illusions in the 1930s, was interested in the nature of the phenomenon of seeing, like the Impressionists. Painter Bridget Riley sought to create movement within the still painting based on the same issue (Krausse, 2005).

Op Art, a modern art movement, emerged in 1965 with the exhibition ‘The Responsive Eye’ at the New York Museum of Modern Art. The exhibition covers a large group of independent abstract artists called ‘Perceptual Abstractionists.’ The group includes British painters Riley and Michael Kidner, Hungarian-French artist Victor Vasarely, American Larry Poons, and Richard Anuszkiewicz (Phillips, 2016).

Stating that this movement, which was popular in the mid-1960s, brought optical illusions to an art form, Heller & Vienne (2016) asserted that precisely planned colored or black and white geometric patterns are graphically eye-catching visual puzzles.

Eroğlu (2013) states that optical art is a movement related to optical impressions that emerged in Europe and America and that the origin of this movement is based on the lectures given by Joseph Albers at the Bauhaus. He also declares that optical art was used for furniture fabrics and decorative panels in a short time. According to Avcı Tuğal (2012), the Op work, whether a painting or a graphic design product, definitely attracts attention since it aims at the direct perception that people cannot reject. For this reason, the power of Op Art to influence the masses has come to the fore in every visual field that requires the use of attention.

Today, Op Art appears in every field, from industrial design products to advertising graphics. For this reason, we can say that Op Art does not only affect a certain period, but is also an art movement that is still alive today.

Employing Op Art Movement in Graphic Design Education

In graphic design education, teachers or academicians should teach by interdisciplinary methods to gain professional competence and train their students as individuals with a versatile design perception. Thus, educators in graphic design should plan interdisciplinary topics according to the students' readiness level and make activities according to these topics. One of the most fundamental disciplines fed from an interdisciplinary perspective in graphic design education is art history. Art movements in the history of art appear as rich sources in terms of design understanding. It is often seen that art movements also affect design.

Designers should be directed to designs that are not conventional, raise awareness, attract the audience's attention with the principle of experimental and research and development, and emphasize memorability (Uslu, 2017, p.90). From past to present, graphic design and other disciplines are in interaction. According to Ambrose & Harris (2017), state that graphic design is subject to intellectual and aesthetic trends that influence the work of designers and are reflected in the general society, and they express that design can provide answers for areas that change the worldview. They also assert that this situation is evident in movements such as Modernism, Postmodernism, and Deconstruction and that these movements shape the development and evolution of graphic design as a creative discipline, open the door to new creative possibilities and offer tools for new design challenges.

According to Uslu (2017), who states that a certain infrastructure should be established in the field of design, the designer can try to improve himself to a sufficient level in terms of knowledge. Hence, art history, mythology, design philosophy, art sociology, and even different disciplines can be used and directions can be made in this direction.

Design is a discipline shaped by a group of different and eclectic influences, both past and present, that determines the choices and decisions made throughout the creation process. Influences may be profound or partial, or they may change the general structure and content of the study as well as minor changes in appearance. (Ambrose & Harris, 2017, p.78). Thanks to such applications, students will be taught at what level and at what level the situations in which there are influences in design education can be.

Creativity in design is the result of a multidisciplinary search. Graphic design is a discipline with specific rules. Design rules, typography, color harmony, psychology, history of graphic arts are subjects that must be learned and studied primarily (Uslu, 2017, p.27). Ambrose & Harris (2017) state that art always influences design and that the ideas defined and guided art, notably those related to editing and page layout, were carried and adapted to the design.

Contemporary Art, which includes multi-dimensional disciplines as an in-class activity in graphic design education, can also be benefited from in terms of ideas, subjects, rules, etc. Moreover, educators can provide vocational education support by adopting different fields and subjects by encouraging individuals to be trained in the field of design to different disciplines. In graphic design education, methods that encourage students to think and develop their creative thinking should be preferred to design ideas suitable for students' readiness level. Op Art movement also has a graphical structure. Therefore, Op Art can be adapted to graphic products, and interdisciplinary studies related to this movement can be performed.

The reader's eye sometimes moves along a line or curve on the design surface. If the eye can make uninterrupted transitions from one element to another, then continuity is achieved. The optical frames of Victor Vasarely, one of the contemporary painters, can be shown among the examples where visual continuity is masterfully provided (Becer, 2013, p.70). For this reason, graphic design products that create optical illusions consisting of simple geometric shapes can be created in the courses within the graphic design education. In such a way, an environment can be provided for an experimental design study that encourages students to think about design.

This research aims to provide students with knowledge and skills about Op Art, to reveal the convertibility of Op Art into graphic design works, and to demonstrate new and original design patterns based on the characteristics of Op Art. The Op Art movement aims to give students different ways of perceiving design in graphic design education. Besides, teaching students to benefit from various disciplines in design with new approaches enables them to produce a design product based on this discipline. It is also to teach students to benefit from different art movements in line with the constructivist education approach by encouraging the latest techniques.

Constructivist learning or constructivist mind architecture is based on the principle that especially children and young people choose knowledge, emotions and skills of their own free will, receive and apply them in their own way, and shape their own minds and personalities freely (Ergün, 2014). Yılmaz (2010), who stated that the main goal in the learning based programs prepared with

a constructivist approach in visual arts course is to ensure that students achieve achievements, states that teachers should be aware that they can give all kinds of topics that will stimulate students' creativity and enable them to develop different perspectives.

METHOD

In the method part of the research, the titles of the research model, the study group, the application process and the collection of data are included.

Research Model

This study is a descriptive study based on literature review and interpretation of the data obtained as a result of the study. The data in this research are graphic design products created by students. This research is action research, one of the qualitative research patterns since it is based on descriptive interpretations of graphic design products created by students in graphic design education by using the Op Art movement, and the application is intertwined with the process. Yıldırım & Şimşek (2016) state that action research is process-oriented and that research and practice are intertwined in this process. In addition, with this aspect, they state that action research is a research approach in which participation, reflection, and development processes are productively applied. According to Ersoy & Avcı (2018), one of the most important features of action research is, filling the gap between theory and practice; it is the same people who produce knowledge and reflect the produced knowledge to practice.

“Action research includes practitioners studying the implementation process alone or with a researcher in order to understand and solve the problems that arise in practice. It is a research approach that brings research and practice together and facilitates the transfer of research results to practice. There is a flexible approach in action research. It is crucial for the researcher to be close to the data, know, and experience the process closely. The ‘participatory role of the researcher as well as a data collection tool,’ which is emphasized in qualitative research, is fully apparent in this approach” (Yıldırım & Şimşek, 2016, p.74).

Action research is carried out by people who are involved in the investigated situation and are directly related to this situation. For example, if the situation being investigated is in a classroom environment, the researcher can be a teacher directly. The probability that a researcher who is not directly related to this environment will conduct action research and achieve the purpose of the research is much less likely than the research carried out by the teacher in this class. However, this does not mean that action research is an individual study, on the contrary, getting the support of a project team or a group in stages such as producing a solution, evaluation of findings, interpretation of results can make the research more successful. Action research carried out in this way with a project team is called “participatory action research” (Büyükoztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2016). Action research is conducted by one or more individuals or groups to obtain information to inform local practices (Fraenkel & Wallen, 2009).

Study Group

The study group of the research consists of daytime and evening education 2nd-grade students in Kastamonu University Kastamonu Vocational School Design Department Graphic Design Program in the fall semester of 2016-2017, 2017-2018 and 2018-2019 academic years. The pilot application of the study was carried out in the 2015-2016 academic year. Pilot application data are not included in the research. The first stage of the research was carried out in the form of transforming a work belonging to the Op Art movement into a visual design product within the “Visual Design I” course. In the second stage of the research, the practice continued in the “Visual Design, Publication Graphics, Lettering and Typography” courses. In Table 1, the number of students according to the years of the courses in which the practice was made is given.

Table 1. Total number of daytime and evening education students who took the courses in the table for the 2016-2017, 2017-2018, and 2018-2019 academic years

Lessons	2016-2017		2017-2018		2018-2019		Total
	Male	Female	Male	Female	Male	Female	
Visual Design	18	26	26	34	42	22	168
Publication Graphics	16	27	23	29	42	25	162
Writing and Typography	12	6	19	24	43	24	128
Total	46	59	68	87	127	71	458

In this study, which is within the scope of action research, the numbers and totals of the students who have chosen the courses for the 2016-2017, 2017-2018 and 2018-2019 academic years are seen.

Application Process

Before the application process of the research, necessary permissions and approvals were obtained from Kastamonu University Kastamonu Vocational School Directorate. The application phase of the study is three weeks. The application was carried out in two different classes (I. and II. education), daytime and evening education, on the same day, at other lesson times, under the same conditions, during four lesson hours per week (one lesson hour is 45 minutes).

Although the students who took the art history course in the first year in graphic design education had knowledge about contemporary art, the theoretical information about “Op Art” was explained by supporting it with visuals at the beginning of the application process of the research (first lesson). After the theoretical knowledge, students were asked to transform a well-known work belonging to the pioneers of the Op Art movement into a graphic design product through design programs. In other words, students were asked to choose one of the most well-known works of the movement and to reproduce the selected work in a digital environment using the copy method.

In the second week of the application, the students were asked to create a new design product (second work) by transforming the work at hand, adhering to the elements such as form, shape, etc., based on the first work they reproduced.

In the third week of the application, students were asked to design original graphic design products based on the Op Art movement. At this stage of the study, students were asked to create visual designs such as background patterns and banners in the “Visual Design” course as graphic design products, magazine cover designs such as art and design in the “Publication Graphics” course, and typographic designs based on the Op Art movement in the “Writing and Typography” course.

Data Collection

In the first, second, and third weeks of the application, the works done as design homework were digitally printed on A3 glossy paper and collected from the students. The studies obtained from the application were evaluated throughout the academic years.

In action research, data can be obtained through both quantitative and qualitative methods. For instance, qualitative data collection methods such as interviews, thinking aloud, open-ended exams, and quantitative data collection tools such as questionnaires, scales, and multiple-choice exams can be applied together or separately according to the research questions and types of data to be collected (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2016, p.272).

Since it is not possible to include all of the studies in line with the collected data, the sample study of the first phase of the application is included in Figure No 2, the sample study of the second phase of the application is included in Figure No 3 and some of the remarkable sample studies of the third stage of the application, which effectively achieved the purpose of the research, are included in Figure Numbers 4, 5, 6, 7. Since this study is an action research study, student studies given as examples are described qualitatively.

FINDINGS AND INTERPRETATION

Findings and Interpretation on the First Week of the Study

In the first week of the application, it was observed that the students enjoyed this work and took their work seriously like a professional designers. After the first study of the application was completed, the students were asked questions about the Op Art movement. In line with the questions asked, the students stated that they reinforced their knowledge about the Op Art movement and that this method created an opportunity to learn effectively in practice.

In the first study of the research, with the method of adapting a Contemporary Art work to a graphic product, theoretically, the students learned that an art or design product is the copyright of the owner of the work and that they cannot include such an application in their work for commercial purposes. At the same time, they tried to comprehend how the artist or designer thinks in the emergence of a design product, and with which methods and techniques he creates the work. A reproduction study belonging to the first phase of the research is given below as an example. An installation work by Victor Vasarely can be seen in Figure 1.



Figure 1. An installation by Victor Vasarely (web: https://tr.wikipedia.org/wiki/Victor_Vasarely)

The first phase of the application consists of two parts. The first part is to reproduce the work of artist through graphic design programs (see Figure No 2).

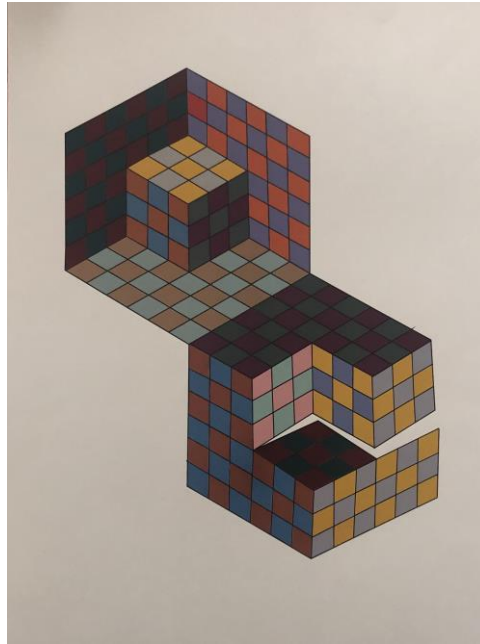


Figure No 2. Student Work 1 (Reproduction work) 2016, Reproduction work by Victor Vasarely.

The student work seen in Figure No 2 is one of the best-known works of Victor Vasarely, one of the pioneers of the Op Art movement. This work of artist is a reproduction work that has been transferred to digital media and turned into a graphic product. The purpose of the reproduction work is to ask the students to graphically draw exactly the same of original of the work Thus, students will be able to comprehend the elements such as artist's feelings, the thought of the art movement, its mathematical setup, color scheme, aesthetic structure, etc. in a graphical sense. As seen in the reproduction work, the design was made by adhering to the artist's original work. It has been tried to remain faithful to the colours and the technical details are graphically illustrated.

Findings and Interpretation on the Second Week of the Study

The second part of the first stage of the application is to make a graphically adaptive design based on the artist's work, adhering to the philosophy of the art movement (see Figure No 3).

Ambrose & Harris (2013) define adaptation as changing an original design to serve another purpose. They also state that adapting allows the new design to take advantage of the original design elements, even if the content, message, or material is different.



Figure No 3: Student Study 2, 2017 (Graphic Pattern Study). A graphic design adaptation of Victor Vasarely's seen in Figure 1

As it can be seen in Figure No 3, in the student work, which emerged from the work of Victor Vasarely and the Op Art movement, an optical illusion was created by combining geometric shapes, adding dimension with the use of color. This student's work can be used by adapting or changing the fields of graphic design and visual communication design, from logo, emblem design, even textile design to the background design of any product. In the student work, it is seen that a new design adaptation was made by going from the piece to the whole, starting from a piece of Vasarely's work.

Imitation is the copying, reproducing, or adapting of an existing design or image for use in a new design. Since design decisions have been made, tried and determined, imitation serves as a shortcut to an effective design. (Ambrose & Harris, 2013, p.92).

For this reason, the works of Contemporary Art and Contemporary Art artists can be promoted through this method, with such works that are not commercial purposes, but only as in-class activities. In addition to the art history courses, various teaching techniques within the workshop courses, as in this study, can enable experimental studies in terms of design in the fields of art and design. In this way, students can be provided with the opportunity to adopt the philosophy of the art movement and the structure of the works to different fields by creating an infrastructure in terms of design education.

Findings and Interpretation on the Third Week of the Study

After completing the first phase of the study, the second phase of the study was started. In the second phase of the research, which covers the third week, students were asked to make original designs that would stimulate their creativity instead of imitation and adaptation techniques based on the Op Art movement. Since it is not possible to include individual comments on all of the student's works, the studies of a few students who have worked on different graphic products, who have the best understanding of the subject and who can turn it into practice, are included as an example in this research. In this direction, below are sample designs of graphic design students.

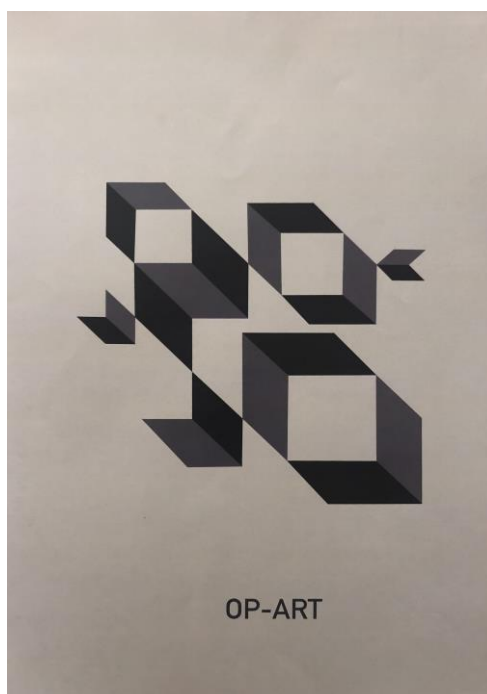


Figure No 4: Student Study 3, (Graphic Pattern Study), 2016

As it can be seen in Figure No 4, an optical illusion was made in the student work with geometric shapes and colors used, based on the Op Art movement. This student's work can be used as a background image in graphic design and visual communication design, from web design to packaging design, from poster work to publication graphic work. In addition, it is seen that the study can be adapted to many areas by being supported with different colors.



Figure No 5: Student Study 4, (Publication Graphics Study), 2016

As it can be seen in Figure No 5, in the student work, a work was created with geometric shapes and the colors used, based on the Op Art movement. In this student's study, an example of a skull is seen consisting of square, rectangular and geometric shapes for the magazine cover design as a publication graphic work, and created by adding dimension with color transitions. In addition, it is seen that a composition suitable for the page structure has been established, and a graphical pattern has been created in an illustrative structure for the page design.



Figure No 6: Student Study 5, (Typography Study), 2017

As it can be seen in Figure No 6, in the student work, a study was created using the gradient technique to create a light and shadow effect with three-dimensional letters, based on the Op Art movement. In this student's study, an example of typographic serif-free font design created with three-dimensional shapes is seen.

Typography means giving a visual form to a written idea. Typography is one of the most effective elements that gives personality and emotion to a design, the visual form that it takes, dramatically changes the accessibility of the idea and the reader's reaction (Ambrose & Harris, 2017, p.38).



Figure No 7: Student Study 6, (Poster Study), 2018

As it can be seen in Figure No 7, in the student work, a poster work was created with geometric shapes and the colors used, based on the Op Art movement. For the student's poster design work, an example of a design consisting of triangle, square and geometric shapes and created by adding dimensions with the tonal differences of the colors is seen.

CONCLUSION AND DISCUSSION

As a result of the research, when we look at the works in general, it can be said that the students have grasped the Op Art movement and that they have produced successful studies related to the Op Art movement. In addition, it is seen that the main idea of the movement, which has simple geometric shapes, styles, and forms; creates optical illusions and graphical patterns in student works. It is also seen that students learned how to transform, simplify and abstract a three-dimensional image into two and one dimensions through this application.

Graphic design students were given the opportunity to think with geometric shapes and forms and create original products in graphic design. In addition, with this application, students understood how to create optical illusions in graphic design products and had the opportunity to learn how to adapt them to other designs belonging to graphic design by practicing. With this method, it can be thought that the Op Art movement will be a source for students to create new design products and it has also been observed that students have learned how to benefit from other art movements and different discipline resources belonging to Contemporary Art.

With the practice study in the first week of the research, it was tried to make the students comprehend the copyright awareness of a work or image belonging to the artists. In addition, it can be said that it has been observed that students have learned the rules of this technique with the reproduction technique (See Figure No: 2).

It can be said that with the application work in the second week of the research, the students have learned how to adapt a new design based on an artist's works or an art movement (See Figure No: 3).

In the application study in the third week of the research, it can be said that the students have learned that not only a work or artistic product belonging to artists but also any design product or an image is copyrighted and cannot be used in individual design products. With the third application of the study, it was concluded that the students learned the level of inspiration or influence in design education by understanding the awareness that an image is a copyright. Furthermore, it was observed that the students tried to do research in terms of design, to work with devotion and to come up with an original design.

In line with the findings obtained from the research, as it can be seen in Figure No: 4, an original graphic design study was made by utilizing the Op Art movement. When this study is examined in terms of composition, it is a suitable design for design principles and elements such as color, rhythm, movement, balance, harmony, etc. The study shows that many two- and three-dimensional shapes that can be created with the understanding of optical art in all fields of graphic design and visual communication design can be fictionalized in a graphical context.

As it is seen in Figure No: 5, an original work has been done with geometric shapes and colors used, based on the Op Art movement. The study shows that many two- and three-dimensional pictures that can be created with the understanding of optical art in all fields of graphic design and visual communication design can be drawn in a graphical context.

As it is seen in Figure No 6, an original work has been done with three-dimensional letters based on the Op Art movement. The study shows that typographic designs can be made by utilizing Op Art.

As it is seen in Figure No 7, an original poster work was created with geometric shapes and the colors used, based on the Op Art movement. The study shows that many two- and three-dimensional shapes that can be created with the understanding of optical art in all fields of graphic design and visual communication design can be fictionalized in a graphical context.

After the design applications were completed, the students were asked questions about the Op Art movement, and it was observed that the knowledge of this movement was reinforced, and the applications created a permanent learning opportunity. From the point of view of the students' achievements, it can be said that this study encourages students to think in general, creates an environment for creation of new ideas and design products, and directs them to think creatively.

In design education, it is important that design principles and elements come first at the beginning of the theoretical knowledge that should be learned first. In addition, graphic design education should be supported by different discipline resources in order to produce qualified design works.

Thanks to the study, which is an experimental type in design, the students had the opportunity to learn in detail or to reinforce using the menus and toolbars of the design programs. It can be thought that students can gain experience in terms of design understanding by using toolbars they have never used, together with practicing the toolbars they know in design programs. Moreover, it can be said that through this application, the language of computer programs for design will be practiced and reinforced.

When the literature is reviewed, there is no study on graphic design education that can be considered equivalent to this research. However, studies similar to the method applied and related to the research subject are included.

The article titled "Op Art Rendering with Lines and Curves" by Inglis, Inglis & Kaplan (2012) shows that a descriptive study was conducted on how an image is transformed into op artworks step by step with the algorithm method through lines and curves. The results of the stages applied in the study support the student works carried out in the application of this research.

When the relevant literature is scanned, Saral (2019) has similar characteristics with this research in the field of visual arts education, in his thesis study titled "5E Modeline Uyarlanmış Çok Disiplinli Sanat Eğitimi Yönteminin Güzel Sanatlar Lisesi Temel Sanat Eğitimi Dersinde Op-Art İçeriğiyle Uygulanmasının Öğrencilerin Akademik Başarılarına Etkisi (The Effect of the Application of Multidisciplinary Art Education Method Adapted to the 5E Model with Op-Art Content in the Fine Arts High School Basic Art Education Course on the Academic Achievement of the Students)". Furthermore, it is observed that after the implementation of the education program consisting of Op-Art content of the multidisciplinary art education method adapted to the 5E Model, it is observed that there is an increase in the academic success and artistic skills of the students. It is seen that the research was carried out in the 'Basic Art Education' course of the 9th-grade students of the Fine Arts High School painting department and consisted of 14 students, including the experimental-control group. As a result of the research, there is a significant difference in academic achievement and artistic skills in the experimental group compared to the control group. The conclusions of the research point that this study also supports the results. In addition, it is seen that such applications can be implemented at different educational levels.

In the article titled "Sanat Eğitiminde Algı, Görsel Algı ve Yanılsama: Victor Vasarely'nin Çalışmaları Üzerine Bir İnceleme (Perception, Visual Perception and Illusion in Art Education: A Study on Victor Vasarely's Works)" by Beyoğlu (2015), which is similar to the artist's aspect of the subject, it is seen that there is a study based on literature review, in which the works of Victor Vasarely and his art on perception, visual perception and illusion related to art education are examined descriptively.

Furthermore, in the research titled "Op Sanat ve Dijital Teknolojinin Kullanımı (Op Art and the Use of Digital Technology)" by Özel (2007), which has a similar nature in terms of the topic of this research, it is seen that an article study was conducted based on the literature review on the use of digital technologies in op art.

It is seen that Uğur (2019)'s article titled "Op-Art (Optik Sanat) Akımının Görsel Algı ve Grafik Tasarım Kavramları Açısından Tanımlanması (Defining Op-Art (Optical Art) Movement in Terms of Visual Perception and Graphic Design Concepts)" is also based on a literature review.

RECOMMENDATIONS

Art history education establishes a basic conceptual infrastructure of the design process, which contributes to the intellectual knowledge of the individual and influences the creative thinking of the individual. A designer must have a good knowledge of art history to learn what has been done earlier, try what has not been done, and produce qualified works (Inceagaç, 2016).

"It is possible to see the influences of many different styles such as Pop Art, Neo-Expressionism, and Post-Modernism in today's graphic products. In addition to creative thinking and philosophy, scientific inventions and technologies are among the factors that direct design styles" (Becer, 2013, p.112).

According to Twemlow (2011), students learned that they could easily grasp a computer program and what they should focus on were intellectual strategies, strong ideas, interesting stories, and thoughtful approaches. From this viewpoint, the method expressed in the final form of an argument can be changed, sometimes even irrelevant. However, at the same time, each method has its texture, unique features, and potentialities. Nevertheless, he emphasizes that they enrich the whole and inspire when these are understood and included in the work.

Therefore, it can be assumed that graphic design students should have a good grasp of the emergence of art and design movements related to their field such as "World Art History, Western Art History, Contemporary Art, and Graphic Art History" disciplines and theoretically be fed from art history subjects. That can only be possible with a comprehensive art history education in the fields of art and design. Furthermore, it is essential in terms of intellectual and creative thinking skills that the individual who receives design education learns the knowledge of art history both from his own culture and from various cultures. Both taking a Turkish Art History course and learning art history or art cultures from cultures all over the world such as China, Japan, Africa, America, and Europe; can also be a source of inspiration for students studying in Turkey in international higher education institutions, to create original and qualified artistic products. It can be considered that learning that is more effective can be achieved by putting the acquisitions in line with this purpose into practice by integrating them with the interdisciplinary method.

From another viewpoint, when a new design will be made while influenced by any design or art movement, getting the correct copyright information is essential for the originality and ethics of the design. The level of influences in design education and the subject of copyright will be taught to students through such applications. It is believed that through such studies, students will be able to comprehend the sensitivity of copyright.

Designers incorporate or combine elements from other work into their designs, possibly with an immense source of work in creative visual disciplines such as fine art, design, and advertising. Appropriation is often quite direct, allowing the audience to understand the intended message readily. The capacity of people to define appropriation makes it a very efficient way of communication (Ambrose & Harris, 2013, p.92).

As a result, in this study, the students learned that other contemporary art movements could be applied in graphic design, as in Op Art. In this respect, it is beneficial to use such applications in in-class activities by field teachers and academicians at all levels, including secondary education, associate degree, and undergraduate education in graphic design education. Because in this way, students can be provided with the opportunity to produce qualified and original studies by transforming a piece of theoretical knowledge into practice.

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