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| Research Article / Araştırma Makalesi |

Students' Views on the Use of Teaching Strategy Through Invention in Digital Illustration Course and an Application Study

Buluş Yoluyla Öğretim Stratejisinin Dijital İllüstrasyon Dersinde Kullanımına İlişkin Öğrenci Görüşleri ve Bir Uygulama Çalışması

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Keywords

1.Art Education
2.Graphic Design
3.Digital Illustration
4. Character Design
5.Teaching Strategy Through Invention

Anahtar Kelimeler

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Abstract

Purpose: The aim of the research is to determine the student's views on the use of instructional strategy in digital illustration course through invention and to conduct a practice study. Graphic design courses is limited research on the use of different teaching strategies in the processing of instruction and the discovery of more math, science in areas such as were used. It is thought that the research is important in this aspect and will contribute to the related literature.

Design/Methodology/Approach: In the research, which was carried out with 24 students who took the Digital Illustration course of Kastamonu University Faculty of Fine Arts and Design, Department of Graphics, education was carried out using the teaching strategy through invention. In this study, in which screening research, which is one of the quantitative research designs, was used, the data were collected with a 5-point Likert-type scale and a graded scoring key.

Findings: As a result of the research, it was determined that the students were active in the educational environment through the invention, and that the information was discovered and learned. As a result of student opinions, it has been concluded that the instructor guides the students and gives hints to the students during the problems encountered during the design process. It was concluded that the teaching strategy through the invention is the method that prepares the students for acquiring new information, the information learned in the lesson is used in different lessons, and it is beneficial for students to develop their thinking, problem solving and creativity skills.

Highlights: The intensity of the curriculum and the lack of hours made it difficult to implement the teaching strategy. In addition, according to the character design evaluation criteria, it was determined that the products designed in the teaching environment through invention were sufficient and incomplete.

Öz

Çalışmanın amacı: Araştırmanın amacı, buluş yoluyla öğretim stratejisinin dijital illüstrasyon dersinde kullanımına ilişkin öğrenci görüşlerinin belirlenmesini sağlamak ve bir uygulama çalışması yapmaktır. Grafik tasarım derslerinin işlenişinde farklı öğretim stratejilerinin kullanımına ilişkin araştırmaların sınırlı olduğu ve buluş yoluyla öğretim stratejisinin daha çok matematik, fen gibi alanlarda kullanıldığı tespit edilmiştir. Araştırmanın bu yönüyle önem taşıdığı ve ilgili alanyazına katkı sağlayacağı düşünülmektedir.

Materyal ve Yöntem: Kastamonu Üniversitesi Güzel Sanatlar ve Tasarım Fakültesi Grafik Bölümü Dijital İllüstrasyon dersini alan 24 öğrenci ile gerçekleştirilen araştırmada, buluş yoluyla öğretim stratejisi kullanılarak öğretim gerçekleştirilmiştir. Nicel araştırma desenlerinden tarama araştırmasının kullanıldığı bu çalışmada veriler 5'li likert tipi ölçek ve dereceli puanlama anahtarı ile toplanmıştır.

Bulgular: Araştırma sonucunda buluş yoluyla eğitim ortamında öğrencilerin aktif olduğu, bilgilerin keşfedilerek öğrenildiği tespit edilmiştir. Öğrenci görüşleri neticesinde, öğretim elemanının öğrencilere rehberlik ettiği ve öğrencinin tasarım sürecinde karşılaştığı problemler esnasında öğrenciye ipucu verdiği sonucuna ulaşılmıştır. Buluş yoluyla öğretim stratejisinin öğrencilerin yeni bilgiler elde etmesine zemin hazırlayan yöntem olduğu, derste öğrenilen bilgilerin farklı derslerde kullanıldığı, öğrencilerin düşünme, problem çözme, yaratıcılık becerilerini geliştirmede fayda sağladığı sonucuna ulaşılmıştır.

Önemli Vurgular: Öğretim programı yoğunluğunun ve ders saati yetersizliğinin öğretim stratejisinin uygulanmasını zorlaştırdığı görülmüştür. Ayrıca karakter tasarımı değerlendirme kriterlerine göre, buluş yoluyla öğretim ortamında tasarlanan ürünlerin yeterli ve eksik olduğu noktalar tespit edilmiştir.

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INTRODUCTION

Today's contemporary art education and training is in the direction of leading the individual to think creatively, to obtain a concept, to make inventions and to evaluate what she/he finds by analyzing it. Art education, which is included in the general education of the individual, is an important educational field that enables the individual to express herself/himself and reveal her/his creative powers.

Art education aims at the development of students in the subjects which are creative thinking, research, problem solving, decision-making, developing their thinking power, communicating, acquiring aesthetic sensitivity and awareness of being human (Balamir, 1999: p. 39). In all areas of art education, the individual is in constant research and experimentation. This situation give an opportunity to be able to produce and freely express herself/himself to the individual. In such an environment, the individual feels confident and happy to perform a creative action (Yılmaz, 2010, p. 18).

Design education, which is within the scope of art education, is a sophisticated process that includes theoretical and applied information. Hand skill is important as much as thinking, creativity and problem solving skills in design education.

Learning the design language and using it effectively depends on a lot of practice and experimentation. The individual should have the ability to reach new knowledge by comprehending the research, exploratory, thinking and behavioral skills, that can solve the problems with her/his knowledge and instinctions, which is ever-enriched by her/his experiments. The goal of design education is consideration with alternatives and to be able to use choosing the most suitable one among these alternatives (Tuna, 2011, p. 190).

The way of these behaviors would be gained to the individual by through an effective design education. How to put into practice of the desired behaviors to students brings up the problem of method also in design education as in other education fields. It is aimed to bring into life and to be applied of the knowledge learned at school in the modern education system. This situation reveals the necessity of establishing a relationship between the information learned in the lessons and adopting an interdisciplinary approach. Because of this requirement, different models, approaches and strategies are needed such as behavioral and cognitive theories, humanistic approach, constructivist learning and teaching strategies that describe the conditions under which learning will take place.

Instructional strategy is one of the variables that is enabled while gaining the desired behaviors in the learning teaching environment (Sönmez, 2009: 175). The main teaching strategies are teaching by presentation strategy, analysis teaching strategy, and discovery teaching strategy.

The presentation-based teaching strategy, which is an approach based on cognitive theory, was developed by Ausubel. according to Ausubel; learning should be meaningful and catchy. In order to be learned of knowledge, it is necessary to properly organize of the information and make it ready for learning. Students can learn existing information, concepts and principles about the subject by presenting to them. Teaching through presentation strategy is a teacher-centered approach (Akınoğlu, 2018, p.69).

The inquiry-based teaching strategy, that is theroized by J. Dewey, is an approach based on the process of seeking and enlighting of problem solving ways. To solve the problem; the student defines the problem, collects data to test his / her hypotheses and reaches a conclusion by evaluating the collected data. The teacher guides to the student at the point of evaluation and reaching a conclusion in situations that are not understood. Inquiry-based teaching strategy contributes to students' effective and permanent learning and the development of independent thought skills (Karaağaçlı, 2011, p. 139-143).

According to Bilen (2006, p. 75), learning by discovery strategy, also known as "learning by practising", "to be found something out (Socratic) method" or "learning by exploring", It is a motivational strategy based on student activity that enables to reach abstractions by collecting and analyzing data about a specific problem". The main goal of this strategy, which has been fruquently the subject of scientific research, is to lead students to problem solving. For this purpose, teaching through discovery method provides to the student with the opportunity to collect information to solve the problems his / her encounters, to analyze the information collected, to reach new information with the information analyzed and to practice.

"Discovery teaching strategy is based on Brunner's theory:

- Identifying the experiences that will ensure students' readiness to learn,
- Structuring the teaching content,
- Sorting of learning experiences,
- Determining the role of reinforcers in the learning process and how they will be distributed "(Büyükkaragöz & Çivi, 1997, p.70).

The ease of use of the discovery teaching strategy is a strategy that should be used to support students to develop higher-order thought skills and to improve students' self-confidence. At the same time, this strategy increases the student's sense of curiosity, reinforces the sense of achievement and enables them to experience the excitement of discovery (Saygılı, 2015, p.55).

The main task in the strategy in which the teacher takes an active role is to guide the student and find the answer to her/him. The teacher is not the person who transmits the information directly, but the person who guides the student to discover the

information. For this reason, the teacher should first specify the purpose and prepare suitable examples that the student can benefit from her/his previous experiences. The student's interest and motivation should be increased by choosing the questions from easy to difficult. As a result, the student should reach the principles and generalizations by herself/himself (Demirel, 2012, p. 75-76). In the strategy of teaching through discovery, the student reaches the principles and generalizations based on the examples presented to her/him by guiding of the teacher's. The teacher guides to the student in collecting and analyzing information and provides to the student accessing information. The design process, which is an effort to find the unknown and solve every new problem; consists of five stages: definition of the problem, information gathering, creativity and invention, finding solutions and implementation. These stages of the design process coincide with the implementation of the inventive teaching strategy.

The discovery strategy based on cognitive theory is one of the teaching methods used in the realization of effective learning in art education. Design education includes hypothetical and theoretical knowledge. In our age where technology gains importance, the use of design programs has also gained importance. The role of the educator and the effect of the teaching method in the trainings conducted to learn design programs are very important (Önal, 2013, p.31). If the designer is a good program user and has the knowledge of creativity, he can design anything imagined (Tepecik, 2002: p. 83).

It is necessary to conduct researches on the use of different teaching approaches in graphic design education. When the related literature is reviewed, it is seen that the teaching strategy through discovery, which has an indispensable contribution to the development of problem solving skills, is mostly used in numerical fields such as mathematics and science. Problem solving skills are the basis of graphic design. No study has been found on the use of an inventive teaching strategy in design education, which serves the same purpose with this aspect. This situation is thought to make the research important.

The primary problem of this study is; The aim of this course is to determine students' views on the use of discovery teaching strategy in digital illustration lessons and to make an application study. Adobe Illustrator is one of the application areas of graphic design and one of the software used for limning and illustration prepared in computer environment. Adobe Illustrator, a vector-based program, has been used frequently in areas such as character design and illustrating children's books. The most important factor in conducting a study on character design in this research is to enable students to create a product by combining technical knowledge of Adobe Illustrator with their creative ideas.

Purpose of the research

The aim of this research is to determine student views on the use of discovery teaching strategy in digital illustration lessons and to make an application study. In this direction, the following questions were sought.

1. Students regarding the use of discovery teaching strategy in digital illustration course;
   a. What are her/his views on the learning teaching process?
   b. What are the views of about the lecturer?
   c. What are her/his views on the effectiveness of the teaching method?
2. The products created by students studying in an inventive teaching environment;
   a. Creating sketches,
   b. Creating symbols suitable for the subject,
   c. Originality,
   d. Use of technique,
   e. Character creation,
   f. Completion of the study,
   g. Presentation of the product,

How is it in terms of above mentioned processes?

METHOD

The headings of the research model, study group, data collection tools, data collection and data analysis were included in this chapter.

Research Model

In this study, scanning model, which is one of the quantitative research approaches, was used. Scanning model is a research method that is used with intend to determine to features of a particular group (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2017, p.15). Scanning model; "… In a universe consisting of many elements, it is the scanning arrangements made on the whole of the universe or a group, sample or sample to be taken from it in order to make a general judgment about the universe"

(Karasar, 2016, p. 111). The questionnaire, which is accepted as the most important data collection technique in survey research, is a research material consisting of a series of questions aimed at describing and emerging people's views on various issues.

Working group

The universe of the research consists of the students studying in Graphic Design Department of Faculty of Fine Arts and Design at Kastamonu University in the spring semester of the 2017-2018 academic year. Again, in the spring semester of the 2017-2018 academic year, the sample; is consisted of 24 students who took the Digital Illustration course in the second year of the Graphic Design Department of the same faculty. Criterion sampling method, one of the purposeful sampling methods, was used in the study. Criteria sampling; It consists of a person, event, and situation with certain qualifications and is used when in-depth study is desired in quantitative research. According to the data collected in the research, criterion sampling is used when it is desired to apply on groups with certain characteristics. In this direction, the criterion was determined by the researcher that the students should be taking the Digital Illustration course at the undergraduate and sophomore level.

Data Collection Instrument

In this study, data were collected with a 5-point Likert type scale and a rubric.

5-point Likert-type scale: One of the frequently used data collection methods in quantitative research is questionnaires. Survey; It is a research material that consists of a series of questions aimed at determining people's living conditions, behaviors, beliefs or attitudes, can be applied quickly and has a low cost (Büyüköztürk et al., 2017, p.129). In this research, a 5-point Likert-type scale was applied to determine the students' views on the teaching strategy through discovery used in the digital illustration course. The scale, developed by the researcher, consists of 29 items, one of which is an open-ended question, and three parts: views on the learning-teaching process, views on the instructor, and opinions on the effectiveness of the teaching method. The items in the scale were checked by five experts in the field of fine arts education, and the necessary corrections were made in the measurement tool in line with the experts' feedback.

Rubric: One of the assessment techniques that show the learning and progress stages of the student in visual arts education is graded scoring keys. The rubric that is commonly used in performance, product and portfolio evaluations consists of evaluation criteria, criterion definitions and scoring strategy (Mamur, 2010, p.182). In this study, a rubric was developed by the researcher in order to evaluate the student products made in the teaching environment through discovery. The developed rubric was examined by three experts in the field of fine arts education, and their feedback was taken, and accordingly, it was finalized and approved by the experts. Ranked scoring key; sketching (15 points), creating symbols appropriate to the subject (15 points), creativity and invention (25 points), use of technique (20 points), character creation (15 points), completion of the study (5 points) and presentation of the product (5 points)) consists of 7 evaluation criteria. The final score of the student was determined by taking the average of the scores given to each evaluation criterion by 3 experts. Scores of 0-49 (very poor), 50-59 (poor), 60-69 (moderate), 70-84 (good), 85-100 (very good / high level) out of 100 points were made for the evaluated products.

Application Process: In order to collect the data of the research, the Adobe Illustrator program was tried to be comprehended by using the teaching strategy through discovery in the Digital Illustration course. A 6-week study was carried out in order to gain the ability to design characters using the Adobe Illustrator program. In the first week, basic drawing tools and features of Adobe Illustrator program, free drawing tools in the second week, and coloring methods in the third week using the teaching through discovery strategy. During the first three weeks, a digital illustration lesson was taught by adding new information to the existing knowledge of the students about the use of the program and based on the students' discovery of the program. In the fourth week, a presentation containing information and visuals about character design was made, and they were able to comprehend character design with questions and answers. Then, the students were asked to design their own characters indigenous to Kastamonu city with a pencil drawing. For this reason, first of all, each student has done detailed research on the prominent features of Kastamonu province and these features are listed. In the fifth week, each student made a pencil sketch of the character toward the symbol which is he chose in line with her/his research. The lecturer constantly followed the work of the students and guided where necessary. In the sixth week, after the character design was completed as a sketch, it was requested to draw the design in digital environment using Adobe Illustrator and the work was completed. Studies were collected at the end of the sixth week.

Collection of Data

At the end of the sixth week, a 5-point Likert-type scale prepared to collect data was distributed to students in a workshop environment. In order to fill in the scale, the necessary explanation was given to the students and 20 minutes were given. In addition, student studies collected by the researcher were evaluated by 3 experts according to the criteria and points in the rubric.

Data Analysis

During the development of the 5-point Likert-type scale, expert opinion was taken to determine the adequacy of the items in the scale in including and collecting the factual and judicial data needed. As a result of the evaluations of the experts, the content validity rate for the items was obtained as 1.00 and it was stated that all items were suitable for the scale. In the study, the scale was pre-applied on a group of 15 people with similar characteristics to the target audience in order to obtain valid and reliable results. In order to evaluate the comprehensibility of the questions in the scale to be applied, the response time and the application method, a pre-pilot application should be carried out on a group selected from the target audience. With this application, necessary corrections can be made on the form to be applied on the main group (Büyüköztürk et al., 2011, p.140).

The data obtained through a 5-point Likert type scale were analyzed with the SPSS 21 program, and the data was tabulated by taking the frequency and percentage distribution values of the data. In the reliability analysis of the scale, the internal consistency Cronbach Alpha Coefficient was found as a = 0.798. Cronbach Alpha reliability coefficients should be between 0 and 1. As this value approaches 1, the reliability of the internal consistency of the scale increases. According to this; Below 0.50 is unacceptable, 0.50 - 0.60 is weak, 0.60 - 0.70 is questioned, 0.70 - 0.80 is acceptable, 0.80 - 0.90 is good and It shows excellent reliability between 0,90 - 1,00 (Gliem and Gliem, 2003). Accordingly, it is seen that the applied 5-point Likert type scale is at an acceptable level.

The characters are, that are intrinsic to Kastamonu city, designed by the participants were evaluated with a graded scoring key by experts in their fields. The arithmetic mean of the scores given by each expert for each criterion was taken, and the scores of all criteria were added to the evaluation score. In addition, the evaluation scores of all students were added, divided by the number of people, and the class average was calculated by calculating $\bar{x}$ = 71.7.

The students participating in the study were coded with numbers (S1 = Student1, S2 = Student2) and presented in the findings section.

FINDINGS

In this part of the study, student views on the use of the teaching strategy through discovery in digital illustration lessons (opinions about the learning teaching process, opinions about the instructor, opinions about the effectiveness of the teaching method) are presented in tables.

In addition, the second aim of the research is “The products created by students studying in the teaching environment through discovery; How is it in terms of creating sketches, creating symbols appropriate to the subject, originality, use of technique, character creation, presentation of the product, completion of the work? " There are evaluations regarding the question.

Table 1. Opinions on the learning teaching process

Statements	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
	f	%	f	%	f	%	f	%	f	%
1- I think I am active in the lesson.	6	25,0	15	62,5	3	12,5	-	-	-	-
2- I approached the design like a problem.	8	33,3	7	29,2	5	20,8	2	8,3	2	8,3
3- When I encountered a problem while designing, I thought to find a solution.	12	50,0	12	50,0	-	-	-	-	-	-
4- When I encountered a problem while designing, I thought of different ways to find a solution.	13	54,2	10	41,7	1	4,2	-	-	-	-
5- I gathered information about the subject while starting the design.	8	33,3	14	58,3	2	8,3	-	-	-	-
6- I analyzed the information I collected about the design.	7	29,2	12	50,0	4	16,7	1	4,2	-	-
7- I was able to put the information I analyzed into practice.	5	20,8	13	54,2	4	16,7	2	8,3	-	-
8- I learned the information about the subject by discovering it myself.	7	29,2	8	33,3	8	33,3	-	-	1	4,2
9- The course was practical.	18	75,0	3	12,5	2	8,3	1	4,2	-	-
10- The course was theoretical.	4	16,7	5	20,8	5	20,8	7	29,2	3	12,5
11- Question and answer technique was used in the lesson.	14	58,3	6	25,0	4	16,7	-	-	-	-
12- Demonstration technique was used in the lesson.	20	83,3	4	16,7	-	-	-	-	-	-
13- Discussion technique was used in the lesson.	8	33,3	7	29,2	7	29,2	2	8,3	-	-

When the findings in Table 1 are examined, the total number of students who answered the statement "I think I am active in the course" by marking the I strongly agree and agree options is 21 (87.5%). It was inferred that the students actively participated in the lesson and that active teaching was provided.

The total of the students who answered the statement “I approached design as a problem” by marking the “I strongly agree and agree” option is 15 (62.5%). The total number of students who selected the statement “I thought to find a solution when I

encountered a problem while designing" is 24 (100%). None of the students selected the same statement as indecisive, disagree, strongly disagree. "When I encountered a problem while designing, I thought of different ways to find a solution." The total number of students who marked the "I absolutely agree and agree" option is 23 (95.9%). According to the findings in these statements; It was deduced that students perceive the concept of design as a problem to be solved, that they produce more than one and different solutions while designing, and that they approach design in an inquisitive and questioning manner.

As seen in Table 1, "I gathered information about the subject while starting the design." The total of the students who marked the "I absolutely agree" and "I agree" statement is 22 (91,6%). "I analyzed the information I collected about the design." The total of the students who marked the "I absolutely agree and agree" option is 19 (79.2%). "I was able to put the information I analyzed into practice." The total number of students who marked the "I absolutely agree and agree" option is 18 (75.0%). I strongly agree with the statement "I learned the information about the subject by discovering myself in the course" and the total number of students who selected the "I agree" option is 15 (62.5%). With this findings, it was inferred that the students were successful in collecting information that would bring them to a conclusion in solving the design problem, selecting and receiving useful information, and applying the information they obtained, and that new information was discovered and learned as a result of these stages.

The total number of students who marked the statement "I strongly agree and agree with the question-answer technique used in the lesson" is 20 (83.3%). The total number of students who marked the "I strongly agree and agree" statement "the technique of showing and making it was used in the lesson" is 20 (83,3%). A total of 15 (62.5%) of the students who marked the statement "Discussion technique was used in the lesson" option, marked the same statement as 7 (29.2%) students as undecided, 2 (8.3%) students as disagree. With the participation of the students to a large extent, it has been concluded that the techniques of question and answer, demonstration and making were used adequately in the teaching environment through invention, but the discussion technique was used less or insufficiently than other techniques.

Table 2. Opinions about the instructor

Statements	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
	f	%	f	%	f	%	f	%	f	%
14- She/He guided me.	16	66,7	8	33.3	-	-	-	-	-	-
15- She/He was active in the lesson.	21	87,5	3	12,5	-	-	-	-	-	-
16- She/He showed many examples in the lesson.	15	62,5	8	33,3	1	4,2	-	-	-	-
17- She/He helped me in the subject I had a problem with in the lesson.	22	91,7	2	8,3	-	-	-	-	-	-
18- When I encountered a problem, She/He gave me time to find solutions on my own.	15	62,5	8	33,3	1	4,2	-	-	-	-
19- She/He gave me a clue to solve the problem I was experiencing myself.	12	50,0	10	41,7	2	8,3	-	-	-	-

When we look at the findings in Table 2, the total of the students who marked the statement " She/He guided me" is 24 (100%). No student has marked this statement as being indecisive, disagree, or strongly disagree. The total number of students who answered the statement " She/He was active in the course" by marking the I strongly agree and agree options is 24 (100%). The total of the students who answered the statement "She/He helped me with the subject I had problems with in the lesson" by marking the "I strongly agree and agree" option is 24 (91.7%). With the participation of all of the students in these statements, it was concluded that the instructor guided the students in the lesson, guided the students and supported the students in solving the problems they encountered.

According to Table 2, " She/He showed plenty of examples in the lesson" and "When I encountered the problem, She/He gave me time to find solutions on my own." The total number of students who answered their statements by checking the I agree and agree options was 23 (95.8%). According to these findings; It was deduced that the instructor showed enough examples in the lesson and gave sufficient time to each student to solve the problems.

"She/He gave me a clue so that I could solve the problem I was having." If the statement is 2 (8.3%) students, the total number of students who marked the "strongly agree and agree" option is 22 (91.7%). It was deduced that the students thought that the clues given by the instructor were mostly sufficient in solving the problems they encountered, and they did not give a positive or negative opinion from the indecision expressed by two students.

Table 3. Opinions on the effectiveness of the teaching method

Statements	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
	f	%	f	%	f	%	f	%	f	%
20- The information I learned in the course is sufficient in terms of program dominance.	7	29,2	13	54,2	3	12,5	-	-	1	4,2

21- After taking this lesson, I built new ones on my old knowledge.	16	66,7	6	25,0	2	8,3	-	-	-	-
22- After taking this course, I realized that my old knowledge was insufficient.	15	62,5	6	25,0	2	8,3	-	-	1	4,2
23- The way the lesson was taught changed my perspective on the program.	11	45,8	10	41,7	1	4,2	2	8,3	-	-
24- I can use the program I have learned in different design courses.	15	62,5	8	33,3	-	-	-	-	1	4,2
25- I can use the program I learned in extracurricular activities.	13	54,2	11	45,8	-	-	-	-	-	-
26- I think the way the lesson is handled has improved my thinking.	13	54,2	10	41,7	1	4,2	-	-	-	-
27- I think the way the lesson is taught improves my problem-solving power.	6	25,0	17	70,8	1	4,2	-	-	-	-
28- I think the way the lesson is handled improves my creativity.	12	50,0	10	41,7	2	8,3	-	-	-	-

According to the findings in Table 3 "The information I learned in the course is sufficient in terms of program dominance." The total number of students who answered the statement by checking the “I absolutely agree and agree” options is 20 (83,4%). According to this finding, it is thought that the mastery of the program has reached a sufficient level with the participation of students in the teaching environment, where information is discovered and learned through discovery.

The total of the students who answered the statement “I have built new ones on my old knowledge after taking this course” by marking the “I strongly agree and agree” option was 22 (91.7%), and 2 (8.3%) students selected the option of undecided. There were no students who answered the same statement by selecting the “disagree” or “strongly disagree” options. It was concluded that in the discovery learning environment, students added new information on their existing knowledge, but some students answered this expression as indecisive, and the information they learned was not sufficient to create new knowledge.

"After taking this course, I realized that my old knowledge was insufficient." and "The way the course is taught changed my perspective on the program." The total number of students who answered their statements by checking the I agree and agree options was 21 (87.5%). It has been concluded that the teaching strategy through discovery used in curriculum teaching contributes to the development of students' thinking and the view that there are different ways to reach information.

"I can use the program I have learned in different design courses." The total number of students who answered the statement by marking the “I absolutely agree and agree” options was 23 (95.8%). According to this finding, it is thought that students gain the ability to carry information and put it into practice by providing the use of information transfer in different areas.

When the findings in Table 3 are examined, the total number of students who answered the expressions "I think that the way the course is taught improves my thinking power" and "I think that the way the course is taught improves my problem-solving power" is 23 (95.9%) of the students who answered by marking the options I strongly agree and agree. Based on these findings, it was inferred that the thinking and problem solving skills of the students studying in the teaching environment through discovery improved.

The total of the students who answered the statements “I think the way the lesson is taught improves my creativity” by marking the “I strongly agree and agree” options is 22 (91.7%). While 2 (8.4%) students marked the same statement as indecisive, no student marked the option of disagree or strongly disagree. According to this finding, it can be inferred that the students' skills based on creativity and exploration developed, while the indecision expression of two students was concluded that the teaching strategy through discovery was not sufficient to gain these skills.

Table 4.Other views on the effectiveness of the lesson

Category	Student Code	Student Opinions
Insufficiency of the lesson time	S6	Our mistakes should be checked and the truth should be told in the given homework. Time is not enough for this in class. Therefore, lesson hours should be increased.
	S9	Class hour is not enough. That's why the narration of the program goes a little fast.
Extension of the hour of the lecture / Additional lesson	S1	Lesson hours are not enough There should be additional lessons for free studies. Hourly activities can be done in a limited time.
	S5	Additional lessons should be given in which we can practice the old topics covered in the course.
	S13	For those who do not know and do not understand the program, only an additional course in which the program is explained is required. Only those who have problems using the program participate.

To the open-ended question directed to students taking the Digital Illustration course - What are your suggestions for the course to be more effective? - 8 students out of 24 in total responded. Students' opinions as seen in Table 4; are grouped in 2

items: insufficiency of the course time and extension of the course time / additional course. Some of the expressions for these titles are given in the table. According to the findings in the table; It has been concluded that the curriculum is intense and the learning issues are not emphasized enough and the effectiveness of the teaching strategy decreases.

Table 5.The evaluation of the products created by students studying in the teaching environment through discovery according to design criteria

	Rubric							
	Evaluation Criteria and Scores							
Student	**Sketching**	**Creating symbols in accordance with the subject**	**Originality**	**Use of technique**	**Character creation**	**Completion of the work**	**Presentation of the product**	**Evaluation Score**
	(15)	**(15)**	**(25)**	**(20)**	**(15)**	**(5)**	**(5)**	
S1	9	11	15	12	9	4	4	64
S2	10	10	17	11	11	4	4	67
S3	11	10	17	15	10	4	4	71
S4	12	12	18	13	12	5	5	77
S5	14	13	22	16	13	5	5	88
S6	11	11	18	13	9	4	4	70
S7	12	13	20	16	12	5	5	83
S8	13	12	20	15	11	4	4	79
S9	11	13	20	16	11	5	5	81
S10	9	11	18	13	9	4	4	68
S11	9	10	18	13	10	4	4	68
S12	10	13	20	15	13	5	5	81
S13	9	10	17	12	10	3	4	65
S14	11	9	13	12	9	3	4	61
S15	11	11	18	13	9	3	3	68
S16	10	11	20	15	11	4	4	75
S17	9	8	13	13	9	4	4	60
S18	11	11	20	13	10	4	4	73
S19	10	9	15	15	10	4	4	67
S20	9	11	18	13	11	4	4	70
S21	13	13	22	16	14	4	5	87
S22	7	9	17	12	9	4	4	62
S23	7	9	18	12	9	4	4	63
S24	10	11	20	15	11	4	4	75
							Total Evaluation Score	1.723
							Average	71.7

0-49 (very poor) 50-59 (poor) 60-69 (moderate) 70-84 (good) 85-100 (very good)

In Table 5, characters indigenous to Kastamonu province designed using Adobe Illustrator in digital illustration lesson; It was evaluated by 3 experts according to a total of 7 criteria: creating sketches, creating symbols appropriate to the subject, originality, use of technique, character creation, completion of the study and presentation of the product.

According to the findings in Table 5; The general average of the points given to the students' products was calculated as $\bar{x}$ = 71.7. Considering the evaluation scores, it was determined that there was no student product in the score range of 0-49 (very poor) to 50-59 (poor). The number of products in the range of 60-69 (medium) points is 11, the number of products in the range of 70-84 (good) points is 11, the number of products in the range of 85-100 (very good) points is 2.

The evaluation score of student products in the range of 60-69 (middle) is the highest score of 68 (S10, S11, S17) and the lowest 60 (S17). Examining the scores of the S1 coded student product from the evaluation criteria, the criteria closest to the full score are; sketching (9 points), creating symbols appropriate to the subject (11 points), character creation (9 points), completion of the study (4 points) and presentation of the product (4 points). Examining the scores of the S17 coded student product from the evaluation criteria, the criteria closest to the full score are; sketching (9 points), creating symbols appropriate to the subject (8 points), using the technique (13 points), creating character (9 points), completing the study (4 points) and presentation of the product (4 points). According to the findings; It has been concluded that student products, which are in the 60-69 (medium) score

range, are at a sufficient level in terms of sketching, creating symbols appropriate to the subject, character creation and presentation of the work, which constitute the creativity and invention stage of the design processes, but the use of technique in practice should be improved.

The evaluation score of the student product in the range of 70-84 (good) points is the highest 83 (S7) and the lowest 71 (S3). Examining the scores of the S7 coded student product from the evaluation criteria, the criteria closest to the full or full score; sketching (12 points), creating symbols appropriate to the subject (13 points), using the technique (16 points), creating character (12 points), completing the study (5 points) and presenting the product (5 points). Examining the scores of the Ö3 coded student product from the evaluation criteria, the criteria closest to the full score; sketching (11 points), creating symbols appropriate to the subject (10 points), using the technique (15 points), creating character (10 points), completing the study (4 points) and presenting the product (4 points). According to the findings; It has been deduced that student products, which are in the range of 70-84 (good) points, are at a sufficient level in terms of creativity, invention and application stages from the design processes.

Among the student products in the range of 85-100 (very good-high level), the evaluation score is the highest 88 (S5) and the lowest 87 (S21). When the scores obtained from the evaluation criteria of the S5 coded student product are examined, one of the criteria closest to the full or full score; sketching (14 points), creating symbols appropriate to the subject (13 points), originality (22 points), character creation (13 points), completion of the study (5 points) and presentation of the product (5 points). According to the findings; It has been concluded that student products, which are between 85-100 (very good) points, are successful in terms of the originality of the character and the use of technique in the design process.

Some of the character designs made by the students indigenous to Kastamonu using Adobe Illustrator are presented below.

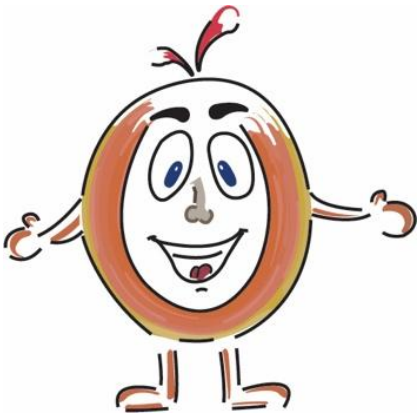

Figure 1. Bald Bagel (S1)

Figure 2. Tosya Rice (S17)

Figure 3. Garlic (S23)

Figure 4. Clock Tower (S10)

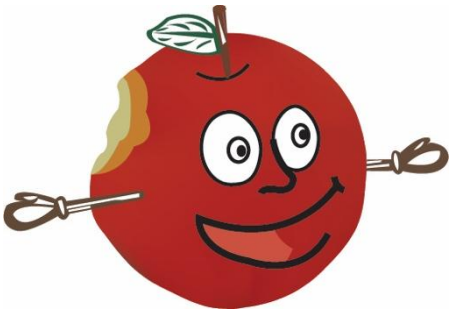

Figure 5. Sour Apple (S7)

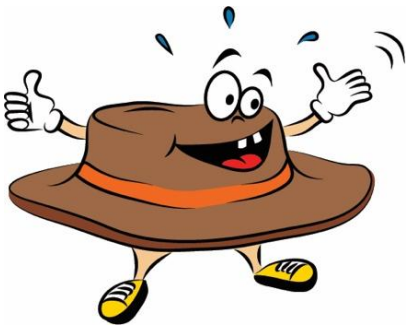

Figure 6. Hat (S3)

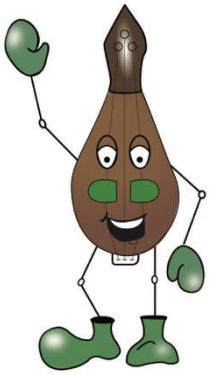

Figure 7. Violin Bow (S12)

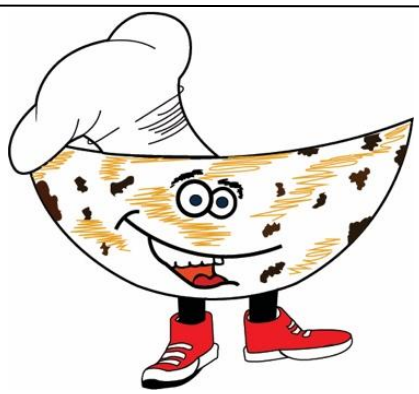

Figure 8. Bread with Meat (S5)

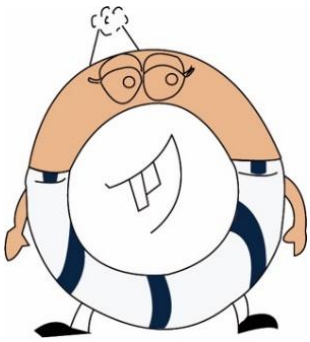

Figure 9. Bald Bagel (S21)

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

As a result of this research, which was designed to determine students' views on the use of discovery teaching strategy in digital illustration lesson and to conduct an application study;

1. Students regarding the use of discovery teaching strategy in digital illustration course;

It was determined that students actively participate in the lesson in the learning-teaching process and approach design as a problem. In the research of Akengin and Başbuğ (2018), it is stated that teaching by discovery is a strategy that makes individuals active from passive situations and directs individuals to research, discover and find creative solutions to problems (p. 135-136). It has been determined that the participants think of a solution when they encounter any problem while designing and produce different solutions for a problem they encounter. In the process of learning and teaching, it is seen that the teaching strategy by means of discovery has reached the aim of the participants in discovering the information about the subjects learned in the lesson and putting this knowledge into practice.

As a result of the opinions about the teaching environment through discovery, it has been determined that demonstration and question-answer techniques are mostly used, and the discussion technique is used less than other techniques. The teacher asks questions to the students in order to think about the relationship between the subject or concepts. Thus, it creates an opportunity for the student to make discoveries. For this reason, the question-answer technique is an important knowledge generation technique that serves the teaching strategy through discovery. The frequent use of this technique in the teaching environment through discovery is important in terms of enabling new knowledge to be discovered.

It was concluded that the lecturer guided the students, showed plenty of examples in the course, and helped to find solutions to the problems they encountered. However, it was determined that the clues given by the instructor were not sufficient in solving the design problems of some students. The discovery teaching strategy is student-centered and the teacher's role is to guide the student. The examples given in the course should be carefully selected, and the examples and non-sample situations should be discussed in the learning environment. In addition, at the point where the student encounters problems in discovering information, she/he should not leave the student alone with uncertainty, they should guide and give clues to the student. In this study, it was determined that the instructor performed her/his role in the teaching environment through invention.

It was determined that the teaching method was effective in building new knowledge on the information learned in the course. However, it was determined that the information that some students learned was not enough to create new knowledge. In Özcan and Türnüklü's (2013) research; It has been determined that the lessons taught with the teaching through discovery strategy not only contribute to the thinking levels of the students but also have an effect on the knowledge formation process.

It was concluded that discovery teaching was effective in bringing a new perspective to the Adobe Illustrator program, and the learned program was used in different lessons. In addition, it was understood that the teaching strategy through discovery was an effective method in terms of improving students' thinking power, problem solving and creativity. Achievement test was applied to the experimental and control groups formed within the scope of the research conducted by Deniz (2010). As a result of the research, it was determined that the success rate of the students in the experimental group in which discovery teaching was applied was high. In addition, it was concluded that the teaching strategy through discovery positively affected students' mental skills such as critical, intuitive and creative thought.

Participants expressed their views on the need to make additional lessons or to increase the course hours due to the intensity of the course content and insufficient duration. It is seen that the implementation of the discovery teaching strategy takes too much time, making the implementation of the method difficult. Temizöz and Özgün Koca (2008) stated in their study that teaching

through discovery is a method that enables learning by doing and experiencing, but the applicability of this method is difficult due to the intensity of the curriculum and the limited duration. In this respect, this finding supports the result of our research. Discovery teaching is a strategy that has limitations as well as benefits. According to Doğanay; One of the most important reasons teachers fail to use this strategy is that they are left with little exploration in their learning experiences and the strategy takes time. It is stated that it is not a frequently preferred approach to use due to reasons such as taking a long time to plan the course, being difficult to apply in crowded environments, reaching the result late when insufficient samples are given (2011, p. 140)

2. At the end of the evaluation of the products created by the students studying in the discovery teaching environment; When the evaluation scores of the characters indigenous to Kastamonu, which they designed using the Adobe Illustrator program, are examined, it is not a student product between 0-49 (very poor) and 50-59 (poor), students who are in the range of 60-69 (medium) and 70-84 (good) It has been determined that its products are excessive. When the scores of the student products from the evaluation criteria are examined, they are grouped as medium-good and very good levels. It is observed that student products get higher scores than the criteria of creating sketches, creating symbols appropriate to the subject, creating characters, completing the study and presenting the product, and getting lower scores on the criteria of originality and use of technique. In the design process, it was determined that students were successful in collecting information, making inventions and solutions, and having difficulties in creativity and application processes. In the study of Kara (2019), it was concluded that students had difficulty and struggled to find a way out in order to develop an original expression language while designing characters. In the research, it was emphasized that the experimental studies conducted in the field are beneficial in the formation of original expression language and the emergence of efficient working styles.

The students combined the information they learned about the Adobe Illustrator program with application studies and gained experience by practising it. The students who entered the design process with the knowledge they gained about the program and the application studies, their level and the missing points were determined with the products they put forward. Based on these results, the following recommendations have been developed:

1. As a result of students' opinions, considering the positive results regarding the use of the discovery teaching strategy in the digital Illustration course, it is recommended to use this strategy in the teaching of design courses and programs.

2. It is recommended to focus on the creativity and implementation phases of the design and to spread these phases over a wider period so that the student products made in the inventive teaching environment can reach a more adequate level in terms of technical and originality criteria.

3. Effective use of question-answer, demonstration and discussion technique in the teaching strategy through discovery, which enables the student to add new information on his existing knowledge and aims to learn by discovering the information, will contribute to the realization of learning. For this reason, effective use of these techniques is recommended in achieving the strategy's goals.

4. In the study, a time problem was experienced due to the application of the discovery teaching strategy to large groups and the intense information about the Adobe Illustrator program. Based on this result, it is suggested that the teaching strategy through discovery should be applied to a smaller number of groups and that the learning subjects should be divided and treated.

5. By conducting studies in which the digital illustration lesson is taught with different teaching strategies, it can be tried to determine which teaching approach is more effective in teaching the lesson.

6. It is recommended to conduct similar studies with different groups in order to generalize the results of this study or to reach more reliable results.

7. The effect of discovery teaching strategy on learning retention and student achievement in the teaching of different design programs (Photoshop, In-design etc.) can be investigated.

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