

Use of Artificial Intelligence and Augmented Reality Tools in Art Education Course

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ABSTRACT

The world of art, which is mostly based on manual dexterity, has endeavored to raise the new generation of students of the future with today's technology tools. Although art education continues to be up-to-date today, it has had to adapt to technological opportunities. In the face of artificial intelligence and augmented reality applications, creativity and mental imagination skills of individuals have begun to develop. This study aims to find out advantages and disadvantages of using artificial intelligence (AI) and augmented reality (AR) technologies within the scope of art education at higher education level. Mixed method was used in the study. Students (n=75) and teachers (n=25) from two different universities in TRNC constituted the population of the research. The results obtained in the study reveal that all students can design the moving objects with AI and AR. It has been observed that with AI-AR applications, the motivation of students has increased significantly and their creativity and imagination skills have strengthened, while their drawing and painting skills have weakened at some points. It has been determined that teachers think that using AI-AR in art education has disadvantages as well as its advantages.

Keywords: Augmented reality, Artificial intelligence, Creativity, Creative thinking, Imagination, Technology.

INTRODUCTION

Individuals who are in contact with the unlimited possibilities of technology adopt the use of technology tools as artificial intelligence (AI) and augmented reality (AR) in their daily life practices (Ali et al., 2017). With the development of technology, AI and AR systems are used in studies in several fields. It can be argued that understanding the broad boundaries of the concept of artificial intelligence and its functioning process is still a complex issue today (Anggrelanggi and Sari 2023; Chujitarom, 2020). Especially neuroscience occupies an important place in the field of AI. This branch of science, which examines cognitive, memorial and learning functions of the human brain, reveals the developments in the field of neural sciences (Chin, Wang and Chen, 2019). Some discussions about AI have focused on the similarities and differences between the brain and computers (Frumer, 2020; Zhang, Shankar, Antonidoss, 2022).

Some studies have shown that AG and AI tools in the learning process have improved and expanded several skills of learners (Buchori, 2023). The use of AR and AI in education has a very important place in motivating students for learning. Research shows that multimedia materials developed for AR technologies help permanent learning (Almelweth, 2022; Chiu, Hwang, Hsia, and Shyu 2022). Some studies have drawn attention to the importance of technology in the field of art. It has been displayed that experimental results enable better creativity and imagination in the development of painting, sculpture, modern art, and construction (Chujitarom, 2020; Leonard, 2020; Miralay,

2022). One study (Chujitarom, 2020) revealed the importance of artificial intelligence in students' recognition and classification of works of art. AI and AR tools in art education have begun to break today's art learning taboos (Kiryakova, Angelova and Yordanova 2018). The use of these applications in art education contributes to the learning process of content such as graphic design, video animation and sound at the maximum level. From another perspective, the representation of reality, which is one of the basic features of traditional art education, has lost its importance in artificial intelligence and similar applications and has even caused the formation of a false aesthetic perception (Miralay 2022; Xu and Jiang 2022).

Technological tools, which have a unique range of applications in the field of art education, can be used in

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creating works [20,7]. Many studies have shown that technological tools improve students' learning success, technology acceptance, learning attitude, learning motivation, self-efficacy, satisfaction level and performance in art classes (Frumer, 2020). For example, in an experimental study, augmented reality was used in 2D printing modeling and these prints were converted into 3D (Portnova, 2019; Salehudin, 2023). In another study, exercises were conducted to help students understand the relationship between three-dimensional 3D objects and their projections. One study analyzed the importance of using computer-aided AI course content in modern art education and it was determined that digital network learning platforms play an important role in design issues. In this study, reveal students' opinions on the use of AI and AR applications and effect of their learning status, creativity and imagination. It also researched teachers' opinions on this subject. In this context, answers were sought to the following questions;

1. What are teachers' opinions on the use of AI and AR tools in the art workshop?
 - 1.1. What are teachers' opinions about the ability of AI and AR tools to be used by teachers?
 - 1.2. What are teachers' opinions on the impact of AI and AR tools on students' creativity skills in art education practices?
 - 1.3. What are teachers' opinions about the impact of AI and AR tools on students' imagination skills in art education practices?
2. What are student opinions on the use of AI and AR tools in art education?

METHODOLOGY

This study is based on a mixed research model to determine the opinions of students and teachers on the use of AI and AR in art education. Quantitative and qualitative methods were used in combination in the study.

Population and Sample

The population of the research consists of art educators and students who worked and study at two different higher education institutions in the 2022-2023 fall semester in the TRNC. Random sampling was used as the sample selection method. A survey and an interview form were administered to the participants. 75 (n=75) art students and 25 (n=25) art educators.

Demographic information about teachers is given in Table 1. When the gender ratio of the teachers is examined,

Table 1: Demographics of Teachers

		N	%
Gender	Male	9	2.25
	Female	16	4
Age	25-30	2	0.5
	30-40	6	1.5
	40-50	14	3.5
	50-60	3	0.75
Degree	BA.	1	0.25
	MA.	4	1
	PhD.	20	5
Qualification	Fine Arts	11	2.75
	Painting	4	1
	Ceramics	2	0.5
	Graphic Design	6	1.5
	Sculpture	2	0.5
Work Experience	5-10	2	0.5
	10-20	5	1.25
	20-30	13	3.25
	30-40	5	1.25

it is seen that 9 are male (n = 9) and 16 are female. This rate shows that the number of female educators is higher than male educators. Looking at the age ranges, it can be seen that 14 teachers are 40-50 years old (n=14), 6 teachers are 30-40 years old (n=6), 3 teachers are 50-60 years old (n=3) and 2 teachers are 25-30 years old (n=2). When the educational status of the teachers is examined, it was determined that 20 teachers (n = 20) had a doctorate degree, 4 people (n = 4) had a master's degree and 1 person (n = 1) had a bachelor's degree. When the fields of the teachers were examined, it was observed that 11 people (n=11) graduated from fine arts department, 6 people (n=6) graduated from graphic design department, 4 people (n=4) graduated from painting department, 2 people (n=2) graduated from ceramics department and 2 people (n=2) graduated from sculpture department. Finally, teachers' working experience was examined. Accordingly, 13 people (n=13) had 20-30 years of working experience, 5 people (n=5) had 10-20 years of working experience, 5 people (n=5) had 30-40 years of working experience and 2 people (n=2) had 5-10 years of working experience.

Table 2 shows demographic information about the students. Accordingly, it can be seen that 35 students are male (n=35) and 40 (n=40) students are female. This ratio shows that female students are more than male students and they prefer this profession better. An overview of the age intervals shows that 21 participants are 17-20 years old (n=21), 19 participants are 20-25 years old (n=19), 30 participants are 25-30 years old (n=30) and 5 participants are 30-35 years old (n=5). When the data regarding the students' departments

Table 2: Demographics of Students

		N	%
Gender	Male	35	4,66
	Female	40	5,33
Age	17-20	21	2,8
	20-25	19	2,5
	25-30	30	4,0
	30-35	5	6
Department	Graphic Design	36	4,8
	Painting	20	2,6
	Ceramics	10	1,3
	Sculpture	5	6
	Glass Making	4	5
Year	1	35	4,66
	2	20	2,6
	3	8	1,6
	4	7	9
	Graduate	5	6
Region	Turkish Cyprus	20	2,6
	Turkiye	36	4,77
	Russia	5	6
	Nigeria	14	1,8

were examined, it was determined that 36 students (n=36) were studying in the graphics department, 20 students (n=20) were studying in the painting department, and 10 students (n=10) were studying in the ceramics department. Additionally, it was determined that 5 students were in the sculpture department (n=5) and 4 students (n=4) were in the glass processing department. When the grade levels of the students were examined, 35 students (n=35) were freshmen, 20 students (n=20) were sophomore, 8 students (n=8) were junior, 7 students (n=7) were senior and 5 students (n=7) were in graduate programs. Finally, when the nationalities of the students were examined, it was determined that 20 people (n=20) were TRNC nationals, 36 people (n=36) were Turkish nationals, 5 people (n=5) were Russian nationals, and 14 people (n=14) were Nigerian nationals.

Data Collection Instruments and Analysis

The data of the research were obtained using two different data collection tools consisting of two parts. In the quantitative dimension of the research, survey items were prepared and administered to the students. Survey results were analyzed SPSS 20.0. In the qualitative dimension, semi-structured interview questions were asked to the participants and their answers were analyzed using the descriptive analysis technique.

FINDINGS

The findings regarding the qualitative and quantitative data of the research are given below.

Qualitative Findings

3.1.1.1 Teacher Opinions on the Use of AI and AR Tools in Art Workshops

Themes	Codes	f	%
Positive	Should always be used	19	7,6
Negative	It weakens dexterity	6	2,4

As seen in Table 3.1.1, 25 teachers fully answered the question. 19 (7.6%) of the teachers who expressed their opinions stated that AI and AR tools should be used in fine arts classes. For example, *“Using AI and AR tools in courses makes the class more understandable, especially when students have difficulty in concentrating and giving examples”* (P.17). Another teacher stated, *“In the 3D modeling study, we see how sculptures can be made more practically with AI, for example by using the Mesh R-CNN program.”*(P.2).

6 (2.4%) teachers stated that they were against the use of AI and AR in their classes. For example: *“I believe that technological developments make students lazy in terms of imagination”* (P.5). *“Creativity and dexterity need to reach a certain level in workshop classes. This corresponds to the university process. “Students can use these tools in their own original works later, rather than during the course”* (P.13). Another teacher (P.6) expressed the following opinion: *“Such practices definitely blunt art and are against the principle of originality.”*

3.11.2: Opinions about the usage of AI and AR tools by teachers

Themes	Code	f	%
AI	I use it but randomly	8	3,2
AG	I can use it at medium level	6	2,4
Ipad	I use it well	7	2,8
Applications	ChatGpt ElevenLabs Aurasma	4	1,6

As seen in Table 3.1.1.2, the ability of visual arts teachers to use technology tools was measured in the study. In this context, 8 teachers (3.2%) who participated in the research stated that they could use AI at a low level: *“We tried to learn new technological tools through in-service training, but I think we suffer from a generation gap and it is very difficult for me*

to analyze” (P.3). As for AR, 6 participants (2.4%) stated that they used it at a moderate level: “We solved this application by looking at phone applications or watching YouTube. The students also helped” (P.12). Another 7 (2,8%) participant said: “We added animations on the works of some artists in the course. Our class was very fun and productive in terms of student motivation” (P.22). Some teachers brought iPads to the classroom from time to time to use these applications: “We are trying artificial intelligence, especially ChatGPT, Elevenlabs and Aurasma applications in the workshop using iPad. It is very new for us, but we are learning” (P.2). 4 (1,6%) participants stated that they were positive about the practice but needed training: “The applications are brand new. There were never such things when we were studying art. I tried to use it but I couldn’t. I think we will need training” (P.16).

3.1.1.3 Teacher opinions about the impact of AI and AR tools on creativity in art education

Themes	Code	f	%
AI	Artificial intelligence identifies students’ weaknesses and provides them with the opportunity to practice more.	3	1,2
AG	It provides a more efficient learning environment.	3	1,2
Positive	Provided more permanent learning on course subjects	12	4,8
	Students learned with fun		
Negative	Fully met life needs and motivation	7	2,8
	Access to topics has become practical		
	Internet connection difficulties		
	Students who do not have phones cannot attend class		
	Economic limitations		
	Difficulty of use		

As seen in Table 3.1.1.3, the study examined the extent to which AI and AR affect student creativity. A group of teachers have claimed that the use of AI and AR technologies in the course process accelerates the student’s practical intelligence. For example: 3 (1,2%), “The visual alternatives available to students who are stuck at the creativity and production stage are unlimited” (P.24). Some teachers expressed the opinion that the learning environment was enriched: 3 (1,2%) (P.7) “In the workshop environment, for example, the drawings we made based on movements become concrete on the screen and learning gains meaning in a different dimension.” P.6 said: “AI and AR are extremely efficient in terms of modeling and technique in 3D sculpture projects in the workshop.”

The majority of the participating teachers pointed out the permanence of practical and theoretical subjects. For example, P.22 said: “Watching live videos on application subjects and performing animations in some applications increased student motivation.” P.2 made the following statement: “Students turn the monotonous process into entertainment by using some animations, and this makes us educators happy.” A group of teachers agreed 12 (4,8%): “Students’ attention is focused on technology. When we use this in lessons, we keep their interest higher.” One teacher commented: “In theoretical courses such as art history, visualization of interpretation issues with AI ensures the permanence of the course” (P.4). A group of teachers made negative comments about the practices 7 (2,8%). For example, P.5 asserted, “When technology enters the nature of art and the creativity process, the student gets used to cutting the corner and does not use his/her mental power anymore.”

Table 3.1.1.4 shows that teachers mostly have positive opinions regarding the visualization skills of the applications (between 5.6% and 1.2%) whereas 2.0% of teachers expressed

3.1.1.4: Teacher opinions on the impact of AI and AR tools on students’ imagination skills in art education practices

Themes	Code	f	%
AI	Increases imagination	14	5,6
AR	Increases imagination but decreases creativity	11	4,4
	Pushes the limits of mental creativity	3	3,2
Improves	Drawing and composition options expand	3	1,2
	Blockage of opinions takes on a different dimension		
	Mental expansion occurs		
	Product creation becomes faster		
Facilitates	It visually concretizes projecting, drawing and coloring in the mind	4	2,0
	Mental visualization becomes practical		
	Time usage becomes economical		
	Technical drawing option increases		
	Saves material		
Limits	Limits dexterity	4	2,0
	It weakens mental production while providing a wide range of options in imagination.		
	Limits tactile sensation		
	Weakens hand and eye coordination		
	Connectivity problems slow down imagination		

a negative opinion. While 9% of teachers are positive about the use of AI, this rate is at 4.4% level for AR. Accordingly, it has been argued that AI especially enriches the imagination of students. “Students who have limited resources can access great examples by using applications from their phones or IPADs” (P.5). P.6, on the other hand, disagrees: “We are reaching truly magnificent world examples, but at the same time, I think the student becomes lazy when it comes to using his/her imagination and putting it on paper.” A teacher gave the following account: (P.8) “Students whose mental creativity is blocked will get a quick return from this application.” Some participants said that the application was limiting and negatively affected their imagination skills. Some criticisms were made, especially

regarding manual dexterity: (P.16) “Workshop classes are based on manual dexterity and sensation. That’s why ready-made technological tools will blunt the student’s imagination.”

Quantitative Findings

Looking at the sub-dimensions of the survey, it can be seen that student opinions regarding the impact of AI and AR tools on creativity and imagination skills in art education are evaluated.

According to Table 1, the students’ arithmetic mean for the creativity dimension was calculated as 4.50. Similarly, in Dimension 1, it was concluded that the lowest arithmetic mean (X=3.41) of the students belongs to the statement

Table 3: What are student opinions on the use of AI and AR tools in art education?

	N	xx	SS
D1	75		
Topics are compatible with AI application	75	3,5005	,93323
Course content is compatible with AR	75	4,6143	1,01500
My creativity power increased with AR	75	4,5100	,83270
My creativity skills have weakened with AI	75	3,4100	1,05521
I learned the class faster with the AR application	75	3,8573	,85842
My creativity skills with AI created a sense of reality in my mind	75	4,3290	,80760
I completed the drawings in my mind without having to see them on the screen and think	75	4,7514	,89355
I had the opportunity to see it in 3D while modeling the sculpture	75	4,3176	,88,952
My drawing skills improved with AI’s motion effect	75	4,1000	,97801
I learned more easily with the sound effects of the works in AG	75	4,5957	,88201
D2			
My imagination has evolved with AI and AR	75	3,8072	,87399
Imagination is easier than before	75	4,3471	,87101
With AI, I no longer need to make drafts	75	3,5806	,87000
I use my time more economically	75	3,6752	,63201
My imagination faded away	75	2,5701	,98007
I had connection problems	75	3,1002	,83849
I am having difficulties in using it	75	2,9243	,65958
I make time between imagining and creating	75	4,5570	,86545
Mentally, I experience a sense of reality in my imagination	75	3,7243	,88399
Imagination transforms from abstract concept to concrete on screen	75	4,4200	,81259
D3			
Topics are compatible with AI application	75	3,4501	1,19252
I can create design principles in 3D at the least.	75	2,9579	1,52819
Makes design principles practical	75	3,9671	,89945
I see design elements live with sound effects	75	3,8155	,88332
I see the result in 3D without doing design modeling	75	3,5000	1,12422

“*My creativity skills have narrowed with AI*”. Accordingly, it was determined that the students’ highest arithmetic mean ($X=4.75$) in the 1st dimension belonged to the statement “*I complete the drawings in my mind without having to see them on the screen and think*.” In the second dimension of the students, visualization, it was determined that the highest arithmetic mean ($X=4.55$) was related to the statement “*I save time between imagining and creating*”. It was determined that the lowest arithmetic mean of the students in this dimension ($X=2.57$) belonged to the statement “*My imagination power has faded*”. The third dimension of the research is related to the use of design principles. It is seen that the highest arithmetic average of the students in this dimension ($X=3.95$) is represented by the statement “*I see the design elements live*”. In this dimension, it is seen that the lowest arithmetic mean of the students ($X=2.95$) is related to the statement “*I can create design principles in 3D*”.

DISCUSSION

When the results obtained in this research were evaluated, it was concluded that the opinions of the participating teachers and students regarding the use of AI and AR in workshop courses were positive. It was revealed that the attitudes of the students towards the application were extremely positive. It is also seen that students think that AR and AI applications enrich the course content and are motivating. As a result of this application, it can be said that attitudes and perceptions of students towards the course have changed positively. When the findings regarding the sub-objectives of the study were examined, it was determined that 7.6% of the teachers thought positively about the use of AI and AR application tools in the workshop environment. A similar study Xu and Jiang, 2022, concluded that art design educators think that technology is important to strengthen their teaching strategies. When the second sub-objective of the study is examined, it is seen that competencies of teachers for AI and AR applications were measured which revealed that the majority of teachers (3.2%) had some difficulty using the applications. When the literature is examined Huang, 2022, reveals the potential of AR to transform education into smart education, but points out that it is natural that there may be difficulties and resistance in implementation from time to time. A similar study Kong 2020, argues that the interaction between users, especially those with traditional perspectives, and an augmented reality (AR) application is limited. According to these results, the findings support each other. When the third sub-objective of the study was examined, the effect of AI and AR tools on student creativity skills was questioned. The answer to this question, which is an important topic of discussion in the field of art education, is that the creativity of students is

generally compromised. Most of the teachers (4.8%) stated that their students grasped the course topics practically and quickly through to AI and AR tools. Some teachers stated that these tools would not be suitable for classical art education Loureiro, Guerreiro and Tussyadiah, 2021, stated in their study that AR and AI can improve learning experiences and pointed out that there are some uncertainties in terms of creativity. Salehudin et.al., 2023, on the other hand, argues that learning interactions and identified practices support the creative competencies of students through new technological equipment. The fourth sub-objective of the study was to analyze the effects of teachers’ AI and AR tools on the imagination skills of students. When the results were examined, it was concluded that 5.6% of the teachers thought that AI and AR tools increased their imagination skills. Chiu et.al, 2022, stated in their experimental study that drawing and painting techniques with AR and AI achieved excellent results and that the imagination power expanded in this sense. A different study Miralay, 2022, emphasized that AR application considerably increases the learning capacities of students and expands their imagination. Within the scope of the fifth sub-objective of the study, students’ opinions on the use of AI and AR tools in art education were examined. Accordingly, the situations in which AI and AR-supported courses facilitate the learning of art students in practice and the satisfaction level of the students were determined. When the literature is examined, it is seen that the use of technology-based applications not only in art education but also in other courses has an extremely positive effect on the minds and learning capacities of students (Leonard, 2020). Huang 2022, points out that the optimization of artificial intelligence applications in art education in higher education institutions in the context of the art design curriculum system is still research topic.

CONCLUSION

The new generation of students of our age is passionate and eager to use technology tools. The fact that students have these characteristics may be a predictor of their high level of technological self-efficacy, perception and attitudes towards the use of AI and AG. Especially in art education based on conventional manual dexterity, transferring AR and AI applications supported by multimedia materials has proven to be beneficial in terms of usability and permanence of information. As a result, this study found that AI and AR tools excite students and increase their motivation. It can be argued that the learning abilities of students who grasp the subject faster with the mobility of 3D objects work differently while having fun. In addition, it is stated that

AR and AI technologies make invisible details visible in art theory and make them more practical by animating them in three dimensions. AI and AR applications that create a sense of reality have broken the monotonous and traditionalist structure. It was stated that most of the students learned the class much faster, were excited about the effects, and their embodied imagination power increased.

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