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Examining the Relationships between University Students' 21st Century Skills, Artificial Intelligence Literacy and Artificial Intelligence Attitudes

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Abstract

The purpose of the present study is to examine the relationships between 21st century skills, artificial intelligence literacy, and artificial intelligence attitudes of fine arts faculty students. The relational survey model, one of the quantitative research models, was used in the research. The population consists of students studying at Fine Arts Faculties in Turkey, and the sample includes 215 students from three universities determined by convenience sampling. To collect data, "Artificial Intelligence Attitude Scale," "Artificial Intelligence Literacy Scale" and "21st Century Skills Scale" were used. According to the results, there was no significant difference in artificial intelligence literacy and general attitudes toward artificial intelligence regarding gender, though male students' social responsibility and leadership skills were higher. Grade level did not significantly affect artificial intelligence literacy or positive attitudes, except for negative attitudes. Similarly, no significant difference was found in 21st century skills regarding career awareness, entrepreneurship, innovation, and total scores.

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Introduction

Rapid advances in artificial intelligence (AI) technologies are causing radical changes in many fields, including education and arts, creating both opportunities and challenges. These changes have become particularly evident in higher education, where the development of 21st century skills, namely critical thinking, creativity, communication, collaboration, and digital literacy, has become an increasingly important goal (Geisinger, 2016; Voogt & Roblin, 2010). AI-based tools, creative design software, and augmented reality applications have been frequently used in fine arts along with classical techniques (Kim et al., 2024; Oksanen et al., 2023).

In the context of fine arts education, AI offers a unique opportunity to expand the boundaries of artistic expression and redefine creative processes. However, in addition to these opportunities, the integration of AI into creative education processes also brings with it various challenges. Fine arts students, accustomed to working with traditional methods, have to adapt to data-driven processes and algorithmic tools (Ceylan & Altiparmak Karakus, 2024; Pente et al., 2022). This requires not only the development of technical skills, but also the acquisition of competencies such as AI literacy, which enable understanding, evaluating, and ethically applying these technologies (Ng et al., 2021). In addition, questions such as the impact of AI on artistic authenticity and the role of human creativity create new ethical and pedagogical discussion areas for artists, educators, and students (Sebastian & Kuswanto, 2024; Yang, 2024).

In terms of the attitudes of fine arts students towards AI; existing studies have generally focused on the general population's perceptions of AI and the social impacts of these technologies (Schüller, 2022; Yurt & Kaşarcı, 2024), and have provided limited data on how students in creative disciplines perceive the benefits, limitations, and ethical dimensions of AI tools for artistic processes. Fine arts students, in particular, tend to develop an attitude shaped by both excitement and skepticism between traditional methods and their approach to technology (Pente et al., 2022). In this context, the need for comprehensive studies explaining the dynamics of the interactions between 21st century skills, AI literacy, and attitudes towards AI in creative education remains important.

In this context, the purpose of the research is to examine the relationships between 21st century skills, AI literacy, and attitudes towards AI in the context of fine arts students and to provide an extensive understanding of how this relationship shapes art education and artistic processes. The research aims to examine specifically how AI literacy supports students' basic 21st century skills such as critical thinking, creativity, and digital literacy, and how these skills affect students' perceptions and attitudes towards AI.

Theoretical Framework

21st Century Skills and their Integration into Fine Arts Education

21st century skills are defined as a multidimensional set of competencies that enable individuals to adapt to the rapidly changing technological, social, and economic conditions of today's world. This framework, which includes basic skills such as critical thinking, creativity, communication, collaboration, and digital literacy, aims to develop individuals' competencies to solve complex problems, develop innovative ideas, and collaborate

effectively (Geisinger, 2016; Voogt & Roblin, 2010). Especially in the context of higher education, these skills provide tools that enable students not only to acquire academic knowledge but also to put it into practice.

Fine arts education is an important area that supports the development of creativity and critical thinking skills. This area encourages students to develop innovative ideas, increase their aesthetic sensitivity and gain an artistic perspective. Creativity is at the centre of art education, allowing students to develop their individual expressions and produce original artistic products (Piirto, 2011). It enables students to generate new ideas and expand their artistic expressions. This process develops not only individual creativity but also aesthetic understanding and artistic innovation (Dean et al., 2010; González-Salamanca et al., 2020; Maneen, 2016). Communication and collaboration skills are one of the basic building blocks of creative processes in fine arts education (Gut, 2011; Öztürk, 2023). Art projects usually require an interdisciplinary approach, and this allows students to develop both individual and collective skills (Dean et al., 2010; Maneen, 2016).

Digital literacy has an increasingly important place in art education in today's world, enabling students to adapt to digital technologies and use them effectively in creative processes (Kennedy & Sundberg, 2020; Shettar et al., 2021). In the context of fine arts, digital literacy not only improves technical skills, but also has a profound impact on aesthetic understanding and creativity. Digital design software and augmented reality tools allow students to develop new artistic expressions and go beyond traditional methods (Öztürk, 2023). They also allow students to reach a wider audience and share their artistic work on a global platform (González-Pérez & Ramírez-Montoya, 2022). The incorporation of advanced technologies such as AI and machine learning into art production processes requires students to critically evaluate the aesthetic and ethical implications of technology (Essel et al., 2017).

Artificial Intelligence Literacy

AI technologies are causing radical changes in many areas of the modern world, as well as in creative disciplines such as education and art, and require individuals to effectively understand, apply, and critically evaluate these technologies. Artificial intelligence literacy refers to individuals' ability to comprehend artificial intelligence technologies, understand the ethical dimensions of these technologies, and use these tools in functional or creative ways. This comprehensive concept includes not only technical knowledge and skills, but also broader dimensions such as critical thinking, ethical evaluation, and social responsibility (Jiang et al., 2024; Ndungu, 2024).

Technological understanding, as the first component of AI literacy, enables individuals to understand how AI systems work and how algorithms are structured (Bian et al., 2024). This understanding includes learning how algorithmic decision-making processes work and how AI guides human decisions (Pente et al., 2022). The scope of AI literacy includes the ability of individuals to go beyond understanding technology and critically evaluate the transformations created by these technologies at the societal and individual level (Ndungu, 2024). In the context of education, this literacy enables students not only to be equipped with technology, but also to question the limits and potential of these technologies.

AI literacy in fine arts and creative disciplines includes the ability of artists and art students to develop new

aesthetic expressions using AI technologies, to redefine creative processes, and to utilize AI as a tool for social criticism (Kim et al., 2024). AI tools support creative processes, especially in fields such as visual arts, music, theatre, and digital design, and offer artists new forms of expression that are not possible with traditional methods (Pente et al., 2022; Wagner, 2024). Promoting AI literacy in fine arts faculties enables students to develop both traditional art skills and a critical understanding of digital technologies. This supports not only individual creativity but also students' interdisciplinary thinking and problem-solving skills (Jiao & Yea, 2024; Yim, 2024).).

Attitude Towards Artificial Intelligence

As the impact of AI technologies in many different areas such as education, business life, and art increases, understanding individuals' attitudes towards these technologies is becoming increasingly important. The perceptions and attitudes of young and frequently technology-using groups, such as students, towards AI largely determine the adoption and effective use of these technologies in educational processes (Schepman & Rodway, 2020; Yurt & Kaşarcı, 2024). Attitudes towards AI generally include cognitive, emotional, and behavioral dimensions; and are affected by factors such as individuals' knowledge of these tools, perceived benefits from them, and general experiences with them (Katsantonis & Katsantonis, 2024). In art and creative disciplines, the increasing use of AI tools in aesthetic and production processes causes positive and negative attitudes towards them to become even more complex (Oksanen et al., 2023; Suh & Ahn, 2022). Research shows that students' perceptions of AI often vary between two poles: some students see it as an exciting innovation, while others are concerned that it may create ethical issues or professional uncertainties (Lichtenthaler, 2020; Pinto dos Santos et al., 2019).

Educators and curricula also have a significant impact on students' attitudes towards AI. A study by Yue et al. (2024) reveals that how teachers introduce AI technologies within the framework of technological pedagogical content knowledge (TPACK) plays a decisive role in students' attitudes towards these technologies. Therefore, it can be said that attitudes towards AI are not only individual but also related to the general structure and culture of educational system. In particular, factors such as fear of job loss, data privacy concerns, and technological inequality lead individuals to have a more cautious attitude towards AI (Pinto dos Santos et al., 2019). Fine arts students display different attitudes towards both the potential use of AI tools in creative processes and the impact of these technologies on the fundamental values of art. The rise of AI in art production is perceived both as an opportunity to expand the boundaries of individual creativity and as a threat to the human-centered nature of art (Oksanen et al., 2023). The convenience that AI-based tools provide in tasks such as color analysis, composition suggestions, and digital simulations is positively received by students (Oksanen et al., 2023; Then et al., 2023). In addition, the role of AI in artistic processes also increases students' questions about ethical and aesthetic values. Issues such as the originality and copyright of artworks produced by AI are intensely discussed, especially among fine arts students (Pente et al., 2022; Yang, 2024).

The Relationship between 21st Century Skills, AI Literacy, and Attitudes Towards AI

21st century skills, AI literacy, and attitudes towards AI can be considered as three important concepts that are

interconnected for individuals to be effective and productive in the digital age (Ng et al., 2021). In the context of fine arts, the use of artificial intelligence technologies allows students to redefine and expand their creative processes, while the effects of these tools on ethical and aesthetic values shape students' perceptions of these technologies (Yang, 2024). The relationships between these three concepts are of great importance in understanding how creative individuals, especially fine arts students, adapt to both artistic and technological processes (Katsantonis & Katsantonis, 2024).

For art students, 21st century skills are of critical importance in terms of developing innovative approaches in creative processes and diversifying aesthetic expressions. The integration of AI tools into these processes contributes to the development of both individual creativity and critical thinking skills of art students. For example, a student can create different visual compositions using AI-supported design software and in the process develop not only their artistic talents but also their technological skills (Cantas et al., 2024). In addition, AI literacy helps art students adopt a more conscious approach to AI by enabling them to use technology effectively in creative processes (Ng et al., 2023). However, how AI tools affect artistic originality and how this situation is perceived among students is another important issue that needs to be addressed together with the aesthetic and ethical dimensions of AI literacy (Yang, 2024).

AI literacy stands out as an important factor that shapes individuals' attitudes towards these technologies. Studies show that individuals who understand AI technologies and have positive experiences with these technologies develop more positive attitudes towards AI (Kasinidou, 2023; Ng et al., 2023). In particular, students who use AI tools effectively exhibit a more positive approach towards these technologies. Addressing AI literacy in the context of fine arts not only improves students' technical skills, but also heps them to gain critical awareness of these technologies (Ng et al., 2023).

When the relevant literature is examined, limited research has been found on 21st century skills and AI literacy and attitudes (Biagini, 2024; Cantas et al., 2024; Gómez Niño et al., 2024; Kasinidou, 2023; Ng et al., 2023). Relevant studies have generally focused on the importance of AI literacy in technical education and its effects in the general social context (Ng et al., 2023; Schüller, 2022) and have not sufficiently addressed the impact of these concepts on the specific needs and dynamics of fine arts students. This research aims to fill an important gap in the existing literature by examining the relationship between 21st century skills, AI literacy, and attitudes towards AI in the context of fine arts. This study will examine the role of AI in creative education, highlighting both the opportunities for skill development and the ethical and pedagogical challenges of these technologies (Yang, 2024). Beyond this, the findings will contribute to a broader discussion on how AI enhances not only technical and analytical skills, but also creativity, critical thinking, and ethical awareness. In this way, the research aims to provide important clues on how creative education can be restructured in the age of digital transformation.

The purpose of this study is to examine the relationships between 21st century skills, artificial intelligence literacy and artificial intelligence attitudes of fine arts faculty students. In this context, answers to the following questions were sought:

1. What are Fine Arts Faculty students' levels of artificial intelligence literacy, artificial intelligence

attitudes and 21st Century skills?

2. Do Fine Arts Faculty students' artificial intelligence literacy, artificial intelligence attitudes and 21st Century skills differ by gender?
3. Do Fine Arts Faculty students' artificial intelligence literacy, artificial intelligence attitudes and 21st Century skills differ by year (freshmen, senior etc.)?
4. Do the participating students' artificial intelligence literacy and artificial intelligence attitudes significantly predict their 21st Century skills?

Method

Research Model

In this study, the relational survey model, one of the quantitative research models, was used. The reason for choosing the this model is that this method allows the examination of the interaction between more than one factor or variable and the direction and level of the interaction (Creswell, 2012). Students' artificial intelligence literacy, artificial intelligence attitudes and 21st century skills studying at the Faculty of Fine Arts were analyzed in terms of their gender and class levels. In the last stage of the study, the relationships between the students' artificial intelligence literacy, artificial intelligence attitudes and 21st century skills were tested.

Population and Sample

The population of the research consists of students studying at Fine Arts Faculties in Turkey. Due to the difficulties of reaching the entire population, time, cost, accessibility, etc. constraints, the sample consists of students from three universities. In this context, the convenience sampling method, which is one of the non-random sampling methods, was used as the sampling method. Rahman (2023) defined this method as preventing loss of time, money and labour. The data collection process started in the first semester of the 2024-2025 academic year and the data collection tool was delivered online to 215 students in three universities.

Data Collection Tools

In order to collect data of the study, '*Artificial Intelligence Attitude Scale'*, '*Artificial Intelligence Literacy Scale*' and "*21st Century Skills Scale*" were used.

21st Century Skills Scale

The multidimensional scale adapted into Turkish by Çevik and Şentürk (2019) was used to measure fine arts students' 21st century skills, as it is suitable for the nature of art education and takes these competencies into account. The scale consists of five sub-dimensions: Information and Technology Literacy, Critical Thinking and Problem Solving, Entrepreneurship and Innovation, Social Responsibility and Leadership, and Career Awareness, with a 5-point Likert structure scored between "1-strongly disagree" and "5-strongly agree." Confirmatory factor analysis by Çevik and Şentürk (2019) verified its five-dimensional structure with significant fit indices, and in

this study Cronbach's alpha coefficients ranged between .822 and .847.

Attitude Scale Towards Artificial Intelligence

To measure fine arts students' attitudes towards artificial intelligence, a Likert-type scale adapted to Turkish by Kaya et al. (2024) based on Schepman and Rodway (2020) was used. Factor analyses showed two subscales: Positive Attitudes (12 items) and Negative Attitudes (8 items, reverse coded). Scores are calculated separately; a lower score in the negative subscale indicates stronger negative attitudes, and no total score is obtained. Reliability analyses in this study yielded Cronbach Alpha coefficients of .86 for the positive and .83 for the negative subscale.

Artificial Intelligence Literacy Scale

The Artificial Intelligence Literacy Scale adapted into Turkish by Erdoğan and Ekşioğlu (2024) was used to measure participants' literacy levels. This 12-item, 5-point Likert scale contains no negative statements. Exploratory and confirmatory factor analyses confirmed validity, with explained variance of 82.87%. The reliability coefficient was .86 in the original study and .88 in this research.

Analysis of Data

After the scale administration were completed, the forms were checked for accuracy before electronic analysis. Data were analyzed with SPSS 26.0. Normality was confirmed as kurtosis and skewness values were within the -2 to +2 range suggested by Hahs-Vaughn and Lomax (2020). To examine relationships between scales and independent variables, parametric tests (independent samples t-test and ANOVA) were applied. In addition, the relationships between AI literacy, AI attitudes, and 21st century skills of fine arts students were tested with multiple regression analysis.

Ethical Procedures

In this article, journal writing rules, publication principles, research and publication ethics rules, and journal ethics rules have been complied with. The ethical permission for the study was obtained from Kütahya Dumlupınar University Ethics Committee with the decision numbered E-67750228-050.04-346625 and 06.12.2024 dated permission.

Findings

This section includes the results obtained by analysing the data via artificial intelligence literacy, general attitude towards artificial intelligence and 21st century skills scales. The scales are applied to the students who participated in the research. The minimum, maximum, mean and standard deviation values regarding the answers given to the applied scales are shown in Table 1 and Table 2.

When Table 1 is examined, it is seen that the scores received from the positive attitude sub-dimension of the artificial intelligence literacy scale were minimum 2.42, maximum 5.00; mean 3.67, and the standard deviation was 0.54. It is seen that students' artificial intelligence literacy in the research is at high level. The scores the students gave to the positive attitude sub-dimension of the general attitude scale towards artificial intelligence were minimum 1.33, maximum 5.00, mean score was 3.71; and the standard deviation was 0.81. The positive attitudes of the students towards artificial intelligence were at a high level. Students' scores in negative attitude sub-dimension of the general attitude scale towards artificial intelligence were minimum 1.00, maximum 5.00, mean score was 3.19; and the standard deviation was 0.86. It was seen that the negative attitudes of the students who participated in the research towards artificial intelligence were at a moderate level.

Table 1. Descriptive Statistics of Artificial Intelligence Literacy and Attitude Scales

Scale	N	Minimum	Maximum	Mean	Std. Deviation
AI literacy	213	2.42	5.00	3.67	0.54
Positive attitude towards AI	215	1.33	5.00	3.71	0.81
Negative attitude towards AI	214	1.00	5.00	3.19	0.86

When Table 2 is examined, it is seen that the total scores were minimum 2.96; maximum 5.00; average 3.97; standard deviation 0.56. It is seen that the 21st century skills of the students participating in the research are at a high level. When the average scores obtained by the students from the subscales were analyzed, it was found that they had very high Information and Technology Literacy Skills, career skills and high level skills also in the other sub-dimensions.

Table 2. Descriptive Statistics of the 21st Century Skills Scale

	N	Minimum	Maximum	Mean	Std. Deviation
Information and Technology Literacy Skills	216	2.71	5.00	4.26	0.53
Critical Thinking and Problem Solving Skills	214	1.17	5.00	3.57	1.04
Entrepreneurship and Innovation Skills	216	1.90	5.00	3.80	0.69
Social Responsibility and Leadership Skills	216	2.25	5.00	3.74	0.63
Career Awareness	216	2.50	5.00	4.45	0.58
21YY Total	214	2.96	5.00	3.97	0.46

When Table 3 is examined, it is seen that there is no significant difference in the average scores given to the artificial intelligence literacy and general attitude scale towards artificial intelligence according to students' gender ($p>0.05$). Although female students obtained higher averages than their male peers in artificial intelligence scales, the difference is not significant. It can be said that the artificial intelligence literacy attitudes of female and male students are at similar levels.

When Table 4 is examined, it is seen that there is no significant difference in the average scores given to the 21st Century skills scale regarding gender variable ($p>0.05$). However, a significant difference was found in the 'social responsibility and leadership skills' subscale in terms of gender ($p<0.05$). According to the averages of the groups,

the social responsibility and leadership skills of male students were found to be higher than those of females.

Table 3. Artificial Intelligence Literacy and Attitude Scales Gender Variable t Test

	Gender	N	Mean	Std. Deviation	t	P
AI literacy	Female	144	3.69	0.55	0.62	0.54
	Male	68	3.64	0.53		
Positive attitude towards AI	Female	146	3.74	0.80	0.66	0.51
	Male	68	3.66	0.85		
Negative attitude towards AI	Female	145	3.25	0.86	1.42	0.16
	Male	68	3.07	0.86		

Table 4. 21st Century Skills Scale Gender Variable t Test

	Gender	N	Mean	Std. Deviation	t	P
Information and Technology Literacy Skills	Female	147	4.27	0.50	0.31	0.76
	Male	68	4.24	0.58		
Critical Thinking and Problem Solving Skills	Female	145	3.53	1.04	-0.69	0.49
	Male	68	3.64	1.07		
Entrepreneurship and Innovation Skills	Female	147	3.76	0.68	-1.25	0.21
	Male	68	3.89	0.70		
Social Responsibility and Leadership Skills	Female	147	3.68	0.61	-2.03	0.04
	Male	68	3.87	0.66		
Career Awareness	Female	147	4.49	0.55	1.28	0.20
	Male	68	4.38	0.65		
21YY Total	Female	145	3.95	0.42	-0.75	0.45
	Male	68	4.00	0.52		

When Table 5 is examined, it is seen that there is no significant difference in the average scores given to the artificial intelligence literacy and positive attitude sub-dimensions regarding the class level variable ($p>0.05$). However, a significant difference was found according to the year in terms of negative attitudes towards artificial intelligence. According to the Scheffe test analyses, the negative attitudes of the students in their third and second year were found to be higher than the senior ones.

When Table 6 is examined, it is seen that there is no significant difference in the average scores given to the 21 YY scale career awareness, Entrepreneurship and Innovation Skills sub-dimensions and total scores considering the year ($p>0.05$). However, Information and Technology Literacy Skills, Critical Thinking and Problem Solving Skills and Social Responsibility and Leadership Skills showed significant differences. According to the Scheffe test analyses, Information and Technology Literacy Skills of the freshmen and seniors were found to be higher than juniors and sophomores. Seniors obtained the highest average in Critical Thinking and Problem Solving and Social Responsibility and Leadership Skills.

Table 5. Artificial Intelligence Literacy and General Attitude Scales Class Level Variable F Test

	Year	N	Mean	Std. Deviation	F	p
AI literacy	Freshmen	55	3.57	0.45	2.32	0.08
	Sophomore	55	3.61	0.54		
	Junior	60	3.70	0.61		
	Senior	43	3.84	0.52		
Positive attitude towards AI	Freshmen	55	3.74	0.66	2.35	0.07
	Sophomore	55	3.47	0.83		
	Junior	62	3.78	0.95		
	Senior	43	3.87	0.72		
Negative attitude towards AI	Freshmen	55	3.10	0.76	3.15	0.03
	Sophomore	54	3.23	0.77		
	Junior	62	3.42	1.00		
	Senior	43	2.93	0.82		

Table 6. 21st Century Skills Scale Class Level Variable F Test

	Year	N	Mean	Std. Deviation	F	p
Information and Technology Literacy Skills	Freshmen	55	4.28	0.45	4.27	0.01
	Sophomore	55	4.07	0.49		
	Junior	63	4.27	0.63		
	Senior	43	4.44	0.43		
Critical Thinking and Problem Solving Skills	Freshmen	53	3.61	1.13	2.58	0.05
	Sophomore	55	3.67	0.85		
	Junior	63	3.28	1.17		
	Senior	43	3.81	0.88		
Entrepreneurship and Innovation Skills	Freshmen	55	3.84	0.64	0.79	0.50
	Sophomore	55	3.69	0.46		
	Junior	63	3.87	0.85		
	Senior	43	3.77	0.74		
Social Responsibility and Leadership Skills	Freshmen	55	3.67	0.63	2.88	0.04
	Sophomore	55	3.68	0.59		
	Junior	63	3.68	0.66		
	Senior	43	3.99	0.58		
Career Awareness	Freshmen	55	4.47	0.56	0.27	0.85
	Sophomore	55	4.41	0.55		
	Junior	63	4.44	0.64		
	Senior	43	4.51	0.57		
21YY Total	Freshmen	53	3.99	0.46	2.07	0.11
	Sophomore	55	3.90	0.42		
	Junior	63	3.91	0.51		
	Senior	43	4.10	0.39		

As seen in Table 7, the regression model created was found to be statistically significant (F= 6.665; p<0.05). The R2 value of the model was found to be 0.088. With this result of the research, it was determined that the independent variables of artificial intelligence literacy and attitude towards artificial intelligence explained 8.8% of the changes in the dependent variable of 21st century skills. According to beta values, only artificial intelligence literacy among the independent variables significantly predicted 21st century skills (β=.225; p<0.01). In short, it can be stated that artificial intelligence literacy made a significant positive contribution in explaining the effect of artificial intelligence variables on 21st century skills.

Table 7. Multiple Regression Analysis Among Variables

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**p**
(Constant)	3.154	0.236		13.372	0.000
AI literacy	0.195	0.069	0.226	2.835	0.005
Positive attitude towards AI	0.057	0.044	0.103	1.299	0.195
Negative attitude towards AI	-0.037	0.036	-0.070	-1.032	0.303
R= 0.297; R^2=0.088; F=6.665					

Discussion and Conclusion

In this study, the relationship between the 21st century skills, AI literacy and attitudes towards AI was analyzed in terms of various variables. The first important finding of the study indicates that the students of the faculty of fine arts have a high level of AI literacy on average. In the Artificial Intelligence Literacy Scale consisting of a total of 12 items, the average score was found to be 3.67, and this value, considering the 5-point Likert structure of the scale, shows that the students have a certain level of awareness in understanding and using AI technologies. Most students stated that they were familiar with AI-based tools and can use them partially or completely in creative processes. This situation suggests that there is a high interest in software and applications that support artistic production in the age of digital transformation.

Another finding is related to the students' positive and negative attitudes towards AI. While an average score of 3.71 was obtained in the positive attitude sub-dimension towards AI, the average of the negative attitude sub-dimension was measured as 3.19. At first glance, a "medium" level is observed in both attitude dimensions, which shows that art students find AI technologies generally useful and interesting, but also have anxious or critical approaches. Positive attitudes towards AI may reflect elements such as contributing to creative processes, offering new aesthetic possibilities and providing technical support to the artist. In contrast, negative attitudes may express concerns that the content produced by AI is not original and may overshadow the "human" aspect of art. In particular, the moderate level of negative attitude scores underlines that students have not yet shown unconditional acceptance of these technologies.

Moreover, it is seen that the students' 21st century skills are generally at a high level (3.97). The sub-dimensions of the scale, such as information and technology literacy, critical thinking and problem solving, entrepreneurship

and innovation, social responsibility-leadership and career awareness, examine the extent to which students are ready for the needs of the digital age from different perspectives. The fact that the average scores obtained in the information and technology literacy sub-dimension and career awareness dimension are particularly high shows that the technological awareness and professional planning of the fine arts students for the future are quite evident. In contrast, the relatively low score of critical thinking and problem solving (3.57) may suggest that art students still need to develop this skill further. However, the fact that the averages are still generally high significantly reflects the capacity of art faculty students to be effective in the digital world. Social responsibility and leadership skills were also relatively strong (3.74), indicating motivation in group projects and artistic activities. The results obtained confirm that art education is not only a field focused on aesthetic concerns but also on reinforcing multidimensional competencies.

In terms of the findings obtained, the high level of AI literacy and the general strength of 21st century skills suggest that art faculty students have a profile that is open to and curious about the digital transformation process. However, it is also possible to attribute this situation to the fact that the majority of art students are constantly interacting with current digital tools. Social media, digital design programs and smart devices may have directly contributed to these students' AI literacy by providing them with the opportunity to get to know technology closely. Therefore, the research results indicate that technological tools are a platform that provides not only "technical support" but also "creative opportunities" in artistic production and learning processes. In addition, the fact that one of the strongest sub-dimensions among art students' 21st century skills is information and technology literacy shows that they have adopted the expectation that technology will be a major part of the future of art.

The fact that attitudes towards AI have relatively high scores in both positive and negative dimensions confirm the "technology paradox", which is frequently discussed in the literature, in the art discipline. While positive attitudes are associated with the benefits of AI, such as saving time, generating alternative ideas in the creative process, and adding new aesthetic layers to works of art, negative attitudes are explained by the belief that concepts belonging to the essence of art, such as originality and emotional expression, are at risk. This dual structure shows that art students do not fully embrace AI, but they are also not willing to exclude it. It can be suggested that educators and curriculum designers should take this situation into account, define the place of AI in the artistic creation process, and enrich their programs in a way that will alleviate the concerns that may arise in students. At the same time, this finding also shows that art students are "seeking balance" at a time when AI is increasingly integrated into the art market and art education.

In terms of gender variable, no statistically significant difference was found between male and female students in both AI literacy and attitude scores towards AI ($p>0.05$). This does not confirm the widespread perception that male interest in technology is traditionally high in this sample, on the contrary, it shows that female and male students have similar awareness and attitude levels towards AI. However, it was noteworthy that males had a higher average score in the "Social Responsibility and Leadership Skills" sub-dimensions of 21st century skills ($p<0.05$). This finding suggests that social roles or club-activity responsibilities within the faculty may have paved the way for male students to exhibit their leadership potential more strongly. Nevertheless, there was no significant difference in the total of 21st century skills in general, suggesting that these skills are acquired at similar levels

regardless of gender. When we compare the findings with the literature, it is seen that, contrary to studies that generally emphasize the dominant interest of men in technology and STEM fields (Park & Woo, 2022), there is no significant difference in the awareness and attitudes of art students towards AI based on gender. This result shows that the distribution of leadership roles in art education should be examined and can be addressed in more depth in future studies.

Another finding of the study covers the results related to the class level variable. Although AI literacy and positive attitude scores did not show a significant difference regarding class level ($p>0.05$), it was determined that the averages of third-year and second-year students were statistically significantly higher than seniors in the negative attitude sub-dimension ($p<0.05$). This situation reveals that students close to graduation have lower levels of negative attitudes towards AI, and therefore, they have more trust or tolerance for these technologies. As might be expected, fourth-year students may have had more opportunities to use AI tools in their professional and artistic projects as they approached the end of their undergraduate education, and these experiences may have alleviated their negative attitudes.

In some sub-dimensions (Information and Technology Literacy, Critical Thinking and Problem Solving, Social Responsibility and Leadership) regarding the relationships between 21st century skills and class level, significant differences were found regarding class level. It was determined that Information and Technology Literacy skills were higher in the first and fourth year students compared to the second and third year ones ($p<0.05$). This finding suggests that freshmen who come to school with a high interest in technology or who have frequently used digital tools since high school have the opportunity to develop these skills until the fourth year. In addition, the fact that seniors have high Critical Thinking and Problem Solving and Social Responsibility and Leadership skills reveals that students gain more mature and versatile skills in the final stages of the education process.

The differentiation between class levels is consistent with the tendency of “higher class students to approach technological tools more positively”, which is frequently discussed in the existing literature (Derinalp & Ozyurt, 2024). As they approach graduation, students become more motivated by their professional career expectations and realize that AI-based tools can play an important role in their future professional practices. Therefore, the decrease in the negative attitude scores of seniors may be a reflection of this pragmatic approach stated in the literature. At the same time, the fact that seniors scored high in many sub-dimensions of 21st century skills indicates that the projects and internships carried out during their education reinforced these skills.

When the regression analysis between the variables is examined, AI literacy and positive-negative attitudes towards AI explain approximately 8.8% of the variance in 21st century skills ($R^2=0.088$). However, only AI literacy stood out as a significant predictor ($p<0.01$), however, no statistically significant effect of positive or negative attitudes on 21st century skills was detected. This result shows that students’ basic knowledge and application skills regarding AI directly support 21st century skills. It can be said that individuals who know and use AI have an advantage in terms of learning and applying the multifaceted skills required by the digital age. However, the fact that attitudes do not create a significant effect indicates that art students’ positive or negative emotional tendencies towards AI are limited in affecting their general skill set.

It can be observed that the regression result regarding AI literacy confirms some studies in the literature. For example, Cantas et al. (2024) stated that AI literacy directly positively affects students' 21st century skills. Because AI literacy includes not only technical understanding but also analytical thinking, creativity and the capacity to use digital platforms effectively. This versatility offers a natural integration area with 21st century skills. The same studies suggest that attitudes toward AI often remain at the emotional or cognitive level and may not significantly affect skill performance. This study confirms that practical skills and technological competence are more influential.

When the research results are examined in terms of consistency with the literature, the existence of a positive and significant relationship between AI literacy and 21st century skills is consistent with the findings of previous studies (Ng et al., 2021). These studies also emphasize that individuals who are familiar with AI technologies exhibit skills such as critical thinking, digital literacy, and communication more effectively. This situation observed in art faculty students supports the evidence that AI has serious potential in the field of art by opening the door to the dimension of creativity. However, it is known that there are different views in the literature on the role of AI in artistic decision-making processes. While researchers such as Kim et al. (2024) defend the innovative potential of artworks created in collaboration with AI, Pente et al. (2022) emphasize that AI can overshadow human creativity. The findings show that this dual debate emerges as a "cautious optimism" specifically for art students.

The findings of this study reveal that while art education inherently focuses on "originality and human touch," AI integration is an increasingly strong necessity. While the creative opportunities offered by AI expand students' aesthetic boundaries, they also bring about deep discussions on the validity, ethics, and emotion of "machine-generated art." The results obtained show that art students are aware of this tension and therefore achieve an average score in the negative attitude dimension. In this context, it is important for art educators to structure course content in a way that will alleviate students' concerns. For example, presenting AI as a tool that facilitates creativity can weaken students' perception that they are "surrendering their artistic identities to machines."

When evaluated in general, the high AI literacy of art students and the fact that this literacy is an important predictor of 21st century skills indicate that future art education policies should be more integrated with digital transformation. At the same time, the findings regarding negative attitudes reveal that students still have some uncertainties and concerns about AI, and it is understood that these may be largely due to lack of experience or ethical concerns. Therefore, it would be appropriate for institutions that want to shape the artists of the digital age to create programs that expand the field of experience of students, increase ethical awareness and enable interdisciplinary collaborations. In this way, both AI literacy is supported and positive attitudes are strengthened by reducing students' anxiety levels.

The limitations of this study are as follows; the collection of data using self-reporting methods. Since survey and scale-based studies reflect participants' own perceptions and response preferences, they also carry risks such as social desirability bias or participants' failure to fully express their true feelings and thoughts. In addition, the study was limited to 215 participants studying in the fine arts faculties of only three universities. This may limit

the generalizability of the findings, and different results may emerge in different geographical regions or in larger samples. Another limitation is the cross-sectional design; longitudinal or qualitative studies could provide deeper insights into changes in AI attitudes and literacy. Finally, considering that the concept of AI is a rapidly changing and developing field, the scale items used in this study may need to be updated at regular intervals and adapted to technological trends.

Suggestions

Future research could focus on longitudinal studies tracking changes in art students' use of AI over time. Such studies would reveal how AI literacy and attitudes evolve from the first to the fourth year and indicate at which stages students develop greater interest or reservations. Comparative research across different universities or countries could also highlight the influence of cultural and institutional contexts on approaches to AI, offering insights into the interaction between global trends and local dynamics in art education. Another suggestion is to investigate attitudes towards AI through qualitative methods. Analyzing students' projects with AI, classroom experiences, or focus group interviews could provide deeper insights into motivations, concerns, and transformations in the creative process. It is also important to refine AI literacy scales with sub-dimensions for technical application and integrate them into art education. In addition, examining interdisciplinary projects with fields such as engineering or informatics could reveal how collaboration shapes students' AI attitudes and skills.

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