

Development of Teachers' Perception Scale Regarding of Visual Arts with NFT: Validity – Reliability Study

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Abstract

NFT technology such as the Metaverse, Virtual Reality, and Extended Reality will change how educators teach and how students learn. NFT technology will also affect Lifelong Education. The study aimed to develop a scale of 25 items to measure how NFTs create a perception among teachers, providing a new understanding of art. For this purpose of the study, data were collected from 310 teachers (135 teacher samples for exploration and 175 teacher samples for confirmatory factor analysis) teaching in various cities in Turkey. The principal component analysis of the varimax rotation was used to obtain evidence for the scale's validity. As a result of exploratory factor analysis, three items were excluded from the survey because their item loads were coincident, and as a result, the scale was reduced to 22 items, and three sub-dimensions emerged. It has been determined that the scale has a structure composed of three factors: "NFT's contribution to art and artists," "NFT's positive contribution to art," and "NFT's negative contribution to art." It was observed that the item test correlation of the scale changed between 0.44-0.88. At the same time, cross-validation analysis was performed to determine whether the scale would produce the same results. When it was applied to similar groups as a result of cross-validation, it was observed that the same result could be obtained when the scale was applied to the same group. Apart from this, to give evidence in terms of the scale's validity, the re-test and Cronbach's alpha reliabilities were calculated, and it was found to be 0.947.

Key words: NFT technology, visual art, Non-Fungible Token, teachers' perception scale, lifelong learning

Introduction

Art is the aesthetic that takes the shape of the expression of the real world and the emotions of human being. Art follows the developing and changing world, society, and individuals and is on the whole with them. In art, aesthetics, essence, universality, and realist and surrealist ideas are interconnected and inseparable. By adhering to these in his work, the artist completes his work by complying with the conditions of the period and conditions in which he lives (Hançerlioğlu 1982). In our digitalized world, these works are also transforming.

The Covid-19 and pandemic process in our world has led to social changes and innovations, as well as to the changes in our daily lives, and have led to universal changes. It has taken its share in the art within the scope of digital platforms from this considerable development and change experienced by our world, gained a completely different dimension, and affected art and artistic activities (Gul, 2014). Online museum activities, which have been in our lives for a long time, have become obligatory to adapt to the new world, which has ceased to be an option with the pandemic and technology development. The virtual art world, independent of time and space, has begun to exist (Özer, 2016). In this process, art lovers tried to integrate themselves by participating in virtual galleries and online auctions on the digital platform. In the wake of these developments, NFT, a work of digital art existed and added another dimension to the art world.

There are two different concepts that artists are fed while creating their works. These are the artistic works that the capitalist system and the consumer demand and expect from an economic point of view and the works of art that exhibit an original, creative re-existing formation of the artist. While art is a qualitative formation that creates concrete formal, creative, and aesthetic works, trade is a commercial quantitative formation that gives concrete work (Velthuis, 2005:23-24). NFTs, which have gained a place in the digital art market by introducing new concepts into the literature in this age of rapid spread of digitalization, have brought a different dimension and quality to society and art.

NFT Definition

Turkish meaning of NFTs, which is the abbreviation of Non-Fungible Token, means a value or token (Günen, 2021; Icrypex, 2021). In another Turkish equivalent, it is described as "unchangeable money or chip" (Webrazzi, 2021). If we examine the words fungible and negative, non- fungible to get an explicit

expression of etymological origin, the word “Fungible” meets the Latin meanings of “perform” and “changeable,” “can be changed” (Merriam-webster, 2021). Although there are minor changes in their translations, the main point is that NFTs are an entity that gives property rights to a single, unique, unchangeable, non-replicable owner (Günen, 2021). Thus, the originality of an artifact exhibited as an NFT can be preserved, and its duplication can be prevented.

It is challenging to move from the known to the unknown, and the transition from the concrete to the abstract in art, the fact that its production is carried out on a digital platform and met with art lovers on this platform has made NFT a bit complicated. Marcel Duchamp’s philosophy of art asserts that creativity occurs with ideas, excluding labor. Those who adopt this philosophy of Duchamp have adapted more quickly in the transition from concrete to abstract art (MacFarlane, 2015). NFTs have added a different dimension to universal and digital art.

The artifacts transferred to NFT are not only sufficient with pictures but also graphic design, video, music, tweet, etc. Assets on other digital platforms are recorded by gaining tangibility and published on digital platforms, which are the wealthiest in terms of these works (OpenSea, ERC721, and ERC1155), offering a wide range of opportunities to those who love them.

Blockchain

Blockchain is a technology we come across with Bitcoin (Stallone, Wetzels, and Klaas, 2021). However, its foundations first started with the studies of Haber and Stornetta in 1991 (Dursun, 2021). Blockchain is a technology implemented to protect a digital artifact’s metadata and preserve its property right (Ante & Token, 2021). It can collect and share multiple data like a decentralized master data ledger. The data in this ledger will be verified with the participation of those in the system, and the recorded information will be strengthened with data that will not be changed or deleted. Because of these features, blockchain can be said to be a secure data structure (Tanriverdi, Uysal, and Üstündağ, 2019). Since there is no central buyer and no need for a third party in this technology, it may disrupt the conventional shopping system (OECD, 2016).

Blockchain allows individuals who want digital money to protect and strengthen personal data. Blockchain addresses are used to exchange Bitcoin and other virtual currencies and NFTs. Thanks to intelligent contracts determined by the Ethereum blockchain it has provided a safer environment for these transfers (Davis and Thilagaraj, 2021). However, it can contribute to digital security, holistic competition, and multi-partner cooperation, eliminating privacy and trust problems. Blockchain technologies have many potentials, from education to health, agriculture to law. Blockchain is a multi-purpose platform (Ethereum, Waves, Neo, etc.) that aims to create and reproduce crypto products, transfer, or digital exchange works (Özkan, 2019).

Eczacıbaşı has included the following words about Blockchain; The world we live in, the developing technology, and the age of science push us to become innovative individuals. Blockchain is one of them. We are in a period where we are in the process of understanding, learning, and experiencing blockchain. The essential feature distinguishing blockchain from conventional systems is the need for “collective work” and creating a platform that can produce products together (Eczacıbaşı, 2019).

Ethereum

Digital art and virtual currencies have taken place in our lives with the universal developments and the pandemic process. Ethereum, one of many virtual currencies, is the type of money applied to the blockchain database (İçözü, 2021). In Ethereum, one can control their account in two different ways. The first is user accounts with unique passwords, and the other is codes created by agreements. A fee is charged for each stage applied in these two ways, which differ. Ethereum is a decentralized, democratic entity that resides and operates on a digital platform without an administrator. Anyone who wants to exist in this application can work without permission (Chow, 2017).

Crypto-Art

Artifacts created on the digital platform are converted into units and values called tokens. It helps to prepare the artifact, which is created on the condition of using blockchain in the infrastructure system, using programs such as Mintable - Mintbase. Access to the system is provided by creating a crypto wallet: existing work OpenSea or NiftyGateWay etc., being uploaded to virtual platforms to reach people. Rarible galleries also provide access to digital virtual marketplaces (Kerrigan, O’Reilly, and Vom Lehn, 2009).

It is a digital virtual platform that is no different from auctions, which can make shopping or barter and realizes a formation that will be presented to us. There is a currency that determines its own value in virtual markets according to the supply-demand balance. Many people also use these coins. The factor that makes

NFT works unique and special is that they cannot be copied or changed; the original is in the person's account (Icrypex, 2021). Here, the products that cannot be replaced are "unlikely" (Bakırcı, 2021).

Art lovers have been investing in precious metals in paintings from investment and unique tastes from the past to the present. However, many problems can be encountered, such as theft, destruction, failure to protect, taxes, commission fees, insurance, etc. There are also extra expenses. In today's works of art, such risks are almost absent, and their importance and reliability are increasing daily. What makes it so reliable is blockchain technology. Personally, signed works can be licensed. Apart from artistic products, "first tweet," "first video," "most watched Tik Tok," or any artist's digital works, games, academic or popular articles, and any other digital product you can think of can be traded thanks to NFT, and they can be bought and sold in a brand-new way. It is among the predictions that it seems to create a market.

NFT Platforms

NFTs and digital assets, platforms that we call the virtual art market, are widely exhibited; these programs are OpenSea, Rarible, SuperRare, Mintable, and Nifty Gateway (Goodwin, 2021). NFT exchange is provided from these platforms. A transaction fee of 100 Gwei (gas) is incurred in the transaction (Iyengar, 2021). Processing time may vary depending on the amount paid. Financial transactions, digital art, games, sound, music, etc., are included in NFT (Kay, 2021). The prices of NFT, however, have been increasing rapidly since it was first formed (Influencer, 2021). Other than the platforms such as Showroom, Snark, Unique, Makersplace, and Artsy (Tellinga, 2021) where NFTs are exhibited, the platforms where they are exhibited the most are listed below:

OpenSea

Founded in 2017, the platform is the largest and most advanced among NFT shopping sites, providing artists and art lovers with a comfortable and easy-to-use opportunity (Fortnow and Terry, 2021: 108). The web address is OpeanSea.io. Manufacturers who register with wallets such as Metamask, Bitski, and Walletlink can offer their digital works and NFTs of collectibles. The platform receives 2.5% money for every work it sells (Aureliano, 2021; Walker, 2021). The platform is free for those interested and curious and is open to everyone without membership (Martinique, 2021).

SuperRare

It is characterized as a secure NFT program that provides good service to users (Walker, 2021). The artist presents their work, which is evaluated and accepted to the site, so there are few artists. Studies take place uniquely, initially, providing shopping on the site (DappRadar, 2021).

Foundation

It is a collective working NFT platform. It has a creative corporate identity. Studies published on the site are determined by the majority of votes (Foundation, 2021). The artists to be exhibited and existing are determined by the decision of the other artists on the platform (Martinique, 2021).

Axie Infinity

It is called a virtual pet community, where fantastic creatures are developed under the name Axie and shaped to fight. The genes of these characters are stored in the blockchain Ethereum. These characters can have six out of many possible body parts. Since the created characters also have combat combinations, many new NFTs exist (DappRadar, 2021).

Rarible

It is a platform that creates and sells NFT works that are not frequently encountered. NFT is relatively easy to produce and publish; use an Ethereum wallet and digital RARI token (Rarible, 2021; Willing, 2021). Rarible on the platform that also hosts the unique system. There are more than 20,000 producers with the token (DappRadar, 2021).

Mintable

Mintable allows the publication of free works compared to other NFT platforms. It is a platform that provides convenience to its users. Its code on the blockchain is ERC-721 (Cuban, 2021).

Digital Production Methods and Quality

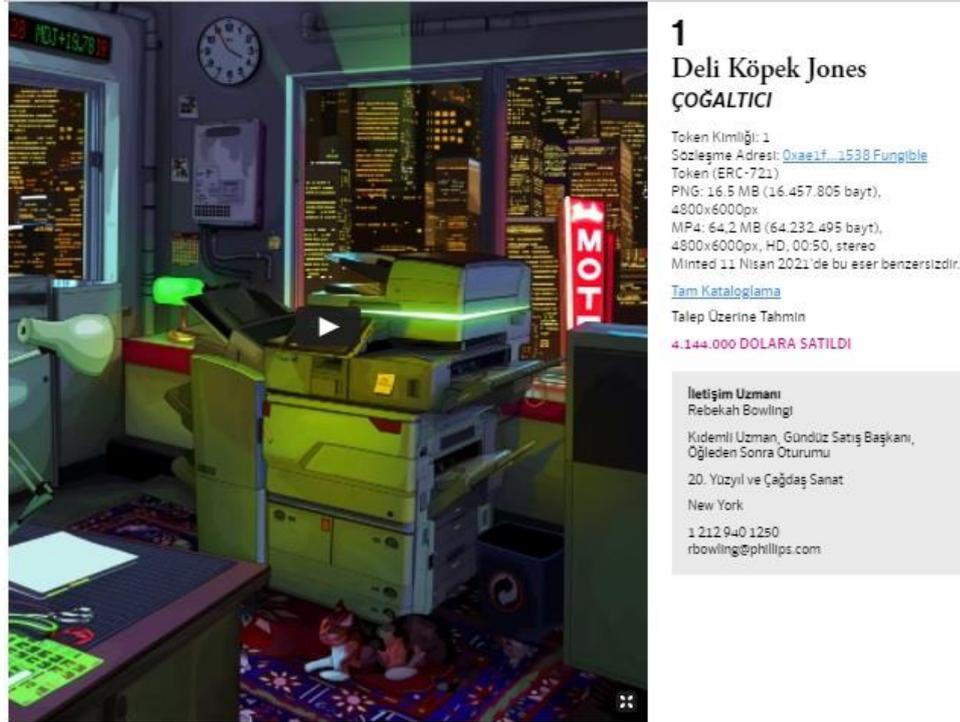
The quality of the content produced and the relationship between the platforms it takes place in is essential. It is noteworthy that NFT's existence of an artifact and meeting with art lovers adds a new dimension to this correlation (Barsotti, 2019). NFTs, seen as a new breath in the art world, are open to

evaluation by the art community. The likes and degree of the artifact on the platform on which it is significantly published affect the sales. Clearly stating the criteria of NFTs affects the evaluation of the artifact, increasing the visibility of the artist's work (Franceschet et al., 2019). Artists, collectors, and investors act on the platform according to these criteria. It is considered appropriate to understand the published works as the original and unique form of different crypto codes and produced NFTs. In this way, the work produced become concrete and become a commodity. This concrete existence indicates that NFT artifacts have a place in the art world (Lotti, 2019).

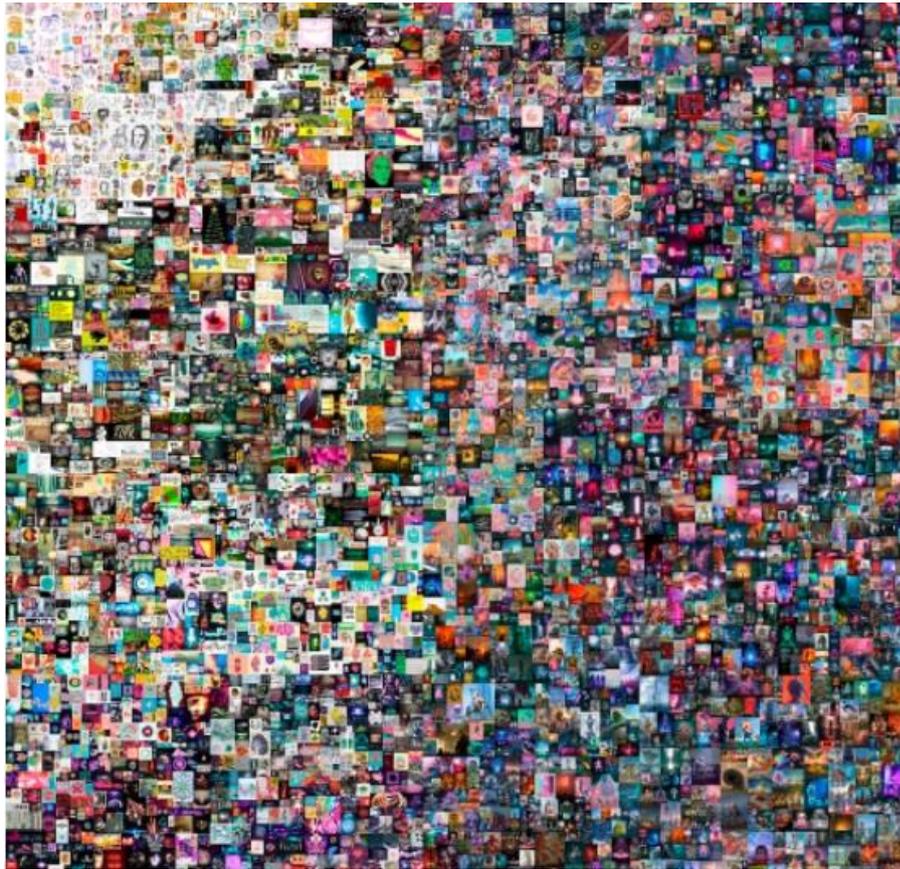
NFT Uses

The digital art production and sales gap between 2013 and 2019 have doubled, with an increase of around 6 billion dollars compared to the 2021 report. Thanks to the effect of the pandemic and the changing art world, galleries, auctions, art fairs, and biennials have moved to the virtual art world, and digital art has spread to a wide area, apart from the artifacts produced digitally. In this development indicator, there was a significant increase in sales, and the amount obtained increased to 12.4 billion dollars. It is proof that it has increased its rate from 9% in 2019 to 25% in 2020. The protection of digital works can be arranged on the platform in the form of the copyright price determined by the artist. Since there is no third party in the sale of the works, their sales are prompt and profitable. Mad Dog Jones's artifact of "REPLICATOR," which sold for \$4.1 million, is an example of this (Wang et al., 2021:11). Michah Dowbak's "REPLICATOR" (Picture: 1) carries a nostalgic reference to this copier, which was the cutting-edge technology of its time, and its evolution with the development of technology (Philipp, 2021). Another work, Mike Winkelmann's digital artifact "Everydays: The First 5000 Days," sold for \$69,346,250. With this work, the artist has been among the three crucial artists whose existence continues (Quirion, 2021). The artifact is a square image file consisting of 21,069 x 21,069 pixels (Picture: 2). It consists of the images Beeple has shared on the internet since May 1, 2007 (Picture: 3).

"Everdays" collection is similar to the artist's three-dimensional digital sketchbook (News.artnet, 2021).



Picture 1. REPLICATOR (Phillips, 2021)



Picture 2. “Everdays” - The First Everdays (News.artnet, 2021)



Picture 3: Images of some parts of the artifact called “Everdays” (News.artnet, 2021)

The pandemic, which brought artists together with NFT, and the problem of finding a job, added a digital dimension to art (Picture: 4). Artists known as “SadexKedu” and “Lorento” are examples of this (Koinbultenni, 2021).



Picture 4: "Midnight Routine" image created by Artist "Lorento" (Koinbulletin, 2021).

In today's geography, everything is consumed rapidly. The change in every sector from A to Z draws attention. Art and marketing come together no matter how much the artists oppose the consumption concept. Marketing provides the relationship between artists and art lovers. Artists also produce products for the needs and tastes of society stemming from this relationship. Concepts such as Featherstone's lifestyle or aestheticization of daily life and Jameson's aestheticization of consumer society come to mind (Kaya, 2013:27). The words of Tolstoy, who predicted art, come true today; art does not have anything in common with the art of the upper classes, it spreads among people and is built on different foundations from its time (Tolstoy, 2020). The reflection of capitalism in art today appears as NFT and destroys existing patterns.

The digitalized world and art are reflected on virtual platforms. The relationship between artist and consumer has taken place on digital platforms with NFT, and shopping continues with virtual art markets and virtual currencies. NFT platforms, which we can also call digital canvas or digital sketchbook, provide a safe, collaborative and accessible environment. It respects the rights of the artist and the consumer and cares about transparency. Property rights are preserved in endless algorithms. Induction is also essential, rather than the whole NFT system. The value should be added to the meanings of the parts as well as the holistic values. NFT is a fair platform that arouses curiosity and interest in art lovers and provides employees with all rights protected after owning it. The artists are more creative, more accessible, and earn what they deserve financially in the NFT environment (Saygın and Fındıklı, 2021).

The ability of artists to reach buyers without intermediaries, the convenience of marketing the product, the protection of rights on both sides, and the ease of access benefit the digital marketplace and NFT's understanding of the market. Every artifact to be done on NFT platforms, which are constantly renewed and grown, can be seen as an excellent investment for the future (Saygın and Fındıklı, 2021).

The negative side of NFTs, which makes people think, is vital in terms of being a platform where rights are protected, and it is thought that an environment can be created to be exposed to cryptocurrency fraud and left unsolved. The rate of those who think this way is relatively high (Öç, 2021). It is foreseen that these enemies of opportunity, which appear in all innovations in our lives, can take advantage of this situation. Such problems will not be forgotten when the system is well established, and complete trust is established over time. The value given to the produced artifact and the artist allows the demand to increase (Dursun,

2021). While defining the creation process of NFT assets, “strong diagnostic assets with a common idea” (Lotti, 2019) are expressed as the creation process.

The study aims to develop a measurement tool to measure how NFTs create a perception among teachers, which provides a new understanding of art. For this purpose, it is aimed to contribute by filling the gap related to the subject in the literature and to reveal a suitable scale for those who want to work on this subject. In line with this subject, it is aimed to develop a tool that can measure the positive and negative contributions of NFT to art, creativity, digital art, and the artist. This study aims to establish the scale needed in the field of NFTs and to measure the perceptions of NFTs in the literature about their positive and negative contributions to digital art and artists.

Method

The quantitative research method was used to develop the NFT teachers’ perception scale. This chapter presents explanatory information about the participants and the procedures performed during the scale development.

Participants

In the study, the participants were determined among the teachers with a convenience sample method, and the scale was applied over the Google form with the online survey method. The total number of participants in the study are 310 people, including 197 women and 113 men. The age range varies between 21 and 60, with the average age between 26 and 45 (252 people). Professional seniority varies between 1 and 30 years. Regarding professional seniority, most participants work between 1 and 15 years in the profession (215 people). First of all, 135 people participated in the study, and exploratory factor analysis was applied to their data. Then, data were collected again to examine the factor structure of the items. In this process, 175 people participated in the research. The information on the first and second groups of participants in the research is given in Table 1 below. According to the literature, it would be more accurate to apply EFA and CFA to different groups (Fabrigar et al., 1999; Worthington and Whittaker, 2006).

Table 1. Information of the first and second groups participating in the study

Demographic information of the Exploratory Factor Analysis participants			
		frequency	percent
Gender	Male	46	34.1
	Female	89	65.9
Profession	Physical education	3	2.2
	Information technologies	16	11.8
	Religion culture	4	3.0
	Science	8	5.9
	Visual arts	36	26.7
	English teacher	9	6.7
	Math teaching	8	5.9
	Music Teaching	9	6.7
	Pre-school teaching	8	5.9
	Guidance	7	5.2
	Classroom teaching	22	16.3
	Turkish teacher	5	3.7
Total		135	100
Demographic information of the Confirmatory Factor Analysis participants			
		frequency	percent
Gender	Male	67	38.3
	Female	108	61.7
Profession	Physical education	6	3,4
	Information technologies	15	8.6
	Religion culture	4	2.3
	Science	8	4.6
	Visual arts	32	18.3
	English teacher	10	5.7
	Math teaching	7	4.0
	Music Teaching	10	5.7
	Pre-school teaching	10	5.7
	Guidance	5	2.9
	Classroom teaching	46	26.3
	Turkish teacher	22	12.6
Total		175	100

In the literature, it has been stated that five times the number of scale items would be sufficient for the sample size in EFA studies, and ten times the number of scale items would be sufficient for the sample size in CFA studies (Kline, 2011). From this point of view, the total number of $n=310$ participants will be sufficient in this scale development process.

NFT perception scale

The psychometric properties of the NFT perception scale were examined by item-total correlation and exploratory and confirmatory factor analysis. As a result of the exploratory factor analysis, the 25-item scale showed a three-factor structure that explained 70.23% of the total variance. However, it is seen that the three items are highly correlated with the other items, and they exhibit overlapping item characteristics according to the rotated component matrix table. When these three items were removed from the list, and exploratory factor analysis was performed again, the 22-item scale showed a three-factor structure explaining 68.14% of the total variance and was obtained with a total without overlapping items. These three factors were named "NFT's contribution to art and artists," "NFT's positive contribution to art," and "NFT's negative contribution to art." This three-component structure was tested by confirmatory factor analysis.

Procedures

The scale items were developed as five dimensions and 25 items as a result of the literature review. These five dimensions are; "The positive contribution of NFT art," "the negative contribution of NFT art," "the effect of NFT on creativity," "the contribution of NFT to digital art," and "the contribution of NFT works to the artist" were determined. Opinions of academicians who are lecturers in the field of Educational Sciences and have various studies on Bitcoin, metaverse, and NFT were received regarding the items created. The items were rearranged in line with the opinions of the academicians. Two Turkish teachers reviewed and arranged the prepared items regarding language and spelling rules.

In the second stage of the scale development process, the items developed were first applied to 135 people. The results of these 135 people were applied to exploratory factor analysis. Then, the scale, which had a specific factor structure and items, was used again, and data was collected from 175 people. The information on the people participating in the study is given in Table 1. The results of this were used in confirmatory factor analysis. Both exploratory and confirmatory factor analysis results showed that the scale was applicable.

As a result of EFA, the five-dimensional scale was reduced to three dimensions. These factors were named "NFT's contribution to art and artists," "NFT's positive contribution to art," and "NFT's negative contribution to art." This three-component structure was tested by confirmatory factor analysis.

The scale's validity in the scale development process; construct, face, content, and concordance validity. The construct validity studies of the scale first started with EFA and then continued with CFA. The structural features of the draft form of the scale prepared with EFA were examined, and its sub-dimensions were determined. Then, the model created with CFA was tested. The model created with CFA has been tried to be based on solid foundations. Expert opinion was sought for face and content validity, and correlation values between the sub-dimensions of the scale were examined for concordance validity. To calculate the reliability, the internal consistency coefficient and the test-retest reliability were calculated.

Data Analysis

Data with IBM AMOS V24 (Chicago, USA) were examined. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) was run to examine the factor structure of the NFT perception scale. EFA and CFA require different samples from each other, and EFA is used to explore possible factors, whereas CFA is used to confirm the hypothesized factor structure (Kahn, 2006). First, EFA was run to explore the factor structure of the scale, then CFA was performed to test the hypothesized structure in a separate sample. Subsample 1 ($n=135$) was used for EFA, and Subsample 2 ($n=175$) was used for CFA.

Ethics Committee Report

There is no violation of scientific ethics in this research according to the Sakarya University Educational Research and Publication Ethics Committee Conformity-approval document dated 09. Nov.2022 and numbered E-61923333-050.99-188788.

Findings

The findings obtained for validity and reliability during the development of the scale are given separately.

Findings Regarding Validity

The scale was examined in terms of construct, concordance, content, and face validity to measure teachers' perceptions of NFT. The scale's construct validity was determined by EFA and checked with CFA. The NFT perception scale, which was prepared as 25 items and five dimensions, was reduced to 22 items and three dimensions due to EFA. Using CFA, factors obtained by EFA were tested. The related process is detailed below.

Exploratory factor analysis

In the study, the factor structure of the NFT perception scale was investigated using Exploratory Factor Analysis (EFA). In EFA, all 25 items were subjected to principal components factoring and varimax rotation. Kaiser-Meyer-Olkin value was 0.934, and Bartlett's test of sphericity was significant (2817.1, $p < .001$). The total variance explained for 25 items was found to be 70.23%.

The rotation method, varimax with Kaiser Normalization, was performed, and the difference between the correlation levels of the three items was calculated to be less than 0.1. According to Büyüköztürk (2006), if the difference in the level of relationship between related factors is less than 0.1, these items are adjacent. As a result of the analysis, removing these items is recommended so as not to cause problems calculating the differences between the dimensions (Can, 2014). These three items (items 1, 4, and 12) were removed, and EFA was reapplied. As a result of EFA with these updated new items, all 22 items were subjected to principal components factoring and varimax rotation. Kaiser-Meyer-Olkin value was 0.927, and Bartlett's test of sphericity was significant (2474.1, $p < .001$). The total variance for 22 items was explained as 68.14%. The factor loadings of the twenty-two items ranged between 0.44 and 0.89, suggesting that each item substantially contributes to the factor at good and excellent levels. Twenty-two items of the scale factor loads are given in Table 2.

Table 2. Factor loads table

Item No.	Factor Variance	Common	Load values after rotation		
			Factor 1	Factor 2	Factor 3
Q21	.831		.888		
Q20	.815		.847		
Q22	.741		.833		
Q16	.764		.816		
Q23	.737		.813		
Q19	.725		.799		
Q15	.754		.794		
Q25	.711		.793		
Q14	.782		.790		
Q18	.629		.748		
Q17	.676		.731		
Q24	.605		.721		
Q13	.648		.610	.438	
Q11	.564		.554	.341	.376
Q7	.713			.828	
Q8	.676			.797	
Q6	.588			.751	
Q10	.584			.660	
Q9	.316			.442	
Q2	.780				.843
Q3	.730				.784
Q5	.621		.396	.361	.578
Explained Variance (Total: 68.14%)			53.15%	9.44%	5.55%

As seen in Table 2, a 3-factor structure was obtained due to varimax-vertical rotation in the EFA process. After factor rotation; the first factor consists of 14 items (items 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25), the second factor consists of 5 items (items 6, 7, 8, 9, 10) and the third factor consists of 3 items (items 2, 3, 5). By examining the items in the same factor, the first factor was named “NFT’s contribution to art and the artist,” the second factor was named “NFT’s negative contribution to art,” and the third factor was named “NFT’s positive contribution to art.”

Confirmatory factor analysis

In the second stage of scale development, the draft form of the scale was applied to a different study group. The data obtained was followed by the CFA process. The structure and sub-dimensions of the draft form prepared with EFA were determined. The accuracy of the structure was tried to be tested with CFA. The scientific validity of the structure revealed by CFA was tried to be supported, and the model was tried to be placed more substantially. Expert opinion was sought for face and content validity. The internal consistency coefficient was calculated for the reliability study, and the test-retest reliability was examined.

In the confirmatory factor analysis process, some fit indices were used to demonstrate the adequacy of the draft scale. For the confirmatory factor analyses conducted in this study, Hu and Bentler (1999) stated; Standardized value of χ^2 according to sample size (X^2/sd), GFI (goodness fit index), AGFI (adjusted goodness fit index), CFI (comparative fit index), NFI (normed fit index), IFI (Incremental fit index), PNFI (Parsimony normed fit index), PGFI (Parsimony Goodness of Fit Index), NNFI-TLI (non-normed fit index), RMSEA (root mean square of prediction errors) and SRMR (standardized root mean square error) fit indices were used.

Confirmatory factor analysis was used to test the three-dimensional and 22-item structure revealed by exploratory factor analysis. The results obtained from the fit indices are given in Table 3.

Table 3. CFA results

Examined Fit Indices	Perfect Fit Criterion	Acceptable Compliance Criteria	Values Regarding the Scale
χ^2/sd (CMIN/DF)	$0 \leq X^2/sd \leq 2$	$2 \leq X^2/sd \leq 3$	1,786
GFI	$.95 \leq GFI \leq 1.00$	$.80 \leq GFI \leq .95$.851
AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq AGFI \leq .90$.806
CFI	$.95 \leq CFI \leq 1.00$	$90 \leq CFI \leq .95$.945
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI \leq .95$.885
IFI	$.95 \leq IFI \leq 1.00$	$.90 \leq IFI \leq .95$.946
PNFI	$.95 \leq PNFI \leq 1.00$	$.50 \leq PNFI \leq .95$.743
PGFI	$.95 \leq PGFI \leq 1.00$	$.50 \leq PGFI \leq .95$.653
TLI (rho2)	$.95 \leq TLI \leq 1.00$	$.90 \leq TLI \leq .95$.935
RMSEA	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$.067
SRMR	$.00 \leq SRMR \leq .05$	$.05 \leq SRMR \leq .10$.0635

Source: Çokluk, Şekercioğlu and Büyüköztürk, 2014

Data from CFA show that all fit indices are within acceptable values. The three-dimensional structure of this scale shows that the level of compliance is sufficient. In addition, in Figure 1, factor loadings showing the three-dimensional structure of the scale and its relationship with the items are given.

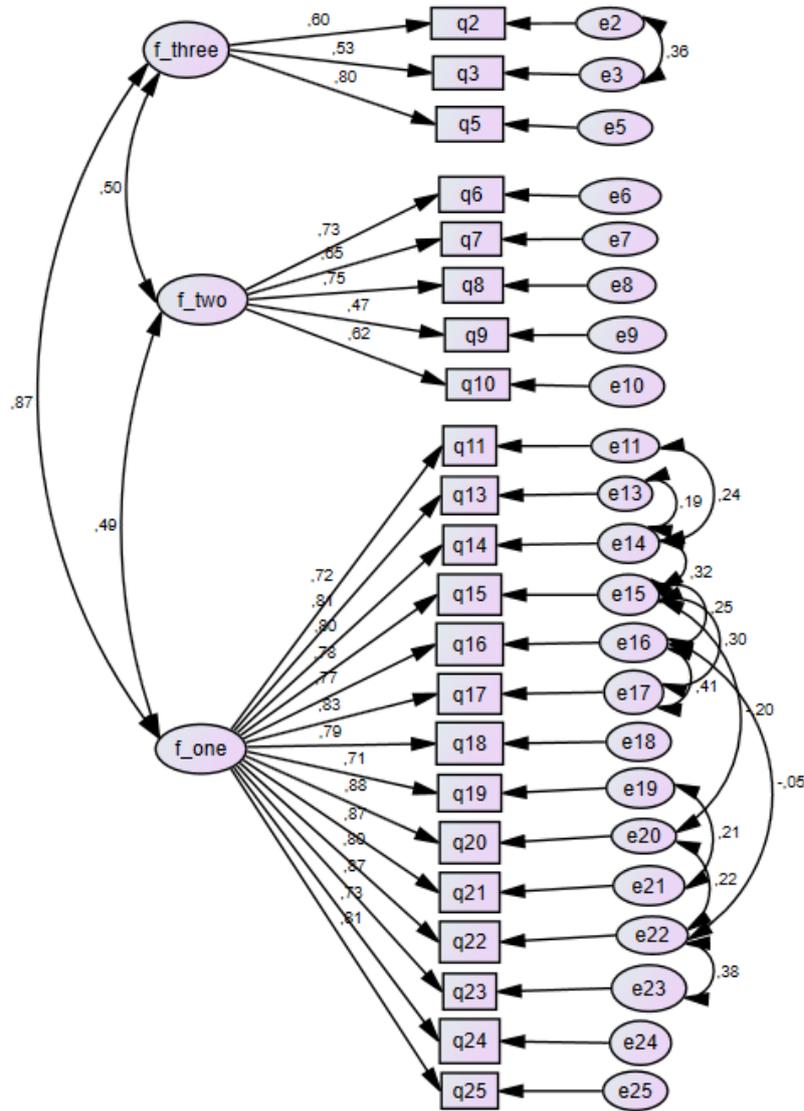


Figure 1. Standardized factor loadings of the scale

As seen in Figure 1, factor loadings vary between .47 and .89. These values are preferred to be close to .70. The closer it is, the more it can be shown as evidence that the model is fit. The error variances of some items are combined in the figure. These combinations were made among the items with high modification indexes based on the AMOS analysis results, in line with the opinion of the field expert.

Concordance validity

Concordance validity was examined in the context of the relationship between the correlation values between the sub-dimensions of the scale and the overall total, and the dimensions of this relationship are given in Table 4.

Table 4. Correlations between the total score and sub-dimensions of the scale

	Sub-dimension 1	Sub-dimension 2	Sub-dimension 3
Total score	.962**	.633**	.750**
Sub-dimension 1		.430**	.677**
Sub-dimension 2			.323**

** Correlation is significant at the 0.01 level (2-tailed).

When Table 4 is examined, the correlation coefficients between the sub-dimensions of the total scale and its sub-dimensions vary between .633 and .962. The correlation coefficients of the sub-dimensions of the

scale among themselves vary between .323 and .677. The fact that these values are significant at the $p < .01$ level and indicate a medium or high level of relationship indicates that the structure is compatible.

Face and content validity

For the face and content validity, the opinions of two academicians who are lecturers in the field of Educational Sciences and who have various studies on Bitcoin, metaverse, and NFT were taken. Twenty-five items prepared in this direction were revised, and necessary changes were made. As expected from the study, these 25 items were prepared to measure teachers’ perceptions about the contribution of NFT to art, creativity, digital art, and artists.

Findings Regarding Reliability

Consistency and stability studies were carried out to ensure the reliability of the developed scale. In the consistency part of the study, data collected from the study group consisting of 310 teachers were used, while data collected from 55 teachers were used for stability. Cronbach’s Alpha coefficient, an internal consistency measure, was calculated for consistency, and the test-retest coefficient was calculated for stability.

Consistency

Cronbach’s Alpha coefficient value, the internal consistency value for the first 25-item version of the developed scale, was .95; The Cronbach’s Alpha coefficient value for the 22-item final version was calculated as .95. Cronbach’s Alpha coefficient values of the sub-dimensions of the scale are; first dimension “NFT’s contribution to art and artists” .96; second dimension “Negative contribution of NFT to art” .79; the third dimension “NFT’s positive contribution to art” was calculated as .76.

Table 5. Cronbach’s Alpha internal consistency coefficient values of the scale

Scale	Cronbach’s Alpha	Number of Items
Total	.947	22
Sub-dimension 1	.963	14
Sub-dimension 2	.788	5
Sub-dimension 3	.762	3

Measurements with an internal consistency coefficient of .70 and above can be considered reliable (Bernardi, 1994). In this respect, the developed scale and its sub-dimensions seem reliable.

Stability

As another reliability test method, the test-retest method was used. Fifty-five teachers applied the scale with an interval of 25 days, and as a result of this application, it was found that there was a positive and significant ($r = .83, p < .01$) relationship between the applications. This means that the developed scale has a stable structure for itself.

Results, Conclusions and Recommendations

In this study, the NFT perception scale was developed to measure teachers’ perceptions of NFT artifacts, which have recently played an essential role in spreading art, especially in electronic media. In the process, the scale development steps were followed. In the study, the construct (EFA and CFA), concordance, face, and content validity of the scale were examined within the scope of validity. For reliability, the consistency and stability values of the scale were examined. Cronbach’s Alpha internal consistency coefficient was calculated for consistency, and test-retest values were calculated for stability. While the draft form of the measurement tool consisted of 25 items and five sub-dimensions, it decreased to 22 items and three sub-dimensions at the end of the EFA process. As a result of the validity and reliability studies, the scale has turned into an applicable scale with 22 items and three sub-dimensions. There is no negative item in the scale, and it is prepared in the Likert type. As a scoring range, it varies from 1=totally disagree to 5=totally agree, and a minimum of 1 and a maximum of 5 points can be obtained for each item. Since the scale was developed by applying it to teachers, conducting a validity and reliability study is recommended before applying it to a different group. By using the scale, it was aimed at measuring teachers’ perceptions of NFT. For the next study, it can be suggested to develop a students’ perception scale regarding visual arts with NFT.

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