Awareness Analysis on Online Art Education using big data

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ABSTRACT

The coronavirus, which first appeared in December 2019, has had a great economic and social impact not only on the world but also on Korea as of 2024, and has a great impact on the cultural and artistic fields. This study was conducted to identify the perception of online non-face-to-face arts and physical education practical training among the fields of arts and culture education and to suggest directions for online arts education. To this end, online big data was collected based on the keywords of 'art education', 'culture and art performance', and 'art and physical training', and after purification/morphological analysis of the collected data, text mining, matrix analysis, discourse analysis, Network analysis and sentiment analysis were performed. The big data collection of online arts and physical training was done through portals and SNS, and was targeted at Naver, Daum, Google, YouTube, and Twitter. The period consisted of 7,837 data from March 2022 to March 2023 to investigate the general public's perception of arts education after the COVID-19 pandemic. This study is expected to be a basic material to present the direction of online education for art culture by analyzing the perceptions of art majors as well as ordinary people interested in art and physical education through big data.

Keywords: Culture and Arts Education, Arts and Physical Education, Distance Arts Education, Online Education, Big Data Analysis, Text Mining, Network Analysis, Emotion Analysis

1. INTRODUCTION

In the midst of this unprecedented pandemic, we are seeing many changes in relationships in our society due to COVID-19 [1,4]. At this time, we believe that education is one of the most urgent issues to be addressed. Due to the nature of cultural and artistic education that emphasizes experience and practice, there are various concerns and discussions about the application of online education methods. Nevertheless, remote cultural and artistic education has various possibilities such as expanding educational opportunities, personalized education strategies, and advanced educational materials, so it is necessary to consider it in terms of preparing for future education[2,3].

In addition, in the educational environment that has changed due to the spread of COVID-19, the educational situation in the field of arts is gradually increasing from on-site to non-face-to-face online educational activities.

Therefore, this study investigated the perceptions of online cultural arts education among instructors and learners with experience in cultural arts education through big data analysis. In addition, this study aims to provide a desirable and future-oriented direction for arts curriculum by conducting perception analysis and emotion analysis of arts curriculum through big data of portal/SNS along with theoretical consideration of arts curriculum in the field of cultural arts. Therefore, the research questions of this study are as follows.

Research question 1. What is the social perception of online arts and culture education in big data?

Research question 2. What are the main keywords of big data on online arts and culture education?

Research question 3. What are the public's sensibilities in big data on online arts and culture education?

2. Theoretical background

2.1. *Understanding online arts and culture education*

2.1.1. *The crisis and opportunity of contactless online education*
Currently, Korean education is facing the reality that the ICT-enabled distance education system has not been sufficiently built and applied compared to the world-class technology and network infrastructure that Korea

has[5]. To date, distance education utilizing various platforms has been in progress and experimental challenges have been conducted under the inevitable circumstances, and our education system is facing a crisis and new opportunities at the same time. Universities have been utilizing their own systems, but due to COVID-19, various platforms and tools have been developed and utilized in the field of education as full non-face-to-face classes are still being implemented until 2024[6]. However, at the same time, the Korean education situation has faced various types of crises. Unexpected problems such as unintentional exposure of teacher and student privacy, internet disruptions, unequal educational opportunities due to inexperience in utilizing smart devices, copyright infringement, and decreased learning efficiency due to decreased concentration in online classes have arisen as a result of conducting real-time virtual classes[7,8]. Jaeho Oh (2020) pointed out that non-face-to-face online learning reveals fundamental limitations in controlling and teaching students who are not voluntary, and that lack of various devices and infrastructure can limit educational opportunities due to difficulties in class participation, and there are large differences in conditions between schools [9,10]. In addition, the index of teachers' utilization of digital devices for online education in Korea is -0.563, the lowest among the seven OECD countries, and the frequency of using digital devices for learning purposes in schools is below average.

This crisis is drawing attention to ICT for educational use, and it shows new possibilities in that it could be an opportunity for the era of edutech to begin in earnest.

Edutech (Education + Technology) ICT refers to new educational technologies or services that integrate technology into the field of education, and includes e-Learning, but can be revolutionary in that it introduces new technologies (artificial intelligence, augmented and virtual reality, and the Internet of Things) for effective education and places a strong emphasis on data and software [11]. The current situation is characterized by a greater understanding of the nature of online education by teachers, instructors, and students, which is an advantage, and the possibility that online education can evolve in a more desirable direction as more people than ever before are interested in it and have opinions based on personal experience.

Distance cultural education allows for self-directed, individualized, learner-centered experiential activities, and teaching and learning that actively utilizes technology. It is necessary to utilize media outlets and develop online activities to overcome the limitations of physical activities and encourage learner participation. As it is becoming clear that distance cultural education is a new way of education, not a complement to the existing face-to-face education, it is necessary to strengthen the strengths and opportunities of cultural education that can be enriched by distance learning, and to propose research and complementary measures to overcome weaknesses and risks.

2.1.2 Crises and opportunities for online education in a pandemic
Life after COVID-19 is becoming a civilizational transition with the emergence of a new culture and spirit, and more than ever, we need a new sense of life, such as ecological sensitivity, otherness, and understanding of new human beings [7]. To do this, we must first start by forgetting what we know, breaking the mold of thinking, looking at things differently, and changing ourselves from unlearning to unlearning. In arts education, it is necessary to move away from the empirical and conventional thinking that 'we must move in contact' and 'we must relate to each other in one space' to a flexible thinking that interactive cultural education is possible even on-tact, and this starts with unlearning [7].

In this regard, Yamaguchi, S., calls for a change in mindset from the 'old type' to the 'new type' that focuses on predicting the future and getting the right answer by recognizing the causal relationship in the world in a simple approach. In other words, the future will require a new type of talent, a new type of talent that grows around "aesthetics and art," he said. "This is because we are convinced that the source of value creation is shifting from the ability to solve problems and make things to the ability to discover problems and create meaning" [12].

2.2. Understanding big data analytics

2.2.1. Big data
Big data can also be defined as large structured or unstructured data sets that exceed the ability to collect, store, manage, and analyze data with traditional database management tools, and the technologies to extract value from these data and analyze the results [19].

Mckinsey defines it as "data that exceeds the scale that can be stored, managed, and analyzed through traditional database software" [13]. The Internet Data Center (IDC) also defines it as "a new generation of technologies and architectures designed to expedite the collection, search, and analysis of large and diverse amounts of data for cost-effective value discovery" [9]. Big data is characterized by its enormous volume, variety, and velocity of creation and distribution, which Gartner reports adds to the complexity of data processing [14]. Meanwhile, the concept has been expanded from the 3Vs (volume-volume, velocity-velocity, and variety-variety) to the 4Vs, which means that big data has been expanded to include the entire process of collecting, storing, processing, and analyzing data to create new value [17].

2.2.2. Big data analytics

Big data analysis technologies include text mining, which uses natural language processing technology to extract or process useful information from data in unstructured and semi-structured text; reputation analysis, which analyzes public opinion and opinions on websites and social media; and social network analysis, which measures the reputation and influence of users based on graph theory in mathematics to find users who act as centers or hubs of word-of-mouth on social networks, cluster analysis, which is a statistical analysis method that classifies high target groups by measuring the similarity of each object and identifies the similarity of objects in a cluster and the differences between objects in different clusters; and complex event processing technology, which detects actionable patterns by analyzing the correlation of various events rather than simply obtaining many event cases, and is expected to accelerate the intelligentization of things by naturally linking with IoT technology [15].

2.3. What big data analytics means for arts and education

The core of big data technology, which has recently attracted attention from the perspective of information services, is to provide users with a new cultural information service environment and provide customized services by analyzing users' data stored on their devices, which is in line with the concept of helping users to produce, recreate, and share information by themselves [18]. Moreover, it has become a hot topic in the cultural industry, which needs to respond quickly to new trends, as it can predict future trends and optimize the use of content by analyzing even unstructured data such as social media [16].

Big data analytics has been able to expand its application and analysis techniques to include trend analysis for market forecasting in the field [20,21]. In addition, the availability of customer data through blogs and social media has made it easier to reduce costs and time and receive real customer feedback, and customer recommendation systems can be made more accurate and sophisticated with sufficient data [5]. Thus, the combination of existing information systems, including customer relationship management systems, and big data generated by social media will contribute to the development and advancement of competitive educational contents in the cultural field.

3. RESEARCH METHODS

3.1. *Collecting data*

In this study, text mining analysis, discourse analysis, topic analysis, and sentiment analysis were conducted on online big data to analyze the perception and evaluation of 'arts and culture education' not only by experts in the field of arts and culture but also by the general public. For this purpose, data was collected from portal sites and SNS, and the specific sites were Naver (webpage, blog, cafe, news, knowledge IN, academic information), Google (web document, news, Facebook), and Twitter.

This study extracted and analyzed data from Naver (webpage, blog, cafe, news, knowledgeIN, academic information), Google (webpage, news, Facebook), and Twitter, including 'art education or arts education in the field of arts and culture' as the central keyword, which has been emphasizing its importance along with online education in the recent one year (April 17, 2022 to April 21, 2023) as online education has progressed into daily education after the COVID 19 pandemic. A total of 7,837 keywords were extracted, and the data was separated and purified by refinement/morphological analysis, and the final data used in this study was analyzed for 3,942 keywords in the top 100. The distribution of portal sites and SNS collected in this study by source is as follows [Figure 1].
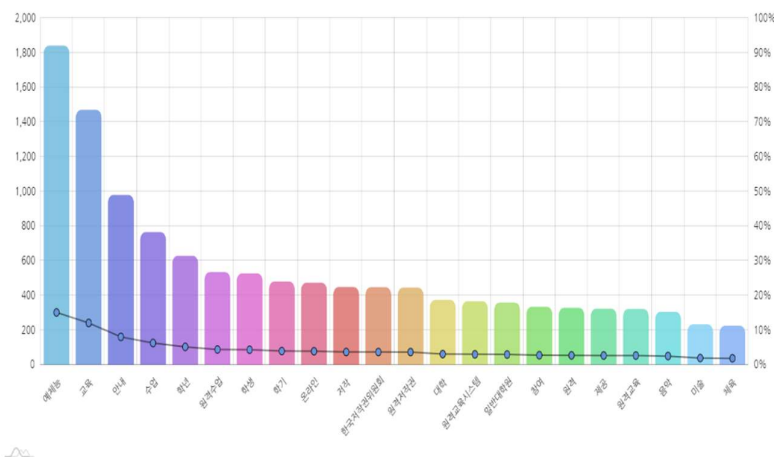
Figure 1. Distribution of key words related to online arts, culture, and arts education by source

3.2. *Analyze data Method*

This study utilized TEXTOM, a web-based analytics solution certified by the Korea Telecommunications Technology Association (TTA), and after collecting big data, it went through the textmining analysis procedure. The collected data was first analyzed by extracting nouns, pronouns, and adjectives from online documents containing the keyword 'online arts education' by specifying the range of words as six words based on the first three words, and secondly, unnecessary symbols, numbers, and promotional phrases were excluded. In addition, to analyze the relevance of keywords, we conducted a connection centrality analysis, and analyzed keywords with high frequency and high connection centrality. Through text mining, word frequency analysis, N-gram analysis, TF-IDF analysis, connection centrality analysis, matrix analysis, matrix chart, topic modeling analysis, and sentiment analysis were conducted.

4. RESEARCH FINDINGS

4.1. *Online arts education big data word frequency analysis*

The keyword analysis of online arts education was conducted by focusing on the most frequent words in the texts related to online arts education and extracting nouns. The top 50 keywords were: online, art, education, research, cultural arts education, held, school, video, and world cultural arts education. When classifying them, first, the types of artistic and cultural education such as art, education, research, cultural and artistic education, video, culture, and world cultural and artistic education appeared as the perception of online art education. Second, the terms for operating and developing such as school, program, continuing education, school art education, university, institution, instructor, and training appeared. Third, terms for the object and method of online arts education, such as education, research, class, learning, primary, audience, and talent. The word frequency analysis of portal sites and SNS related to online arts education is as follows [Table 1].

Table 1: Frequency Analysis of Top 50 Words for Online Art Practical Education

Rank	keyword	Frequency	Weight
1	Online	6068	4.620%
2	Art	2572	1.958%
3	Training	2269	1.727%
4	Research	1548	1.178%
5	Arts and Education	1377	1.048%
6	Held	1297	0.987%
7	School	1147	0.873%
8	Video	1016	0.773%
9	Weekly	907	0.690%
10	Support	891	0.678%
11	World Culture and Arts Education	887	0.675%
12	Culture	758	0.577%
13	Programs	727	0.553%
14	Target	633	0.533%
15	Social	625	0.481%
16	Progress	599	0.475%
17	Share	592	0.456%

18	Seoul Arts Education	579	0.450%
19	Cover page	549	0.440%
20	Possible	548	0.418%
21	Purpose	541	0.417%
22	Arts Education	528	0.411%
23	Expert	524	0.402%
24	Arrange	495	0.399%
25	Operational	481	0.376%
26	Operating System	481	0.366%
27	Recommendations	475	0.361%
28	Student	472	0.359%
29	Variety	459	0.349%
30	Shooting	454	0.345%
31	Apply	438	0.333%
32	ContinuingEducation	422	0.321%
33	Homepage	418	0.318%
34	Festivals	417	0.317%
35	School Arts Education	414	0.315%
36	Region	410	0.312%
37	Roundtables	393	0.299%
38	Contact	392	0.298%
39	Methods	381	0.290%
40	Engagement	379	0.288%
41	Youth	374	0.284%
42	Introduction	373	0.284%
43	Coronavirus	368	0.280%
44	Required	360	0.274%
45	Experience	354	0.269%
46	for	354	0.269%
47	Artists	352	0.268%
48	Center	350	0.266%
49	Help	343	0.261%
50	Arts & Culture	341	0.259%

The implications of keyword frequency for the results in Table 1 are as follows. First, the main characteristics of the 50 keywords related to online art practical education are that the main keyword with the highest frequency of more than 1000 is "education", and the main keywords with the middle frequency are "people", "operation", and "program". The lowest frequency keywords with 400 or fewer occurrences are "learning audience" and "program". When we examine the details of "education" in the high-frequency keywords for online art period education, we can see that there is a strong positive perception of non-face-to-face practical education. This is because online training offers time flexibility, the ability to train from anywhere, and no travel time. However, recent media reports suggest otherwise, with headlines such as "Instrumental lessons via video cam are ridiculous" [21].

This means that the effectiveness of education is extremely limited if it is not general education, but practical education, which requires interactive teaching methods using objects that are not possible through online education alone. Therefore, a proper allocation of online and offline is essential to overcome the limitations of online art period education. Engage a variety of instructors who are able to deliver arts-in-practice training online, which occurs at a median frequency. Have flexibility in adjusting hours of operation. In addition, offering a variety of programs allows for repetition of content. In the lower frequency, when the target audience is elementary school students, online art practical education requires a lot of instructor demonstration training, which is not enough for online education and needs to be combined with offline training. As such, online arts practical education provides flexibility in terms of time, location, program, and instructor, but the instructor's demonstration, physical training, and bodily sensory training required in practical education are not as effective as those delivered offline. Therefore, the ratio between the development of online education programs for online arts practical education and education programs that require offline experience, interaction, and training should be properly organized.

4.2. N-gram analysis of online arts education
N-gram analysis refers to the frequency of two words occurring consecutively through text mining, i.e., a high

frequency in word 1 and word 2 means that the two words occur side by side. When analyzing the N-grams for online arts education, the following words were found: 'art-education', 'online-occurrence', 'world-culture-week', 'online-festival', 'Seoul Arts Roundtable', 'lifelong-education-online', etc. This was analyzed by analyzing the frequency of two words appearing consecutively in the process of perceiving online arts education, and it was analyzed that the places and programs where online arts education takes place, such as lifelong education, arts education, world culture and arts education, and schools, are highly connected in the perception of online arts education. The results of the N-gram analysis of online arts education are as follows [Table 2].

Table 2: Top 50 N-gram Analysis of Online Art Education

Rank	Word1	Word2	Frequency
1	Art	Education	1010
2	Online	Held	909
3	World Culture and Arts Education	Weekly	883
4	Weekly	Online	763
5	Seoul Arts Education	Roundtables	392
6	Online	Festivals	390
7	Social	Above	370
8	Apply	Online	331
9	Online	Contact	324
10	Related activities	Apply	324
11	Help	It will be	324
12	Homepage	Related activities	324
13	Currently	Homepage	324
14	Contact	If you receive	317
15	If you receive	Help	316
16	Support	Possible	311
17	Online	Art	308
18	Cover page	Table of Contents	305
19	Culture	Art	303
20	Latest	Broadcast Equipment	303
21	Possible	Currently	303
22	Labs	School	302
23	School of Broadcasting	Latest	302
24	Broadcast Equipment	Labs	302
25	Incheon School Arts Education	Online	294
26	Purpose	Research	286
27	Online	Workshops	283
28	Continuing Education	Online	281
29	School	non	279
30	Art	Empathy	274
31	Arts & Education	Roles	271
32	Digit	Arrange	269
33	Domestic and international	Arts and Education	268
34	Discussion	Digit	268
35	each other	Wisdom	268
36	Expert	each other	268
37	Experience	Social	268
38	Wisdom	Experience	268
39	Arts and Education	Expert	268
40	Features	etc.	268
41	Roles	Features	268
42	Per resignation	Artists	264
43	Where	Description	250
44	Description	School of Broadcasting	239
45	Introduction	Research	220
46	Research	Backgrounds	218
47	Above	Online	207
48	Campaigns	Art On Classroom	207

| 49 | non | Support | 207 |
| 50 | Art On Classroom | Implementation | 204 |

The implications for [Table 2] are as follows. Based on the co-occurring keywords in the N-gram analysis, it is concluded that there is a relationship between art and education, online and event, world culture and week, online festival, Seoul Arts and Round Table, etc. First of all, online art education is not limited in terms of space and the programs are flexible. On the other hand, offline education has space constraints and limited programs. On the surface, online education seems to have many strengths, but in reality, most online arts education cannot be said to have the effect of education and training by watching videos. When learning the educational content of world cultural arts online, learners can receive conceptual education without having to physically go there. However, although this has the advantage of being able to receive cultural education content that overcomes regional limitations, it is difficult to expect tangible educational results through education, training, and practice. For example, some people have recently learned to play various musical instruments through YouTube and are very good at it. However, playing an instrument well does not mean that you can express all musical elements. Therefore, even if there is flexibility in the spatial limitations of online education, it is difficult to secure educational effectiveness/efficiency without offline education.

The differentiation of online learning contents is as follows. First, lectures included in the subscription service increase the user's learning effectiveness by providing learning methods and weaknesses suitable for existing learners and increase advertising effects and sales through contents and subscription services used by learners. Second, based on the learner's data generated in the subscription service, service providers that recommend the most appropriate content for learners provide differentiation between subscription services and learning mentoring services. Third, experts in mathematics and coding education present customized learning methods through learner analysis, and through this, learners provide mentoring services that identify their own problems and perform optimized learning. Fourth, by periodically providing an analysis report on learning outcomes to the relevant learner in the learning management mentoring system and presenting step-by-step learning contents, it is provided as a service that allows learners to participate with fun and interest by conducting continuous math and coding learning on their own. The platform screen design is designed in [Figure 2] so that it can proceed after undergoing skill tests such as differentiation, integration, trigonometric functions, polynomials, factorizations, rational expressions, equations, and limitations of functions in figure 2.

4.3. *Online Arts Education TF-IDF Analysis*
TF (term frequency) is the number of times a particular word appears in a single document, or co-occurrence frequency, and DF (document frequency) is the number of documents in which a particular word appears. In addition, IDF (inverse document frequency) is the reciprocal of DF, which takes the inverse of DF between these documents, indicating that IDF decreases as DF increases. In this study, the TF-IDF of online arts education was analyzed, and the top terms were education, art, research, student, school, cultural education, video, world cultural arts education, and Seoul arts education. The table analyzing the TH-IDFs of online art education is as follows [Table 3].

Table 3: TF-IDF Analysis of Key Words Related to Online Art Education

Rank	keyword	TF-IDF
1	Art	3668.05
2	Research	3135.076
3	Education	2878.881
4	Held	2345.108
5	Arts & Education	2117.383
6	Weekly	2048.258
7	World Culture and Arts Education	2037.247
8	Video	1948.523
9	School	1869.383
10	Seoul Arts Education	1844.441
11	Support	1696.279
12	Culture	1635.84
13	Festivals	1529.007
14	Continuing Education	1495.734
15	Sharing	1463.729
16	Programs	1460.992
17	Art Sites	1408.539
18	Table of Contents	1350.452
19	Shooting	1348.144

20	Featured	1335.91
21	Who	1334.976
22	Progression	1313.529
23	Purpose	1310.347
24	Arts Education	1301.601
25	School Arts Education	1292.625
26	Online	1290.686
27	Social	1288.835
28	Student	1283.824
29	Available	1257.506
30	Roundtables	1253.906
31	Tabling	1191.753
32	Workshop	1185.109
33	Operations	1169.55
34	Experts	1164.914
35	Regional	1136.421
36	Arrangements	1126.785
37	Incheon School Arts Education	1118.976
38	Youth	1092.843
39	Empathy	1091.333
40	Result Sharing Meeting	1091.148
41	Various	1083.594
42	Apply	1064.995
43	Resignation Party	1056.404
44	Lectures	1029.855
45	Homepage	1026.366
46	How To	1017.546
47	Implementation	1016.955
48	Contact	1000.361
49	Engage	987.9584
50	Corona	981.7236

Here are some takeaways from Table 3 Among the keywords that appear frequently in specific documents, the most frequent keywords are art, research, education, organizing, and cultural arts education. The high frequency of the above keywords in key documents related to online arts education suggests that online arts education is about research, efficiency of education, organizing cultural events that can be implemented in the field, and diversifying the content of global cultural arts education.

4.4. *Online Arts Education Matrix Centrality Analysis*

In order to analyze the micro-level network properties of online arts education, centrality analysis was conducted on the top 30 keywords, and the results of the connection centrality analysis showed that the keywords with the highest interaction between keywords were 'online' and 'education', followed by research, arts education, school, video, world cultural arts, culture, and program. Proximal centrality keywords with very short connections to other keywords are 'education', 'program', 'cultural education', 'world cultural education', and 'culture'. In particular, cultural education, support, culture, program, target, share, and Seoul Arts Education were analyzed as having higher proximal centrality than other words. Mediational centrality keywords with high connections to other words are 'education', 'online', 'art', 'student', 'research', 'program', and 'event'. In addition, the keywords that show the strongest connections to words with high centrality include "education," "research," "institute," "art," and "school.

The connection centrality of online arts education analyzed in this study quantifies the words that are directly connected to the main keywords of online arts education. Therefore, the connection centrality analysis of online education shows the following keywords: education, online, student, creative, operation, progress, program, art, and culture.

Table 4: Analysis of the centrality of connections for key words related to online art education

Word	Connection-centricity	Proximity centrality	Mediocentricity	Dominance
Online	138.928	0.655	0.023	0.482
Art	77.951	0.597	0.012	0.424

Education	56.29	0.618	0.013	0.319
Research	24.699	0.511	0.004	0.051
Arts Education	31.284	0.562	0.008	0.112
Events	40.531	0.52	0.004	0.233
Schools	33.109	0.571	0.007	0.125
Video	27.685	0.554	0.005	0.08
Weekly	20.9	0.46	0.002	0.094
Support	24.418	0.572	0.006	0.104
World Culture and Arts Education	20.593	0.434	0.001	0.093
Culture	20.675	0.544	0.005	0.093
Programs	15.252	0.578	0.007	0.064
Table of Contents	11.28	0.462	0.005	0.021
Who	18.082	0.551	0.007	0.107
Social	18.56	0.498	0.003	0.087
Progress	14.007	0.577	0.006	0.067
Sharing	20.449	0.486	0.002	0.146
Seoul Arts Education	18.992	0.416	0	0.174
Title page	8.879	0.452	0.003	0.017
Possible	11.734	0.55	0.004	0.031
Purpose	10.34	0.498	0.004	0.021
Arts Education	9	0.554	0.006	0.045
professional	13.807	0.484	0.002	0.092
Arrangements	15.042	0.478	0.002	0.068
Operations	9.387	0.556	0.007	0.032
Featured	14.407	0.499	0.002	0.042
Student	12.634	0.544	0.004	0.046
Various	14.081	0.558	0.006	0.069
Shooting	13.009	0.488	0.001	0.03

The implications for Table 4 are as follows The reason for analyzing the matrix centrality of online arts education is to show which keywords are central to its association. The analysis shows that the keywords education, research, academy, art, school, online, research, program, and event are central to online arts education. In other words, it refers to the efficiency of online education and the expansion of the target audience, i.e., schools and academies. In addition, it can be said that it plays a mediating role in promoting the efficiency of online education research as well as research results. Therefore, it can be said to provide diversity and flexibility of educational programs due to online art education.

4.5. *Online Arts Education Matrix Analysis and Charts*
In this study, we conducted a matrix analysis of 'online art education'. Matrix analysis provides information that analyzes the association between keywords based on matrix data created by the frequency of co-occurrence between refined words. In this study, we analyzed the perception of online arts education based on the co-occurrence of words related to online arts education and analyzed the correlation between the main keywords. The correlation analysis showed that education, art, research, culture and arts, held, school, video, program, etc. were significantly related. The matrix keyword correlations of online art education analyzed in this study are as follows [Table 5].

In the interpretation of the correlation analysis, the expression range is -1~0, 0~+1, and 0~0.2 is a very weak relationship, 0.2~0.4 is a weak relationship, and 0.4~0.7 is a relatively strong relationship. A correlation of 0.7 to 0.9 is considered strong, and a correlation of 0.9 to 1 is considered very strong. In this study, the highest correlation is between online and art, and the lowest correlation is between research and cultural education, which is 0.022. Furthermore, arts and education is the only correlation above 0.5. The next highest correlation is between online and arts at 0.478.

Table 5: Correlation between online art education matrix keywords

	Online	Art	Training	Research	Arts and Education	Held	School	Video
Online	0							
Art	0.478	0						
raining	0.100	0.618	0					
Research	0.213	0.128	0.085	0				
Arts and Education	0.095	0.168	0.147	0.022	0			
Held	0.347	0.368	0.371	0.123	0.221	0		
School	0.262	0.118	0.097	0.071	0.121	0.188	0	
Video	0.035	0.009	0.038	0.102	0.165	0.146	0.350	0

The implications of Table 5 are as follows. Online, arts, and education are highly correlated, indicating that arts education is a unique option/alternative in a contactless environment. However, judging by the degree of relevance of the correlation, it is more relevant than other keywords, but it is not highly relevant at 0.478. This suggests that there is room for offline selection due to the wide range of choices/alternatives once you leave the non-face-to-face environment. The network connectivity of key words related to online art education in this study is shown in Figure 2. The implications of this are, first, that various keywords are connected to online art education, indicating that various environments should be prepared. On the other hand, it can be seen that online art education is an important means to solve various needs.
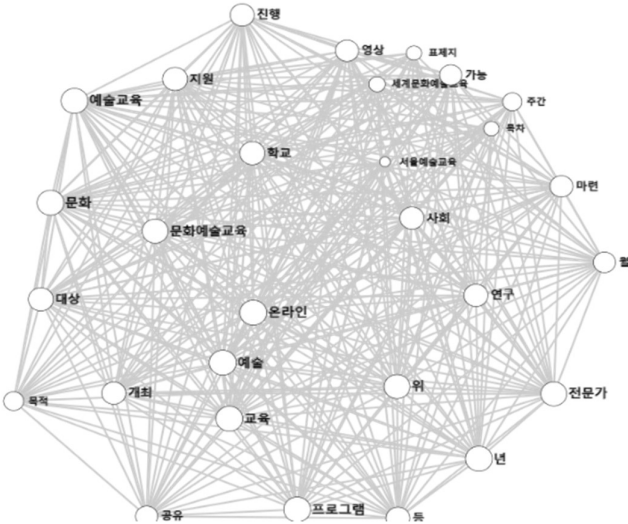

Figure 2. Matrix chart of key words related to online arts education

In this study, we conducted a discourse analysis of online art education. Discourse analysis is an analysis that shows the relationship between words that appear simultaneously (co-occurrence) in a document, and it is a method of clustering according to the pattern of relationships between words using correlation. The results of the discourse analysis of online education in this study were environment, promotion, experience, lecture, spread, culture sharing, instructor, utilization, and society.

Through discourse analysis, the factors necessary for online art education were derived. This means that it is important to ensure the continuity of use and spread through publicity to improve the efficiency of online education. Also, it is very important to secure experienced course content and instructors.

4.6. *Word Sentiment Analysis for Online Arts Education*

The sentiment analysis conducted in this study is categorized as positive/neutral/negative for the keywords of online art education. The results of this study compared positive and negative responses to online art education, with positive responses comprising 74.23% of the total percentage and negative responses comprising 25.77% of the total percentage, and detailed sentiment analysis showed that positive responses of liking, interest, and joy and negative responses of rejection, sadness, and fear were high.

The implications of [Table 6] can be summarized as follows. In reality, online art education is a non-face-to-face environment, so it is not something that can be chosen according to the emotions of the participants. However, if the emotional state of online art education is not identified, it is a lost opportunity to improve educational efficiency. In this study, 72.23% of the respondents answered that they had a positive attitude toward online art education. In particular, the positive detailed emotions of liking, joy, and interest were high, while the negative emotions of rejection and sadness were also high.

If respondents answered with positive emotions, they would be positive about online arts education. However, if the respondents answered positive emotions, online arts education will be negatively affected by rejection, sadness, and fear. However, in order to increase the efficiency/effectiveness of online art education, it is not possible to consider all the emotional states of the participants. However, it is possible to build additional programs and operating methods for online art education by referring to the emotional state of the participants. For example, in order to increase the efficiency/effectiveness of learning, it is necessary to develop strategies to highlight interesting factors that can overcome the emotions of the participants or offset negative emotions. Specifically, you can develop educational content that is emotionally engaging so that people feel favorably toward the content.

Table 6: Online art education keyword sentiment analysis

Separation	Frequency	Emotional Strength Ratio(%)	Frequency ratio (%)
Positive	2926/3942	74.78/100.0	74.23/100.0
Negative	1016/3942	25.22/100.0	25.77/100.0
Sensitivity to detail	Granularity frequency		Detail Sensitivity (%)
Crush	1954		50.92
joy	318		8.17
Interest	654		15.69
Sadness	294		9.35
Rejection	563		12.68
Fear	86		1.71
Anger	49		0.93
Pain	12		0.16
Surprise	12		0.39
TOTAL	3942		100%

5. CONCLUSION

In order to suggest a new direction for contactless art education in the COVID-19 pandemic, this study examined social perceptions of online art education through big data and analyzed matrix and sentiment to gain implications for online art education. To this end, we collected and refined online data on 'online art education', 'art education', and 'art culture research'. After that, text mining, matrix analysis, discourse analysis, and sentiment analysis were conducted, and the results of the study were data visualized. As stated in the introduction, the purpose of this study is to suggest the future direction of online arts and culture education by analyzing the perceptions of not only art majors but also general people who are interested in arts and culture in order to conduct online arts and culture practical education.

First, we analyzed the data collected online to understand the social perception of 'online arts education', and the results are as follows. The high-frequency words were online, art, education, research, culture and arts, school, video, world cultural arts education, program, target, society, etc. and the co-occurrence frequency analysis showed that 'art-education', 'online-occurrence', 'world-culture-week', 'online-festival', 'Seoul Arts Roundtable', and 'continuing education-online' were the most frequent words in the documents. The text mining results show that online art education is perceived by the general public on SNS and portal sites as mainly about art education classes at places such as art education schools through education, and Seoul Arts Education School for sharing art and culture. In addition, online art education is perceived as a process of sharing programs, videos, and YouTube, and learning about art and culture, and that such education leads to sharing professionals, cultural arts, etc. Based on the above results, we suggest the following directions for online arts education. Online arts education is being used in a variety of ways, especially in world culture, organizing, festivals, and continuing education. This means that there is potential to expand the range of online arts education in the future. In addition, respondents are very positive about online arts education. However, the reality is that the limitations of online art education are still unavoidable. In terms of teaching effectiveness, there is a clear difference between

practical art education and general online education. Online arts practical education should be organized in consideration of the limitations of online education in terms of teaching efficiency in arts practical education, such as demonstration training by instructors, training that requires interaction between instructors and students, physical training (acrobatics), physical sensory training (smell, taste, touch), demonstration training (performers' collaboration, martial arts dance, etc.), and arts practical education that requires more than two people.

Second, a matrix analysis of the keyword "online arts education" revealed the following words that are highly related to the keyword. Online, art, education, research, culture and arts, school, video, world cultural arts education, program, target, society, etc. These words were found to be positively correlated. This suggests that online arts education is generally perceived as a space for academies and schools, and online arts education is perceived as education, art, program, and convergence. Therefore, in order to receive online art education, it is perceived as going to the institution to receive professional education, and it can be seen that art education through online is necessary for this kind of art education to be popularized. However, we shouldn't overlook the blind spots in terms of popularizing online art education. For example, the YouTube channel is a representative product that has contributed to the popularization of online arts education. Even if a person is trained to play a musical instrument through YouTube and is technically good at playing, he or she is not trained in the philosophical, interpretive, and semantic communication of music. In the online space, education and training is mostly focused on how to play an instrument well and popularized by creating content based on technique alone. While the popularization of online arts education is a very necessary factor, it is necessary to first acquire the philosophical, interpretive, and semantic transmission of music in conjunction with offline education. This is because if the concept of practicing art is simply playing, it is not called art, but learning technique.

Third, we analyzed not only the surface perception of 'online art education' but also the internal perception, or sentiment, and found that positive responses were higher than negative responses. This means that they have positive expectations and feelings about online art education, especially good, recommended, special, best, fun, and growth, while negative responses include difficult, complicated, esoteric, and hard. These results show that online education is perceived as a way for students to learn various arts-related programs through schools and professional arts education institutions, so there is a need to build a system that allows students to learn arts-related education online as well as in physical spaces. It is also necessary to amplify and spread positive feelings about online arts education. However, the logic of spreading it simply because people's perception of it is positive needs a lot of work. This is because there is a pandemic-like situation where people may avoid online arts education if they perceive it negatively. With so many people lost due to the pandemic, online art education, or online education in general, was initially very difficult, overwhelming, and unsure of where to start. It was only when I got used to online education over time that I felt positive emotions. It is important to consider the emotional state and perception of users, but to improve the efficiency/effectiveness of online art education, it should not be dependent on the emotional state of users. Therefore, it is necessary to continuously mature the content of online art education programs so that emotional transference can occur in a favorable state where positive/negative emotions can be focused.

In summary, this study suggests the following directions for online art education: First, it is essential to combine online and offline education. Second, the online space should not be utilized by focusing on problem-solving or techniques. It is necessary to provide offline education that can convey the philosophical, interpretive, and semantic meaning of art.

Third, in order to improve the efficiency/effectiveness of online art education, not the spread/expansion of online art education according to users' emotions, emotional transfer that can focus users' emotions on education should be included in the education program.

Overall, respondents perceive the use of online arts education to be diverse, positive, and easy to popularize. However, it is difficult to expect the continuity of online art education and the results of education based on these variable factors. In order to secure the solid performance of online art education, it is a good medium that overcomes the limitations of time, distance, and space, but it should not exclude the face-to-face educational interaction with people that cannot be had online. In conclusion, online art education alone is not enough, so it is necessary to consider parallel elements of offline education and efficient allocation of time, space, and physical infrastructure.

By examining the direction of online art education and the direction of art education perceived by the general public through previous research, this study will serve as a basis for suggesting a future-oriented art education that is desirable, sustainable, and can satisfy the needs of consumers.

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