

Media Article Text Analysis in the Context of Distance Education: Focusing on South Korea

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Abstract – The impact of COVID-19 pandemic is far-reaching, encompassing the social, economic, and psychological aspects of the society. . In order to prevent the spread of COVID-19, various countries, including South Korea, have entered into long-term home care and distance learning systems. However, distance learning experiments conducted in many countries have raised whether face-to-face education can be replaced by distance learning. Therefore, this study analyzed public opinion, social perception, and field trends based on media reports on remote learning. For this purpose, 2,600 articles from 11 newspapers and four broadcasters related to remote learning were collected in this study. Based on this data, keyword trend analysis, topic modeling analysis, semantic network analysis, and emotion analysis were performed. This study provides valuable insights into the impacts and perceptions of remote learning during the COVID-19 pandemic. It highlights the complexities of remote education, from influencing educational policies to affecting students' and parents' emotional states. The findings underscore the potential of remote learning in driving educational innovation while also pointing out its role in widening educational disparities. This research offers essential perspectives for shaping future educational strategies in crisis situations, emphasizing a balanced approach to harness the benefits of remote learning while mitigating its challenges.

Keywords – Distance learning, topic modeling analysis, semantic network analysis, sentiment analysis.

1. Introduction

On March 11, 2020, the World Health Organization (WHO) declared the situation caused by COVID-19 as a pandemic. Countries worldwide responded to the spread of infectious diseases by implementing facility control, city closures, and social distancing. Many changes have occurred in people's daily lives as a result of this response. The reach of pandemics extends to education, adding to its widespread social, economic, and psychological disruptions [1]. In South Korea, to prevent the spread of COVID-19, various countries have declared the shutdown of educational institutions.

As the situation showed signs of prolongation, it entered into long-term home care and distance learning system from mid-March. Such measures in South Korea are similar to major overseas countries closing schools or implementing remote learning [2]. More than 1.7 billion students in 199 countries, representing approximately 98.5% of the world's student population, are experiencing changes in their learning environment and educational interactions [3]. Through remote learning, the transition from the existing face-to-face classes to non-face-to-face classes was made. For remote learning, public teachers and schools, and the private sector are providing educational content online [4]. However, remote learning experiments conducted in many countries raised whether face-to-face education can be replaced with remote learning. Moreover, educational deficits and widening educational gaps were commonly pointed out [5].

During this time of spreading the infectious disease, the amount of news coverage in the media increases significantly. The media plays the role of warning of infectious disease risks, agenda-setting agents, spreading risk awareness, and delivering public opinions [6]. Therefore, this study intends to analyze public opinion, social perception, and field trends about remote learning in COVID-19 based on media reports.

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Specifically, we analyze the remote learning of the COVID-19 situation presented in the press using trend analysis, topic modeling, semantic network, and emotion analysis techniques.

During the pandemic, education around the world has been replaced by online education. On the one hand, online education provides students with an opportunity to learn, and on the other hand, various issues are emerging according to the new education methodology [7]. Educators have been proactive and supportive of changes in instructional delivery. It is therefore clear and generally accepted that this crisis has stimulated innovation within the education sector [8]. The COVID-19 pandemic is posing major challenges to the education system, and to strengthen distance learning capacity, schools and universities must utilize asynchronous learning, which works best in digital formats [9]. When normal classes resume following the COVID-19 pandemic, teachers and learners should continue to be encouraged to use these online tools to enhance teaching and learning [10]. Therefore, in this study, the emphasis is on analyzes of distance education in a pandemic situation through media articles and discuss the implications for the future.

2. Remote Education Policies and Implementation Methods in South Korea During the COVID-19 Pandemic

2.1. Remote Learning During COVID-19 in South Korea

The new school year in March 2020 has been postponed due to the COVID-19 infectious disease that began to spread in earnest in February 2020. Since then, due to the spread of infectious diseases, the Ministry of Education has closed schools four times. After that, on April 9, 2020, starting with the third year of high school and the third year of middle school, online school started sequentially by school level and grade.

In countries worldwide, online classes were conducted using distance learning methods using various learning platforms in elementary, middle, and high schools [11]. A similar method was conducted in South Korea. However, due to the problem of care caused by remote learning, educational deficits, and the widening educational gap, the Ministry of Education set standards for school attendance and remote learning by the social distancing phase about the academic operation in the second semester of 2020.

In the first stage of social distancing, 2/3 density within the school was maintained; in the second stage, 1/3 density, and in the third stage, the standards for distance learning or closure were set.

After that, in the first semester of the 2021 school year, students in the first, second, and third grades of elementary school were allowed to go to school every day when social distancing was level 2 or lower. In the second semester of the 2021 school year, a plan was established to expand students' school attendance in line with the revised 4 step reform plan for social distancing.

2.2. Remote Learning Method in South Korea

Boram Lee and Kangyi Lee [12] classified remote learning into five types. He categorized the various types of remote learning as follows: real-time connection classes, interactive classes where teachers and students engage with each other, lecture classes directly recorded by teachers, recorded classes provided by the Educational Broadcasting System (EBS), classes for submitting assignments online, and classes for viewing specific content provided by teachers. Elementary and lower grades showed the highest level of participation in EBS content utilization classes. Elementary and high school students showed high participation experience in task performance type and video material used classes. The task performance type, EBS content utilization class, and video material utilization class were in that order in middle school students. High school students showed a high participation experience in EBS content utilization class, teacher's recorded lecture class, and real-time interactive class. The study considered that relatively diverse types of distance learning were conducted in middle and high schools where the students were of high age.

3. Methodology for Text Analysis of Korean Media Reports in the COVID-19 Context

3.1. Used Data

The media analyzed in this study are South Korean media registered with the South Korea Press Foundation as of July 1, 2021. In order to minimize the influence of specific political inclinations of media companies on the analysis results, a total of 14 media, including ten central print media and four central broadcasting media, were selected.

Central Print Media is one of the top 11 media certified by the ABC Association of South Korea. Specifically, the Chosun Ilbo, Donga Ilbo, JoongAng Ilbo, Hankook Ilbo, Hankyoreh, Munhwa Ilbo, Kyunghyang Shinmun, Seoul Shinmun, Segye Ilbo, Kookmin Ilbo, and Naeil Shinmun. The central broadcasting media are the three domestic terrestrial broadcasters, KBS, MBC, SBS, and Yonhap News (YTN).

The analysis data was collected using BigKinds, a news extensive data analysis system operated by the South Korea Press Foundation. The analysis period is from December 31, 2019, when the first case of COVID-19 in Wuhan, China, was reported in South Korea to July 15, 2021. The search terms included distance education and distance learning. Since this study aims to analyze articles on remote learning in education, only articles containing elementary and high school keywords were analyzed.

3.2. Data Analysis Method

The analysis methods applied for this study are topic modeling, semantic network analysis technique, and emotion analysis. Topic modeling is a method of deriving potential topics that influence the appearance of words in individual texts [13]. In other words, it is a technique for classifying topics that can best show a specific set of texts and performs the task of classifying each text into topic categories that represent it. This is suitable for deriving and analyzing the frame of multi-layered and complex COVID-19 related news reports. The most representative algorithm for topic modeling is Latent Dirichlet Allocation (LDA). LDA analysis is a consolation algorithm to discover latent topics in a broad and atypical document set and is a technique for clustering similar documents based on the probability of co-occurrence in large documents [14].

Semantic network analysis is a text-based extensive data analysis method that extends the network analysis unit to the relationship between individual words and the overall structure as social network analysis techniques [15]. Centrality analysis in semantic network analysis is a technique to determine how important each keyword is in the overall network. In this study, the degree centrality index was used for centrality analysis, which measures how connected the core keywords constituting the network are with other keywords [16]. Therefore, semantic network analysis can be an appropriate analysis technique to analyze the whole logical structure of the specific issue of 'remote learning' in terms of what words interacted with and developed the signification process in the unspoken news article.

The study of sentiment analysis is based on the operation according to the frequency of lexicons classified as positive, negative, or neutral [17]. An emotion dictionary is used for emotion analysis. The emotion dictionary consists of words expressing emotions and numbers expressing the intensity of emotions. Using the emotion dictionary to give emotion scores to words in a sentence and then sum them up can figure out what emotion the sentence expresses.

In English, multi-perspective question answering is used as representative data for emotion analysis [18]. This corpus annotated the emotional expressions in about 1,000 sentences using an annotation language to express the meaning well. In this study, emotion analysis was performed using the KNU South Korean Sentiment Dictionary made by Kunsan University [19]. The emotion dictionary is composed of 14,843 emotional vocabularies that are not affected by a specific domain. For this reason, it can be used as primary data to efficiently and quickly build a sentiment dictionary for a specific domain. Therefore, in this study, it was used to analyze the emotions of media articles related to 'distance learning'.

4. Keyword Trends, Topic Modeling, Semantic Network, and Sentiment Analysis of Korean Media Reports During COVID-19

4.1. Keyword Trend Analysis

A total of 2,600 news articles extracted through the Big Kinds analysis service using the keyword for remote learning were searched for. The following Figure 1 is a monthly report trend graph of news articles related to 'remote learning' extracted through Big Kinds.

Most articles were published in May (357 articles) and April (294 articles) in 2020. Grades 4 to 6 of elementary school started online from April 16, 2020, and grades 1 to 3 of elementary school started online from April 20, 2020. Accordingly, April and May of 2020 were a period of increasing national interest in remote learning, and it can be seen that various articles were written about the method, effectiveness, and concerns of the class.

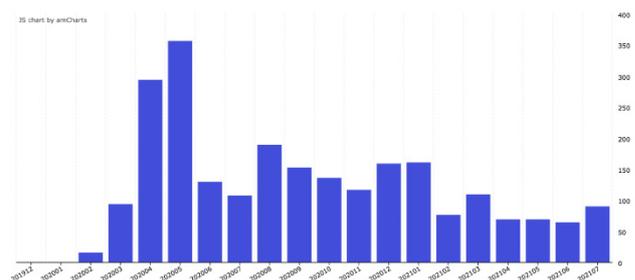


Figure 1. Monthly coverage trend of news articles related to remote learning

4.2. Topic Modeling Analysis

Figure 2 shows the results of topic modeling. To determine the number of topics, topic modeling was performed while changing the number of topics from 2 to 20. As a result, when six topics were extracted, the overlap of crucial keywords was minimized, and interpretation was easily classified by category.

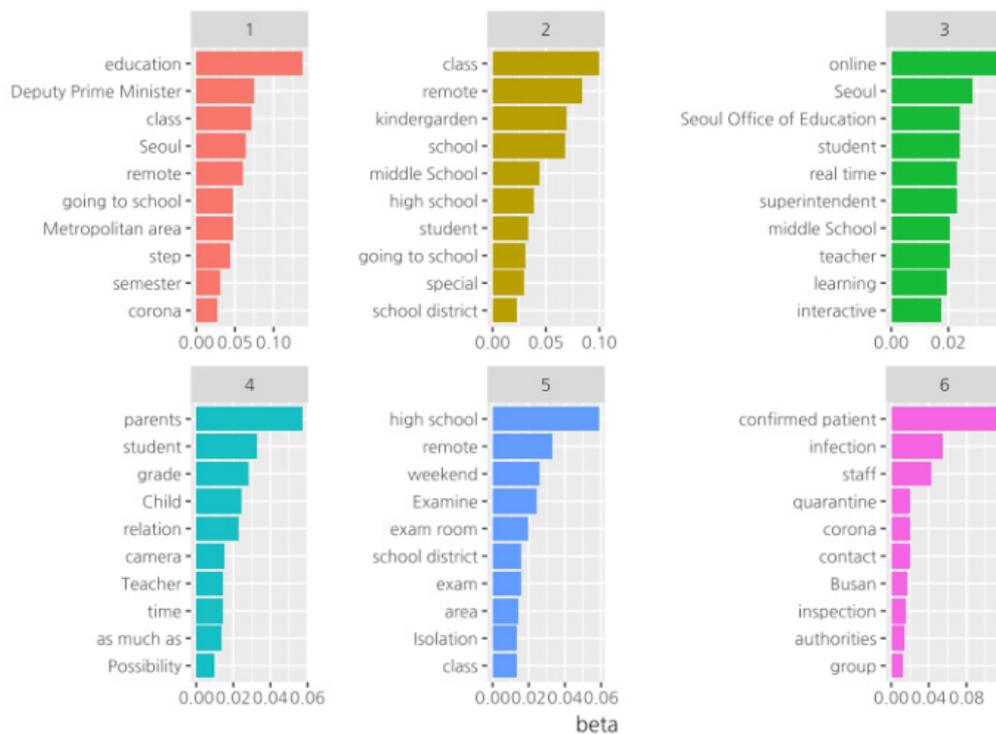


Figure 2. Results of topic modeling analysis toward news articles related to remote learning - display by each topic

The main keywords of the first topic were presented as education, deputy prime minister, class, school attendance, step, and semester. This topic can be viewed as a topic about changes in the school's remote learning guidelines according to the social distancing stage in the Ministry of Education. The main keywords of the second topic are class, distance, kindergarden, middle school, high school, etc. This can be seen as a topic about the overall trend of remote learning in elementary and secondary education. The main keywords of the third topic are online, Seoul, real-time, and interactive.

This can be seen as a topic related to real-time interactive classes in terms of remote learning methods. The main keywords of the fourth topic are parent, student, child, relationship, and teacher, which can be viewed as topics related to the relationship between parents and students in remote learning. The main keywords of the fifth topic are high school, test-takers, exam room, exam, isolation, etc. It can be seen as a topic related to testing in remote learning. The main keywords of the last topic can be viewed as topics related to the current status of the COVID-19 that causes remote learning, such as confirmed cases, infection, quarantine, and contact.

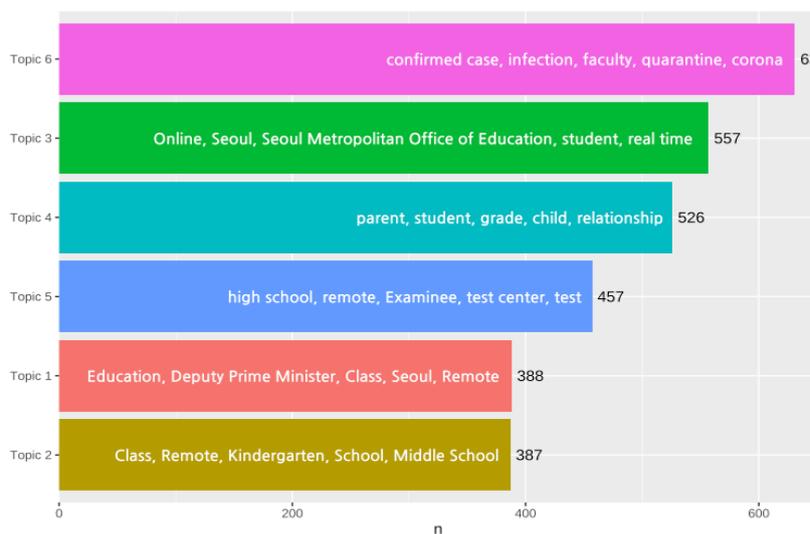


Figure 3. Results of topic modeling analysis toward news articles related to remote learning - top frequency by topic

Figure 3 shows the frequency of articles on each topic. The topic with the most frequency is the topic related to the current status of the COVID-19. The following are topics related to testing in remote learning, and the following topics are related to the relationship between parents and students. The following are topics related to testing in remote learning, and the following are topics related to changes in remote learning guidelines. The topic that showed the minor frequency could be seen as a topic in remote learning methods.

4.3. Semantic Network Analysis

In semantic network analysis, the degree centrality indicator shows how closely a key keyword is connected with other keywords. Figure 4 is a network graph for data related to remote learning.

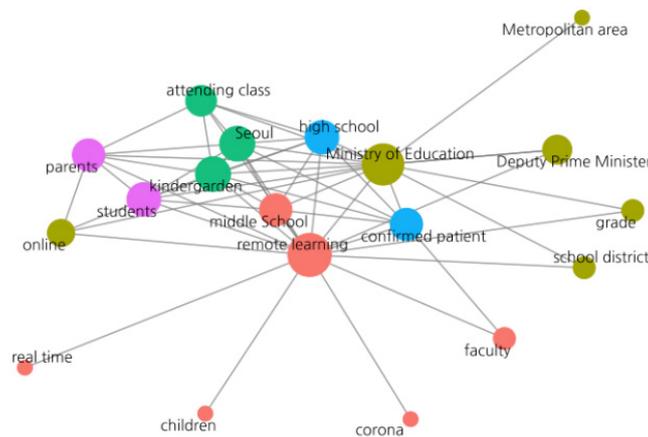


Figure 4. Network of semantic network analysis toward news articles related to remote learning

The size of each keyword (node) was adjusted using the connection centrality index. From the graph, it can be seen that keywords such as large distance classes, the Ministry of Education, and attending classes are relatively essential. Also, each node is made up of a different color indicating a community, a group of nodes that are frequently connected with a high degree of relationship between words. It can be seen that distance learning has a high correlation with online, the deputy prime

minister, the education office, and real-time. Also, it can be seen that there is a high correlation between parents and school attendance.

Figure 5 shows the results of correlation analysis between words using the phi coefficient. The pi coefficient is used to look at words frequently used with specific words but are not used with other words, that is, words with relatively high relevance [20].

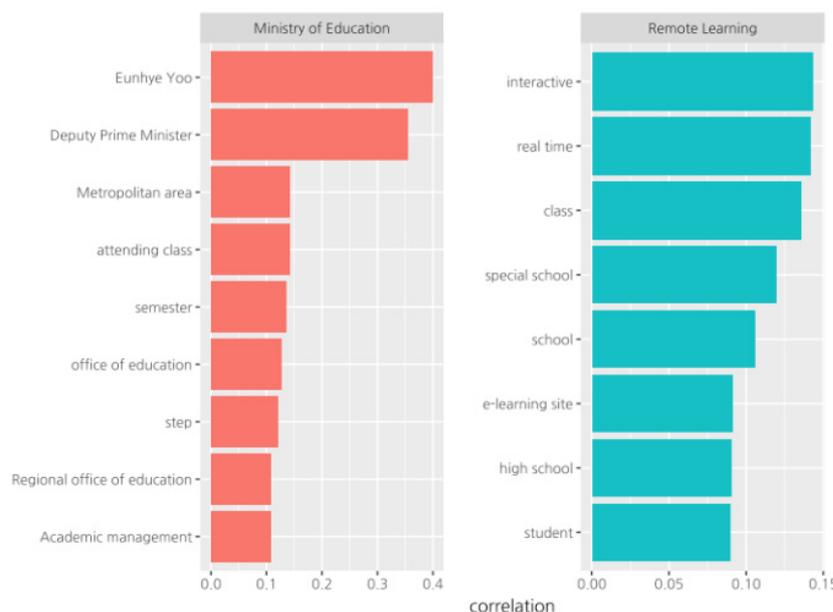


Figure 5. Results of word-to-word correlation analysis using the phi coefficient

First, keywords highly related to remote learning were presented as interactive, real-time, class, particular school, school, and learning place in that order. Immediately after remote learning was introduced, content-oriented classes were mainly conducted due to the lack of response in the field and the lack of remote learning devices. However, it was suggested that content classes alone could not replace face-to-face classes. Accordingly, a real-time interactive class was suggested as an alternative, and the relevance in the article was also suggested as high. In addition, in South Korea, a remote learning platform that can be used in public education has been developed. The name of this platform is e-learning, and it was developed so that content classes and real-time interactive classes can take place in elementary, middle, and high schools across the country. Through semantic network analysis, it can be confirmed that the remote learning keyword has a high correlation with the keyword in the aspect of the teaching method. Next, the keywords with the most significant relevance to the Ministry of Education were EunHye Yoo, Deputy Prime Minister, metropolitan area, school attendance, stage, and academic operation. The Ministry of Education in South Korea is the department that determines the principles of academic operation related to school attendance in elementary and secondary schools.

It was suggested that the relevance was high because Deputy Prime Minister EunHye Yoo, who served as the Minister of Education during the COVID-19 period, mainly announced the phases of school attendance.

4.4. Sentiment Analysis

The results of sentiment analysis on the data are shown in Figure 6. The graph shows the frequency of positive and negative words presented in each article. The frequency of negative emotion words was presented in the order of anxiety, side effects, disease, disaster, and anxiety, and the frequency of positive emotion words was presented in the order of safety, high rank, love, satisfaction, and innovation. Through this, it can be confirmed that in articles related to remote learning, the words about anxiety and the side effects of remote learning conducted nationwide are used relatively often. As more and more students do not go to school due to the COVID-19 virus, there is a problem that students with difficult family backgrounds are left alone. Also, since digital devices are used for a long time for non-learning purposes, these behaviors put students at significant risk of developing physical health problems.

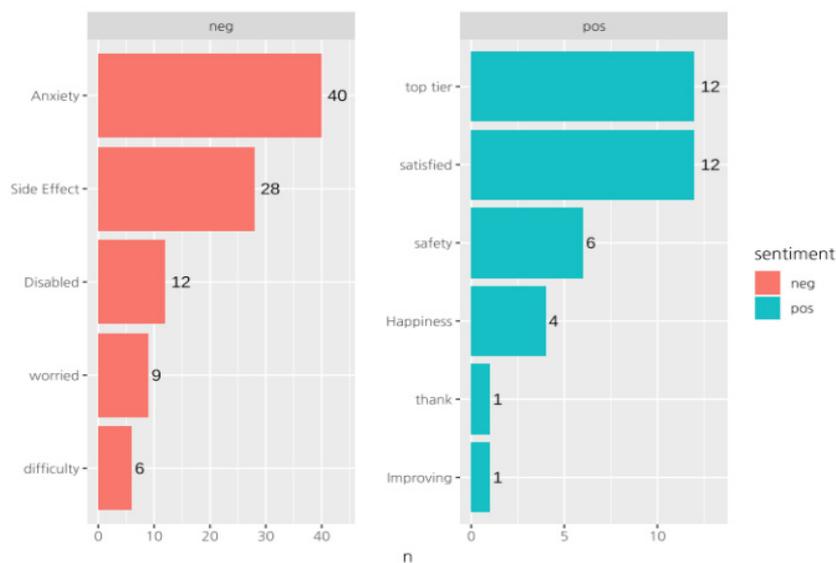


Figure 6. Results of sentiment analysis toward news articles related to remote learning

Next, we can confirm that the safety and innovation of the word are used because remote learning can prevent mass infection in schools. In addition, the high-ranking keywords among positive words can be seen as close to negative words that can be examined in connection with the widening of the educational gap in remote learning and the development of educational inequality structure.

The polarization of education has emerged as students' learning methods have changed from face-to-face to online classes after the COVID-19 virus. In the context of challenging family backgrounds, students who engage in online classes and assignments independently often exhibit a tendency to inadequately prepare for school assignments and examinations at home, resulting in a limited comprehension of the class content.

5. Discussion

Previously, infectious diseases were blocked by delaying the start of school, but since April 20, 2020, online remote learning has been implemented. It can be seen that the national interest has increased. In research, a topic modeling analysis on articles related to remote learning was conducted, which allowed classification of them into six distinct topics. The first is a topic about changes in the school's remote learning guidelines according to the social distancing steps in the Ministry of Education. The second is a topic about the overall trend of remote learning in elementary and secondary education. Third, the main keyword is a topic in terms of remote learning methods, and the fourth is a topic related to the relationship between parents and students in remote learning. The fifth is a topic related to testing in remote learning, and the last is a topic related to the current status of the COVID-19 virus that causes remote learning. Also, through semantic network analysis, it was confirmed that it has a high correlation with online, deputy prime minister, education office, and real-time education. As a result of the semantic network analysis, remote learning had a high correlation with real-time interactive classes and e-learning, a public education remote learning platform in South Korea. Next, the Ministry of Education had a high correlation with keywords such as academic schedules for each stage of social distancing. This was the last time remote learning examined adverse reactions to social anxiety and the side effects of remote learning through Sentiment analysis. Moreover, we were able to see the positive response of safety because it can prevent the COVID-19 virus infection of students by conducting remote learning. Moreover, in terms of remote learning, we can see a positive reaction to innovation due to the emergence of various platforms. However, it was also possible to examine negative reactions to widening the educational gap through the keyword of high rank.

6. Conclusion

After the outbreak of the COVID-19 situation, the polarization of education appeared as students' learning methods changed to remote learning methods. Therefore, this study analyzed public opinion, social perception, and field trends based on media reports on remote learning. For this purpose, a total of 14 media, including ten central print media and four central broadcasting media, were selected. Articles were collected using the keyword remote learning. In order to carry out this study, keyword trend analysis, topic modeling analysis, semantic network analysis, and emotion analysis were performed.

Expressly, the correlation between the frequency of remote learning-related articles and the online opening was confirmed through keyword trend analysis. Most articles related to remote learning were published in April and May 2020.

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