

# A Study on Exploring Direction for Future Education for the Common Good Based on Big Data

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## 빅데이터 기반 공동선 증진을 위한 미래교육 방향성 탐색 연구

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**Abstract** The purpose of this study is to provide basic data onto preparing soft landing plan of future education policy by exploring direction of future education for the common good using big data and keyword network analysis. Based on the big data provided by Textom, data was collected under the keyword 'future education + common Good' and then keyword network analysis was performed. As a result of the research, it was found that 'common good', 'social', 'KAIST future warning', 'measures', 'research', 'future education', 'politics' were common keywords in the social awareness of future education for the common good. The results of this study suggest that the social awareness of future education for the common good is related to factors related to human, physical environment, social response, academic interest, education policy, education plan, and related variables, It was closely related. Based on these results, we suggested implications for the support for the preparation of a soft landing plan of future education for the common good.

**Key Words** : Big Data, Keyword Network Analysis, Common Good, Future Education, Learning Community

**요약** 본 연구는 빅데이터와 키워드 네트워크 분석을 통해 공동선 증진을 위한 미래교육 방향을 탐색함으로써 미래교육의 방향성 제안에 대한 기초자료를 제공하는 것을 목적으로 한다. Textom에서 제공하는 빅데이터를 기반으로 '미래교육 + 공동선'이라는 키워드로 데이터를 수집한 후 키워드 네트워크 분석을 수행했다. 연구결과 '공익', '사회', 'KAIST 미래경고', '대책', '연구', '미래교육', '정치' 등이 공동선을 위한 미래교육의 사회적 인식에서 공통 키워드인 것으로 나타났다. 이번 연구결과는 공동선 증진을 위한 미래교육에 대한 사회적 인식이 인간, 물리적 환경, 사회적 대응, 학문적 관심, 교육정책, 교육계획 및 관련 변수와 밀접한 관련이 있음을 시사한다. 이와 같은 결과를 바탕으로 공동선 증진을 위한 미래교육의 방향성 제안을 위한 기초자료 마련에 의미 있는 시사점을 제시하였다.

**주제어** : 빅데이터, 키워드 네트워크 분석, 공동선, 미래교육, 배움공동체

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## 1. Introduction

For a happy society centered on infants, good quality childcare and childcare policies should be developed, along with administrative and financial support. In the world, policy changes centering on early childhood education and childcare are actively being carried out, and the size and subject of the business is also gradually expanding and diversifying. As the awareness of the importance of infant / toddlerhood increases, support for infant and toddlerhood will be the most definitive preparation for the future that can be shown in the current society with low birth and aging issues.

There is a growing awareness of the importance of early childhood education and childcare, and due to the increase in female employment, there is a growing demand for quality early childhood education and care for each home. In addition, due to the high interest in early childhood education and childcare in OECD countries, interest in early childhood education and childcare policies is gradually increasing in Korea. At present, the direction of early childhood education and childcare policy in Korea is getting better by establishing the public system such as the quality management and financial support of the state. It aims to establish a new form of early childhood education and childcare system by including education and childcare of elementary school preschool infants in principle in public education and public education system.

Integration early childhood education and childcare has become one of the long-standing controversies in the field of early childhood education in Korea due to the fact that the two fields have different backgrounds in law, institution, purpose, and function. Recent social changes have increased the participation in women in society and government measures to

solve low birth problems have become active. As the functions of kindergartens and childcare are increasingly becoming similar, and the boundaries become blurred, the necessity of reservation integration is emphasized[1]. So far, the concept and role of early childhood education and childcare, free education of young children and infants, extension of kindergarten full day operation, expectations for interdisciplinary education of early childhood education, transition of kindergarten to early childhood, . However, since 2012, free education for young children has started. After the plan to support childcare allowance by local educational financial grant has been established, discussions about integration of early childhood education and childcare are proceeding rapidly.

Early childhood education and childcare means that the services are divided into two groups in terms of service function, teacher qualification and training course, facility standard, etc., according to the Early Childhood Education Act and Infant Childcare Act[2]. Currently, the educational system for infants and toddlers in Korea is divided into administrative departments, institutions, service targets, teacher standards and names, and related matters. This has expanded financial support for childcare, but inefficiency among ministries has been a problem[3].

Recently, integration early childhood education and childcare, which has recently emerged as a hot issue in early childhood education and childcare, has received great social attention. This is a major policy of the government and it is already being actively discussed by the topic of regional education for early childhood education and childcare groups. This has attracted a great deal of attention not only to early childhood education and care workers but also to parents with infants and

toddlers. In 2002, 10 ministries formed a T / F team to discuss integration early childhood education and childcare, but in 2013, the 3-5 year-old Nuri curriculum. Although some aspects are integrated, the problem of inefficiency of the administrative and financial system that is systematically dualized has come to the surface. Efforts to integrate early childhood education and childcare, which have so far maintained a dual system, have been going on for more than 10 years in academia and research. In recent years, however, the government has been attempting integration. The government established the Infant and Toddler Education Integration Team on February 14, 2014, and will integrate the government's diverse management departments for three years from 2014 to 2016, and integrate the financial integration of early childhood education and childcare. And plans to finalize the integration of reserves.

However, there was a difficulty in improving the quality of services due to the pursuit of profit for the early childhood education and childcare services led by the private market. In other words, as the choice of parents is emphasized rather than the equality of starting points, it becomes an obstacle to the integration of reservations[4]. In addition, the results of previous researches on the study of future education for the common good also showed that most of the previous researches were limited to the recognition of the sample group based on the survey. Therefore, it is necessary to grasp trends of previous research through network analysis[7,8].

It is important to see the social perception of future education for the common good, which is the basic stage of 21c education, in keeping with the demands of the times that emphasize common good. These can be important determinants. In this study, we conducted a

frequency analysis and a keyword network analysis method focusing on the centrality to provide basic data onto policies related to future education for the common good by looking at the social perception of future education for the common good.

Especially, in this study, it is aimed to provide basic data onto preparing soft landing plan of future education policy by examining the social perception of future education for the common good through keyword network analysis[5,6]. The purpose of this study is to suggest the implications of future education for the common good. In order to achieve the purpose of this study, what is the social perception of future education for the common good examined through big data?

## 2. Materials and Methods

### 2.1 Research data

In this study, raw DATA was collected web DATA, which is provided with three domestic and foreign portal sites and SNS sites using Textom, a big data analysis solution of the IMC[9,10]. The collection period is from May 10, 2018 to May 10, 2021, and is the last three years in which meaningful discussions about future education for the common good have been most actively conducted in the field of education[11,12]. Raw DATA was collected as a core keyword of 'future education + common good'[13,14]. The collected data is 1,759 web pages of portal site, 599 blog, 833 news, 579 cafes, and 20 knowledge book, and 3,790 in total, which are large-scale data[15,16].

### 2.2 Analysis tools

This study used Textom, a big data analysis solution developed by 'The IMC', to collect and refine data on future education for the common

good. In addition, UCINET ver. 6.645 and NetDraw ver. 2.161 were used to analyze the network structure between the future education for common good related keywords[17].

### 2.3 Data refining

For the purposes of this study, data cleaning was performed to derive meaning from raw DATA, and text mining was performed on the first refinement[18]. In addition, Excel 2016 is used to remove keywords that are not relevant to core keywords, or that is inappropriate for analysis due to spacing. In the second refinement, synonyms or similar words were nominalized and used for analysis based on representative keywords[19].

### 2.4 Data analysis

In this study, data onto future education for the common good were collected using Textom are the 1st and 2nd refinements were conducted through text mining[19]. The frequency analysis was performed based on the refined data onto data cleaning, and the top 100 nodes were selected and a 100 × 100 1-mode matrix data set was created[17]. The network analysis was divided into a micro level and a macro level[20], and the procedure is as follows. First, node, density, average connection degree, average connection distance, number of components, diameter, and network centralization was analyzed to identify network attributes. Second, a single sample mean test using bootstrapping was conducted to test the statistical significance of the future education for the common good network[18]. Third, in order to understand the structural characteristics among the nodes in the network, we analyzed degree centrality, closeness centrality, nbetweenness centrality, and eigenvector centrality[11,19]. Fourth, ego network analysis was conducted to analyze the

network formed by core keyword, and NetDraw was used to visualize each network[20].

## 3. Results and Discussion

### 3.1 The frequency of keywords related to future education for the common good

As a result of the big data analysis on keywords related to the future education for the common good, a total of 13,129 keywords were extracted and the target nodes were selected based on the top 100 keywords. Table 1 shows the frequency analysis results of the top 30 keywords among the selected keywords. The word cloud of future education for the common good is shown in Fig. 1.



Fig. 1. The word cloud of future education for the common good (top 30 node)

Table 1. Frequency analysis result (top 30 node)

R	Keyword	N	R	Keyword	N
1	common good	902	16	educational institution	300
2	social	719	17	country	289
3	KAIST future warning	676	18	common wealth	283
4	measures	540	19	culture	253
5	research	457	20	general election	247
6	future education	372	21	democrats	237
7	politics	354	22	personality education	232
8	growth	342	23	human	230
9	future	339	24	Korea	224
10	candidate	338	25	person	220
11	need	315	26	share	217
12	election	311	27	transform	208
13	education	307	28	student	208
14	learning community	306	29	danger	207
15	era	306	30	member of congress	201



### 3.2.2 The statistical significance of the whole network on future education for the common good

As a result of testing the statistical significance of the network of future education for the common good, the average sampling distribution of the network data was 19.0315 and the standard error were 0.5550. As a result of calculating the Z-score, the probability that the network data onto future education for the common good are greater than the Z-score is 0.0002 at  $Z = 9.0857$ , and the relationship between the network data onto the significance level of 5%.

### 3.2.3 Micro-level network analysis of future education for the common good

In order to examine the micro-level network characteristics of future education for the common good, we conducted a centrality analysis of the top 20 keywords, and the results are shown in Table 2.

**Table 2. Centrality analysis result (top 20 node)**

R	Degree		Closeness	
1	KAIST future warning	11.470	common good	.934
2	common good	10.790	social	.929
3	social	8.079	future	.894
4	research	6.889	need	.889
5	measures	6.889	Korea	.884
6	future education	5.526	politics	.879
7	election	5.302	education	.879
8	educational institution	5.202	era	.864
9	learning community	5.175	value	.859
10	common wealth	5.044	problem	.854
R	nBetweenness		Eigenvector	
1	politics	2.889	KAIST future warning	.416
2	common good	2.506	common good	.350
3	social	1.985	social	.289
4	education	1.706	research	.258
5	measures	1.529	future education	.214
6	Korea	1.526	educational institution	.212
7	need	1.422	common wealth	.212
8	announcement	1.399	learning community	.206
9	person	1.365	growth	.157
10	future	1.361	need	.156

As shown in Table 2, the results of the centrality analysis of keyword network of future education for the common good were based on the top 20 keywords and the standardized values were used to take into account the influence of the network scale. The centrality analysis showed that the highest degree centrality was KAIST future warning (11.470), followed by common good (10.790), social (8.079), research (6.889), and measures (6.889). These keywords can be regarded as keywords with high connection strength within network of future education for the common good[19]. The centrality analysis showed that the highest closeness centrality was common good (.934), followed by social (.929), future (.894), need (.889), and Korea (.884). These keywords are located at the shortest distance from other keywords and can be regarded as keywords that are likely to be at the center of the network[20]. The centrality analysis showed that the highest betweenness centrality was politics (2.889), followed by common good (2.506), social (1.985), education (1.706), and measures (1.529). These keywords can be regarded as keywords that are likely to act as mediators among multiple keywords[21]. The centrality analysis showed that the highest eigenvector centrality was KAIST future warning (.416), followed by common good (.350), social (.289), research (.258), and future education (.214). These keywords can be regarded as keywords that are highly related to highly centralize keywords.

### 3.3 Analysis of ego network of future education for the common good

In order to analyze the relationship between the core keyword and the other keywords in the network, frequency analysis and centrality analysis were performed on the main keywords 'future education', 'common good'

First, as a result of analyzing the structural properties of the ego network for 'future education', the number of nodes was 54, the number of connection lines was 1862, and the density was .650. Also, as a result of analyzing the centrality based on 'future education', the degree centrality was 5.526, closeness centrality was .773, betweenness centrality was .511, and eigenvector centrality was .214. Research (383) was the highest keyword with the highest level of connection with 'future education', followed by KAIST future warning (377), common good (292), educational institution (285), and learning community (189). Second, as a result of analyzing the structural properties of the ego network for 'common good', the number of nodes was 860, the number of connection lines was 3,822, and the density was .582. As a result of analyzing the centrality based on 'common good', the degree centrality was 10.790, closeness centrality was .934, betweenness centrality was 2.506, and eigenvector centrality was .350. KAIST future warning (771) were the most frequently cited keywords with 'common good', followed by social (421), learning community (307), research (304), and educational institution (297). Third, as a result of analyzing the structural properties of the ego network for 'learning community', the number of nodes was 37, the number of connection lines was 952, and the density was .714. As a result of analyzing the centrality based on 'learning community', the degree centrality was 5.175, closeness centrality was .685, betweenness centrality was .170, and eigenvector centrality was .206. KAIST future warning (384), common good (307), research (285), educational institution (193), and scenario (191) were the most frequent keywords in terms of 'learning community' and connection strength.

#### 4. Conclusion

The purpose of this study is to provide basic data onto preparing soft landing plan of future education policy by exploring direction of future education for the common good using keyword network analysis. To do this, we collected raw DATA onto 'future education + common good' and conducted keyword network analysis focusing on frequency analysis, centrality analysis, and ego network analysis. The results of this study are as follows.

First, the frequencies of keywords related to future education for the common good were found to be in the order of common good, social, KAIST future warning, measures, research, future education, politics, growth, future, and candidate. In addition, keyword related to human environment (human, person, student, and member of congress), physical environment (background, Republic of Korea, global, war, and world), social response (social, growth, need, era, share, and danger), academic interest (KAIST future warning, research, future, and present), education policy (measures, politics, candidate, election, and general election), education plan (education, learning community, and transform), and related variables (common good, future education, future, common wealth, and personality education) appeared as important keywords.

Second, the results of the whole network analysis on future education for common good are summarized in three. First, analysis of structural attributes for the whole network analysis showed 100 nodes, density of .465, average connection degree was 46.020, average connection distance between 1.543, component number of 1, diameter of 3, networks centralization of 9.093% respectively. Next, in the statistical significance test of the whole

network of future education for the common good, the sampling distribution of the network data was 19.0315 and the standard error was 0.5550. In particular, the Z-score was calculated as  $Z = 9.0857$ , and the probability that the network data onto future education for the common good showed a larger absolute value than the Z-score was 0.0002. In addition, 'KAIST future warning', 'research', 'educational institution', 'learning community', and 'common wealth' among the keywords that appeared in future education for the common good are high in the centrality indicators such as degree centrality and eigenvector centrality, respectively. In addition, keywords such as 'future', 'Korea', 'politics', and 'education' are the main keywords with high closeness centrality and betweenness centrality, and 'measures' is the main keyword with high degree centrality and betweenness centrality. On the other hand, 'need' is the key keyword with high closeness centrality, betweenness centrality, and eigenvector centrality, and 'common good' and 'social' are the core keyword with high all centrality indicators. In other words, the core keywords of future education for the common good can be seen as 'common good', 'social', 'need', 'future education', 'learning community', and 'politics'. Based on these keywords, we can identify keywords with high connection strength to future education for the common good.

Third, the result of ego network analysis on future education for common good, the results of this study are as follows: First, 'KAIST future warning', 'research', and 'educational institution' are important keywords in all ego networks. As stated in the 2030 KAIST future warning published by the Future Strategy Research Center under the Graduate School of Future Strategy at KAIST, the prestigious research

institute for future studies in Korea, We must be able to contribute to shifting the paradigm so that we can think about values of all. In other words, in future education, it should be able to contribute to shifting the paradigm so that values of all, such as the common good and the common wealth, can be contemplated, not individual interests. In addition, we found that 'learning' and 'community' are closely linked to positive keywords such as 'growth', 'inclusion', 'share', 'hope', 'happiness', and 'positive' for 'learning community'. In other words, it means that in order to effectively carry out future education to promote the common good, education must be conducted through a learning community.

These results show that 'common good', 'future education', 'learning community', 'social', and 'politics' are the core keywords. Therefore, 'common good', 'future education', 'learning community', 'social', and 'politics' should be considered as key factors for soft landing of future education for the common good policy do.

Meanwhile, in the ego network analysis, 'future education' was not closely related to 'teacher'. In the words that the quality of education does not exceed the level of teachers, it means that 'teacher' was very important to traditional education, but its importance is low in future education. On the other hand, it was found that interest in the learning community increased significantly. Therefore, it is necessary to additionally look at the changes in the role of teachers in future education for the promotion of common good, and it is suggested to focusing on the learning community.

In this study, it is meaningful to grasp the core keywords related to future education for the common good by using keyword network analysis and to grasp specific tendency of future education for the common good based



on big data. In the Subsequent study, in addition to discussing the details of policies related to future education for the common good, we expect that discussions will take place at the level of social practice in the actual field. It is also proposed to develop a future education program based on a learning community to promote the common good. In particular, it is suggested that stakeholder groups such as Industry, University, Research and Government (IURG) participate actively in these discussions to provide a bottom-up policy rather than a top-down.

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