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Keyword Network Analysis on the Research Trends of Life-Long Education for People with Disabilities in Korea

Jakyoung Kim, Sungwook Jang

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***Abstract*—**The purpose of this study is to examine the research trends of life-long education for people with disabilities using a keyword network analysis. For this purpose, 151 papers were selected from 594 papers retrieved using keywords such as 'people with disabilities' and 'life-long education' in the Korean Education and Research Information Service. The Keyword network analysis was constructed by extracting and coding the keyword used in the title of the selected papers. The frequency of the extracted keywords, the centrality of degree, and betweenness was analyzed by the keyword network. The results of the keyword network analysis are as follows. First, the main keywords that appeared frequently in the study of life-long education for people with disabilities were 'people with disabilities', 'life-long education', 'developmental disabilities', 'current situations', 'development'. The research trends of life-long education for people with disabilities are focused on the current status of the life-long education and the program development. Second, the keyword network analysis and visualization showed that the keywords with high frequency of occurrences also generally have high degree centrality and betweenness centrality. In terms of the keyword network diagram, it was confirmed that research trends of life-long education for people with disabilities are centered on six prominent keywords. Based on these results, it was discussed that life-long education for people with disabilities in the future needs to expand the subjects and the supporting areas of the life-long education, and the research needs to be further expanded into more detailed and specific areas.

***Keywords*—**Life-long education, people with disabilities, research trends, keyword network analysis.

I. Introduction

THE rapidly changing modern knowledge information society requires individuals to continuously acquire new knowledge and skills. Existing school education alone is not enough to solve the needs for rapid change and new knowledge. Therefore, the importance of life-long education for new knowledge and ability development is increasing. This applies the same to people with disabilities as well as people without disabilities [2]. However, since special education, which is a representative education for the people with disabilities in Korea, focuses on school ages, there are many deficiencies in the educational support for the disabled people in post-secondary education [2], [3]. Since the 1990s, interest and research on the life-long education for people with disabilities has begun. In the 2000s, the study of the life-long education for people with disabilities has expanded, and it is gradually becoming an independent field of study [2], [8]. In addition, due to the amendment of the 'Life-long Education Act' in 2016, the life-long education for people with disabilities is facing a big turning point. Although it is partially revised in the 'Life-long Education Act', it is a major revision in terms of life-long education for people with disabilities, considering the content and scope of the law [2], [7]. However, the analyses of the research trends on life-long education for people with disabilities have been limitedly conducted both quantitatively and qualitatively [2], [3]. Therefore, it would be necessary to objectively analyze the trends in the life-long education for people with disabilities in order to find the direction of life-long education for people with disabilities to meet the demands of a rapidly changing society.

Jakyoung Kim is a Professor, and Sungwook Jang is a PhD candidate with the Department of Special Education, Pusan National University, Korea (e-mail: jakyoung@pusan.ac.kr, woogado@naver.com).

II. Method and Goals

Recently, researches using the keyword network analysis for objective analysis of the research trends are increasing in the field of social science and education [1], [4]-[6], [9], [13]. The keyword network analysis can complement the limitations of traditional research methods and increase the objectivity of research [4]. Keyword network analysis is also called semantic network analysis, and it also uses the term network text analysis. The keyword network analysis is an analytic technique that constructs a network of relationship among words appearing in text, finds meaning, comprehends the whole contents, and analyzes phenomena [10], [11]. This study analyzed the research trends of life-long education for the disabled using the following procedure, as shown in Fig. 1.

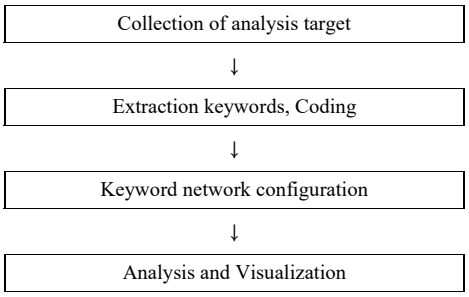


Fig. 1 Procedure of keyword network analysis

A. Collection of Analysis Target

In order to collect the research articles to be analyzed, related papers were collected using keywords such as 'people with disabilities', 'life-long education', 'life-long learning', etc. by

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using the academic paper search function of the Research Information Sharing Service (RISS) in Korea. First, a total of 594 papers were retrieved from the search, with duplicate articles and articles not related to the subject being excluded. Finally, 151 papers were selected for analysis.

B. Extraction Keywords, Coding

The software used for keyword extraction is KrKwic. The KrKwic program allows you to identify main keywords in various types of messages [12]. A total of 373 keywords were extracted from the title of the 151 selected papers and coded. The title of the papers shows the subject of the thesis most implicitly. A keyword frequency analysis was performed to calculate how many times each keyword was used in the papers using KrKwic. The keywords were arranged according to the occurrence frequency.

C. Keyword Network Configuration

A 1-mode matrix was constructed using the KrTitle program for keyword network configuration. For this purpose, top 20 words with more than five occurrences among 373 words were selected as the final analysis words. The 20 words were used to construct a 'wordxword' 1-mode co-occurrence matrix.

D. Analysis and Visualization

Using 'word x word' 1-mode co-occurrence matrix, we constructed a keyword network by using UCINET 6.0 program and expressed it as diagrams by using NetDraw program. Also, we analyzed the frequency of appearance, degree centrality, and betweenness centrality of keyword network.

In terms of this process, this study investigates what the main keywords are in the research of life-long education for people with disabilities and what the relationship is among the keywords. This study aims to understand the research trends of life-long education for the disabled and suggest directions for future research.

III. Results

The results of the keyword network analysis showed that the most frequently used keywords in the life-long education research for people with disabilities from 1998 to 2016 were 'people with disabilities', 'life-long education', 'developmental disabilities', 'current situations', 'development', etc. Table I shows the top 20 keywords commonly used more than five times and their frequency. Keywords that directly express the people with disabilities and life-long education were on top, and the keywords such as 'current situations', 'development', 'program', 'demand' and so on were frequently found among the top keywords. This shows that there is a lot of research on the current situations of the life-long education for people with disabilities, the demand for the provided programs, and new developments.

The results of degree centrality analysis are shown in Table II. Degree centrality is defined as the number of connection points that a main keyword makes with other words. It means the degree centrality appears in proportion to the number of connections. Degree centrality is an indicator of how central each keyword is in the network structure. The degree centrality is higher in order of 'people with disabilities', 'life-long education', and 'education', etc. In the case of 'education', the frequency of occurrence is not high, but the degree centrality is high. It means that 'education' is not frequent but is located at the center of the network.

TABLE I
FREQUENCY ANALYSIS OF KEYWORDS

Rank	Keyword	Frequency of keyword
1	People with disabilities	75
2	life-long education	65
3	developmental disabilities	42
4	current situations	26
5	development	22
6	program	21
7	demand	15
8	education	10
9	night school	10
10	recognition	10
11	task	9
12	parents	9
13	higher education	8
14	teacher	7
15	adult	7
16	operation	7
17	life-long education agency	7
18	life-long education system	6
19	school age	6
20	support	5

TABLE II
DEGREE CENTRALITY ANALYSIS OF KEYWORDS

	Keyword	Degree centrality
1	People with disabilities	19
2	life-long education	19
8	education	19
3	developmental disabilities	16
4	current situations	15
6	program	15
7	demand	15
10	recognition	13
14	teacher	13
16	operation	13
5	development	12
12	parents	12
13	higher education	12
15	adult	10
17	life-long education agency	10
20	support	10
19	school age	9
9	night school	8
11	task	8
18	life-long education system	4

The results of betweenness centrality analysis are shown in Table III. Betweenness centrality indicates how much a single keyword acts as a mediator or bridge in constructing other keywords and networks. If betweenness centrality of a keyword is high, it is located between the main keywords. And it can

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have a great influence on the flow of information in the network. The betweenness centrality is higher in order of 'people with disabilities', 'life-long education', and 'education', ‘developmental disabilities’, ‘development’, etc. In the case of 'education', the frequency of occurrence is not high, but the betweenness centrality is high. It means that 'education' has an important role in the flow of network information, though it is not frequent.

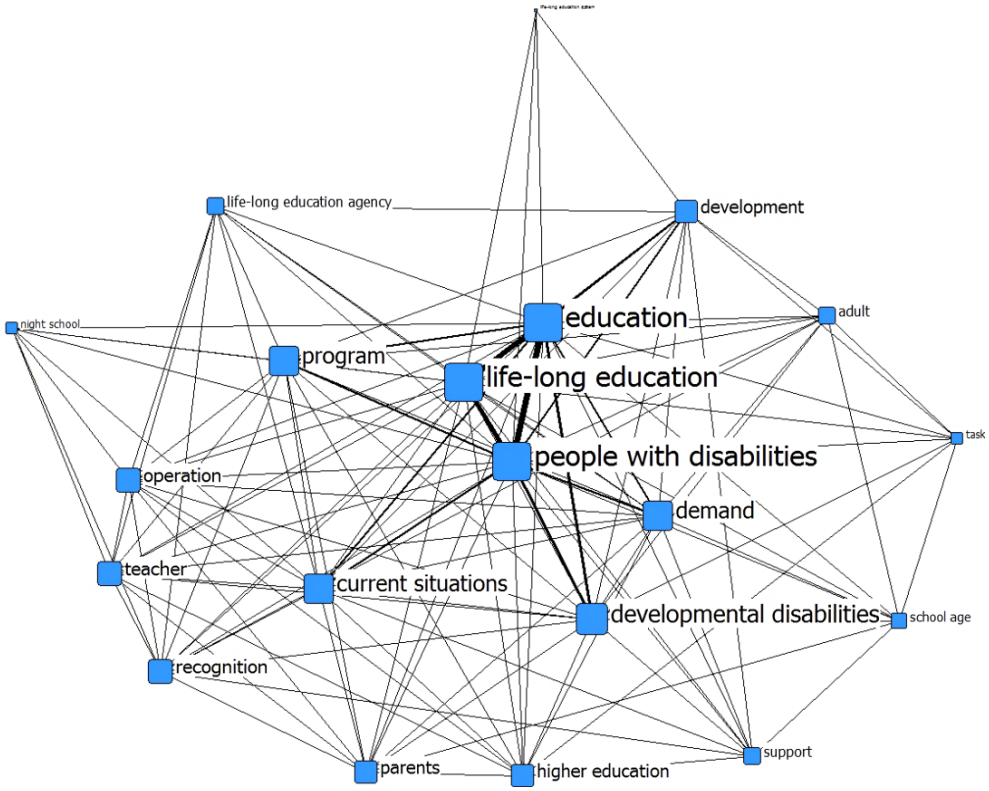


Fig. 2 Network diagram for degree centrality

TABLE III
BETWEENNESS CENTRALITY ANALYSIS OF KEYWORDS

	Keyword	Betweenness centrality
1	People with disabilities	11.81
2	life-long education	11.81
8	education	11.81
3	developmental disabilities	4.43
5	development	3.57
7	demand	3.52
6	program	3.02
4	current situations	2.81
10	recognition	2.41
13	higher education	1.62
14	teacher	1.18
16	operation	1.18
12	parents	1.07
15	adult	1.07
20	support	0.94
19	school age	0.80
11	task	0.50
17	life-long education agency	0.44
9	night school	0.00
18	life-long education system	0.00

Figs. 2 and 3 show the result of degree and betweenness centrality analysis using a network diagram, respectively. The network was constructed using the top 20 keywords, and 252 links among the keywords were generated. The maximum geodesic distance among the keywords was two, and the average geodesic distance was 1.25.

In Fig. 2, the keywords such as 'people with disabilities', 'life-long education', and 'education' can be found that are located in the center of the network. On the other hand, the keywords such as ‘life-long education system’, ‘tasks’, and ‘night school’ are located far away from center of the network.

In Fig. 3, the size of each node represents betweenness centrality. The keywords such as 'people with disabilities', 'life-long education', and 'education' located at the center of the network, and also have an important role in the flow of information in the network through the size of the node. On the other hand, the keywords such as ‘life-long education system’, ‘night school’, and ‘life-long education agency’ are located far away from center of the network, and also have not an important role in the flow of information.

Figs. 2 and 3 show keywords such as 'people with disabilities', 'life-long education', and 'education' were high of both centrality. The keywords such as 'teacher' and 'support' appear less frequently but relatively high centrally. On the other hand, the keywords such as 'current situation', 'night school', and 'task’ have high frequency of occurrence and degree

centrality, but relatively low betweenness centrality. Although these keywords are widely used in research, it is shown that the mediating role between keywords is relatively low.

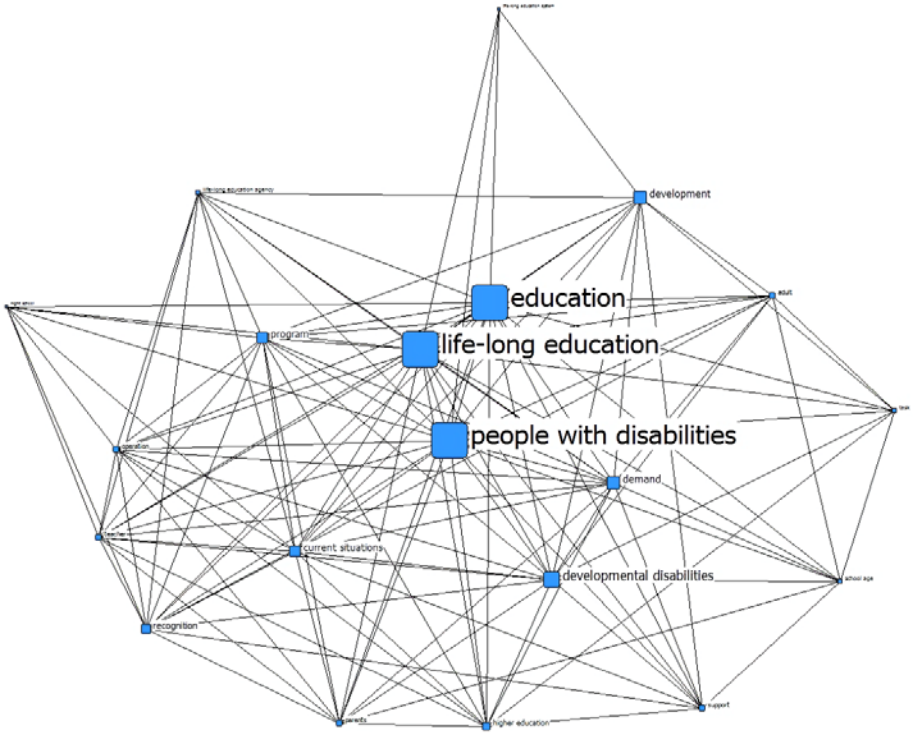


Fig. 3 Network diagram for betweenness centrality

IV. Discussion

In this study, the keywords such as 'people with disabilities', 'life-long education', 'developmental disabilities', 'current situations', 'development' appeared most frequently in the life-long education studies. And they were located at the center of the connection. The subjects and topics of the studies are not divided into detailed and specific categories, and they remain at the universal and general level. Also, we can confirm that many studies analyze the current situations of the life-long education. Future research needs to be extended to detailed and specific fields such as education subject, support field, related experts, and life-long education agency.

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