

## Research Trend Analysis of German Education in Korean Journals

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### < ABSTRACT >

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German education has many implications for Korean education, if not for its experience in achieving unification of education systems since the reunification of Germany, then because of its pedigree in the Korean literature of comparative education. Bearing this in mind, this research aims to systematically capture the research trend within Korean literature about German education. For the analysis, a total of 293 research papers including ‘Germany’ and ‘education’ as key words published within the last decade have been gathered from the Korean Research Information Sharing Service (RISS), upon which process 1,465 key words have been selected for network text analysis. As a result of the analysis, some interesting research trends and implications have been captured. The volume of research about German education, in comparison to the volume of research about Germany, has remained small yet consistent. The frequency of research on German primary and secondary education was significantly lower than higher, adult, and life-long education. Even, a higher frequency and clustering of research topics regarding ‘intercultural education’, ‘multicultural education’ and ‘social integration’ were identified, showing a disposition to focus on education as an agenda for social integration. Other significant findings are provided on the part of conclusion and discussion.

**Key Words** : German education, network text, research trend analysis, Korean journals

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## 국내 학술지에 나타난 독일 교육 관련 연구 동향 분석

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### < 요약 >

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독일 교육은 통일 이후 교육체제 통일을 이룬 선행 사례로 뿐 아니라 한국 비교교육의 계보라는 점에서 한국 교육에 시사하는 바가 크다. 이를 염두에 두고 본 연구는 독일 교육에 관한 한국 연구들의 연구 동향을 체계적으로 살펴보고자 하였다. 이를 위해 RISS(한국연구정보서비스)에서 ‘독일’과 ‘교육’의 키워드로 도출된 최근 10년간의 KCI 등재 및 등재후보 학술논문 총 293편의 1,465개(293편\*5개) 주제어를 네트워크 텍스트 방법으로 분석하였다. 그로부터 도출된 주요 결과는 다음과 같다. ‘독일’에 대한 연구의 양에 비해 ‘독일 교육’에 대한 연구의 수는 적지만 지속적이다. 또한 독일 초중등교육에 대한 연구 빈도가 고등교육, 성인교육, 평생교육에 비해 현저히 낮았다. 특별히 ‘상호문화교육’, ‘다문화교육’, ‘사회통합’과 관련한 연구 주제가 더 높은 빈도와 이들 간의 군집성 또한 발견돼 사회통합의 의제로서 교육에 집중하는 경향을 보였다. 그 외 중요한 발견 및 시사점은 결론 및 논의 파트에서 구체적으로 제시되었다.

**주요어** : 독일교육, 네트워크텍스트, 연구동향분석, 국내학술저널

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## I . Introduction

Ever since its reunification in 1990, Germany has continued to receive attention and serve as a critical empirical reference to Korean researches in discussing and preparing for Korea's reunification. It is therefore only natural that pundits of Korean education, including those of the field of reunification education, continue to study various aspects of German education, specifically Germany's post-reunification education process and changes in the education system (S. M. Kim, 2018). Unrelated to the issue of reunification, Germany's education system – along with those of U.S, U.K, China, and Japan – still holds quite a pedigree within the Korean education literature as a popular reference for comparative researches and case studies about education systems, policies, and education reform (Kim, 2019). Korean academics continue to study Germany as a model case wherein Germany's insufficiency in natural resources meant that development had to be sought through education to foster creative and moral human resources (Jeong, 2022, May 27).

While Korean scholars of post-independence are actively performing research trend analyses in various disciplines since 2000 in an effort to systematize research outputs and synthesize discourses of the Korean academia(Seo, 2008; Shin et al., 2009), inquiries into education systems of other countries have been scarce (Park, 2015; Song, 2014). Comprehensive and meticulous research trend analysis can be invaluable insofar as it provides critical indicators for future research (Kim & Hwang, 2020) through which topical variables may be deduced and explored to expand the scope of research for relevant academic disciplines and fields (Kubra & Lee, 2020). It is therefore argued here that analyzing with rigor the way in which German education is discussed in Korean journals can contribute to establishing a guiding framework for understanding the patterns of how academic discourse and external referencing are formulated particular to the theories, practice, and reality of German education. This importance is highlighted by the fact that so far Korean journals about German education have predominantly been characterized by a narrow focus on particular phenomena or theory of education in Germany. That is to say that while robust, the literature are fragmented in the sense that it is nearly impossible to discern the extant and potential trends — connections between topics and epistemological characteristics — of research about German education in Korea, which signifies a lack of

systematic review of the trends of research journals. Therefore, establishing and analyzing a framework to understand how academic discourse about German education in Korea have changed and shifted will provide academics an opportunity to systematically view these trends.

Korean research about German education can be broadly categorized into four types based on research foci. The first type is to study German curriculum and education system as case studies in order to derive implications to Korean education. Second, there have been comparative research about German and Korean textbooks and pedagogy. The third type of research mainly concern of changes in German education since its reunification, and the fourth type of research mostly consists of German language education in Korea. Notwithstanding some notable research trend analyses on German education by Korean scholars such as ‘International comparative analysis of educational philosophies-USA, UK, Korea, Germany (2005-2009)’ (Woo, 2011), ‘A Study on Reform Trends of Teacher Education in Germany – Focused on the Enlargement of School Practice in Two Federal States, Nordrhein-Westfallen and Niedersachsen’ (Kim, 2015), literature analysis of German reunification education and the process of education integration (Kim, 2016a; 2016b), and ‘Achievements, limits and tasks of studies on German unification education conducted in South Korea’ (S. M. Kim, 2018), the volume of such literature is significantly smaller than that of all research about German education. Such a gap in research trend literature about German education will, hereafter, have to be bridged by envisioning what should be inquired with more focus based on a comprehensive and rigorous overview of what the Korean education academe have researched as late as 2019 about German education.

Therefore, in an attempt to present a reading of the literature concerning what aspects of German education should be researched with more focus, this study has analyzed the research topics pertaining to German education from the last decade (2009-2019). Here, the definition of German education subject to research is not limited to the level of a specific subject, area, or target of German education, but refers to the German education of domestic KCI registration and registration candidate sites, including the German education system, education system, curriculum, specific subject education, specific target education, teachers and students.

1. What are the core keywords presented in Korean research about German education, and how frequently have those keywords been used?

2. What are the levels of network centrality of the core keywords?
3. What clusters of core keywords can be formed by Korean research about German education?
4. What are the implications to future research about German education in Korea?

## II. Theoretical Background

### 1. Literature about German education

Albeit in small numbers, the subject of German education was introduced to Korean education literature the early 1960s mostly as degree theses. Search for literature about German education using RISS's keyword search function (keywords used were "Germany" and "education") yielded 1,243 articles, which makes up the fourth largest literature about a foreign country's education research in Korean education literature (see <Table 1>).

<Table 1> Number of academic texts of foreign countries in Korean education literature

Country	Academic Journal Article	thesis/ dissertation	Books	Reports	Total	%
Japan	3142	1191	2092	271	6,696	31.38
China	2499	2630	1136	176	6,441	30.18
U.S.	2225	412	477	171	3,285	15.39
Germany	1268	185	274	199	1,926	9.03
France	785	177	184	132	1,278	5.99
Russia	250	95	66	30	441	2.07
Canada	173	14	55	25	267	1.25
Finland	103	35	79	23	240	1.12
India	110	23	61	5	199	.93
Sweden	93	11	33	22	159	.75
Australia	122	13	3	2	140	.66
New Zealand	66	7	51	15	139	.65
Israel	54	36	31	8	129	.60
Total	10,839	4,829	4,542	1,079	21,340	100
%	50.79	22.63	21.28	5.06	100	

<Table 1> lists the number of academic texts about education of 38 OECD countries and 5 BIRCS countries that are either published or made public within the Korean literature of education (only countries with more than 100 texts in total have been included in the table). As the table shows, the preponderance of the literature about the top 5 countries overshadows the number of all texts about all other countries combined (Russia, Canada, Finland, India, Sweden, Australia, New Zealand, and Israel) which only makes up for 10% of the total volume of literature.

The abject scarcity of efforts to review and synthesize the research trend of German education in Korean academia therefore undergirds the importance of this study.

Despite the low number, literature about German education published throughout the last decade can be thematically and typologically categorized into the following. The first type of literature focuses on deriving implications for Korean education based on inquiries about the curriculum and education system of Germany based on a comparative lens. Ju (2019)'s ethnographical case study of inter-generational teaching and learning practices and educational culture in Germany provides positive pointers on how to operationalize lifelong learning in Korea to achieve a lifelong learning society. Kim(2019), based on his theorization of how a countries' development of education systems and pedagogies are embedded in their respective historical and cultural contexts, examines how differences in education are manifested in educationally advanced countries. His research highlights the German culture of education that places students' experience and fostering of social cohesion in the context of Germany' s social context and education system. This distinct culture of German education, in Kim' s research, is analysed through case studies of German practices to resolve issues of students' sense of solidarity to derive implications for promoting and enhancing students' sense of solidarity in Korea.

In other aspects, an abundance of comparative literature about German and Korean forms and systems of education proposed positive pointers on the way ahead for Korean education. In Lee (2013)'s comparative analysis of the Korean after-school institution and Germany' s Ganztagschule — an all-day schooling system — Lee highlights that seamless coordination between Ganztagschule and the community' s various youth support institutions and infrastructure was vital to the success of Ganztagschule, alluding to the need for institutional linkage among Korean schools and its fragmented youth support institutions. Lee' s comparative analysis also implies the need for the Korean

government's financial support to Korean after-school programs which are currently paid by parents, whereas Ganztagschule are provided free in Germany. Other research include comparative studies on German and Korean education systems and educational facilities; comparative analysis of German and Korean perceptions of higher education institutions (Preut, 2019); and comparative analysis of higher education quality assurance systems of UK, Australia, and Germany (Lee & Rhee, 2019).

The second type of literature are those that examine the characteristics of specific education subjects, as it were. Lee (2019), based on the fact that Germany has a strong academic basis on geography education, conducted an analysis of recent trends in Germany's geography education to deduce implications for Korean elementary sociology. Lee argues that an analysis of German geography education provides meaningful pedagogical pointers to plan Korea's integrated curriculum design. Other subject-oriented research include analysis of German Interkulturelle Erziehung (inter-cultural education) – which focuses on changing epistemologies based on a historical lens – in light of today's broader shift from nation state to migration society (Na, 2011); Ju's analysis of Germany's music curriculum examined the characteristics and design process of Germany's capacity-oriented music curriculum and derived its implications to Korean music education (Ju, 2019). Other research include examinations of law education as part of Germany's social studies curriculum (Bae, 2019; Choi, 2018), and research about practical implications of German music education (Ham, 2019; Kim, 2017).

Third, an emerging type of research about German education has to do with the increasing approaches to Germany's post-reunification education reform and integration. This is because the analysis of changes in Germany's unification process and its subsequent curriculum provides a meaningful context for Korean education, which always considers and prepares for the possibility of reunification of the two Koreas. Various studies on German education related to unification have been continuously conducted in Korea, such as how education was integrated in the unification process of East and West Germany; how history and world history subjects were integrated; and what problems were posed for curriculum development before and after unification of Germany. In the context of unification education, Kim & Kim (2015) define the 5 years between 1989 – when the Berlin Wall was demolished – and 1994 as Germany's "period of transition", and analysed the characteristics and problems of East and West German curriculum integration within the

time frame. Through their analysis, Kim & Kim (2015) were able to draw implications for a plan to achieve curriculum integration during what may be a period of transition of Korea in the possible context of Korea's reunification. These academic endeavors are characterized by research about Germany's educational changes driven by socio-political changes such as comparative analyses of German physical education curricula before and after its reunification (Park et al., 2019). Through their analysis of German physical education based on Germany's political systems, Park et al. (2019) warn us of the dangers of a unilateral education integration, and point to the importance of preparing for the utilization of human infrastructure. Other such literature include diagnoses – and prognoses – of Germany's education integration process (Kim, 2011; Kim, 2013; Kim, 2016b); vocational educational support for social integration of multicultural adolescents in post-reunification Germany (Yu & Kim, 2019); and intercultural education research for cultural convergence in a unified Germany (Lee, 2019).

The fourth type of literature are characterized by their focus on German language education and relevant educational subjects. This body of literature mostly consists of analysing German as a foreign language in middle and high school curricula, where studies have been conducted on the German language itself and the German language pedagogies or teaching and learning methods as well as German language teacher training. These texts include: Analysing the difficulties in learning German based on an analysis of frequent errors made by German language learners (Lee, 2017). Kim attempted to use self-directed learning techniques based on problems in German grammar education for college students (M. Kim, 2018), and similarly, So's action research on flipped learning German grammar classes analysed its effectiveness and emphasized the importance of grammar in understanding Germany's language culture. Other similar types of research include research on teaching German using movies and digital media (Hwang, 2016; 2019), analytical research of objective statements for German language education based on Bloom's Taxonomy (Lee, 2016), and research related to German language word order education (Lee, 2017). Recent trends also highlight the importance of comprehensive language education whereby the functions and content of language education should be geared toward facilitating practical problem-solving, suggesting that German writing classes should be redesigned as such (Kim, 2019).

There are also some noteworthy research trend analyses of German education such as



the study of trends in German teacher training reforms (Kim, 2015); comparative analysis of educational philosophy among U.S, UK, Korea, and Germany (Woo, 2011); and ‘Achievements, limits and tasks of studies on German unification education conducted in South Korea’ by Kim (S. M. Kim, 2018). However, with most of such literature being predicated on specific topics or subjects, it is difficult to gain a comprehensive overview of research trends about German education as a whole; limiting the presentation of a meta-analysis of Korea’s academic discourse about German education, not to mention the correlation and clustering of keywords used in studies of German education.

## 2. Network Text Analysis

In network text analysis – not unlike grounded theory or content analysis – contents and keywords embedded in text are analyzed to derive the argumental discourse latent within the literature; the methodology is particularly useful in analyzing vast amounts of literature in a relatively short amount of time with precision, which will prove practically unfeasible otherwise (Park et al., 2017). Additionally, network text analysis can exclude bias in the analytical taxonomy that is shown in research trend analyses that use other methods (Kwak et al., 2014), while at the same time being useful for understanding contents by providing the network of individual concept groups and various means of visualization of such networks (Park & Chung, 2013).

Amidst the recently growing use of network text analysis there is the increasing usage of the method in research trend analyses. Kwon & Cheon (2013) utilized language network analysis for their research on smart education research trends, while Y. H. Kim (2018) took a network text analysis approach to the changes in research trends of Korean ICT education reform brought about by different administrations of Korea. In a similar vein, Son and colleagues (2016) examined and analyzed the changes in the research foci of articles published in 「Journal of Korean Association for Educational Information and Media」 by different administrations. Kim et al. (2015) also analyzed the keyword network of 173 research articles published on Journal of *Lifelong Learning Society*, while J. O. Hwang & Y. H. Kim (2020) also utilized the same method for examining Korean research trends of North Korean English education. In addition, Park (2019), through a network text analysis of student course reviews for a university software course, presented a way in which network

text analysis can be used to effectively analyze students' needs in class.

### III. Methodology

#### 1. Research Subject

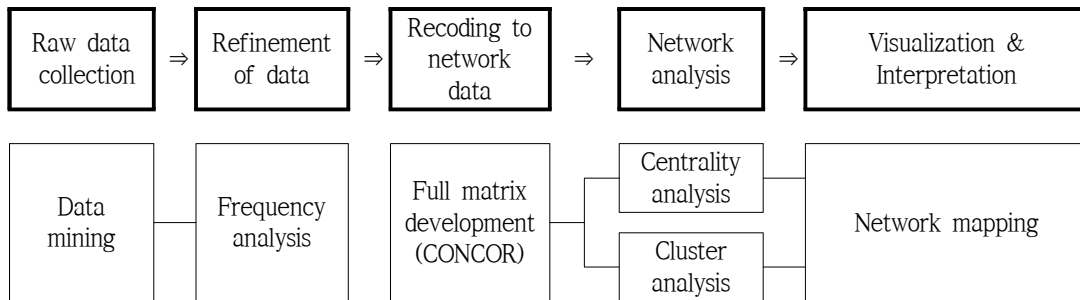
This research utilized the largest and most comprehensive Korean academic database, RISS, as the source of literature for analysis and went through a two-stage data gathering process. In the first stage, 316<sup>1)</sup> articles were gathered through a keyword search of 'Germany' and 'education' on the 'detailed search' tab of all academic journal articles published within the last decade(2010 to December 2019). The most salient limitation of this research is perhaps the data: due to real-world time constraints for collecting and analyzing data, only the articles that were published upto 2019 were used as data for this study. Therefore, we propose an early recommendation for future research to include, to the extent possible, up-to-date data. In the second stage, a screening of initial data was conducted by ① eliminating overlapping and repeated articles, and ② rejecting research articles that were considered to have insufficient relevance to, or be inadequate for, analyzing the research trend of literature focused on German education. In determining the relevance of articles to the purpose of this research, 1 professor of education and 2 graduate students were consulted to ensure the validity of data selection. As a result, a total of 293 published articles were selected for analysis. The frequency of all articles published by year is shown in <Table 2> as follows.

<Table 2> Korean research articles about German education published by year

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
No.	28	38	30	28	26	20	30	32	33	28	293

1) Both Korea Citation Index(KCI) registered and non-registered articles.

## 2. Data Analysis



[Figure 1] Network Text Analysis process

For this research, 5 core keywords presented by each research article collected were used as data for frequency analysis and network text analysis. The analysis of data followed five steps, as demonstrated in previous works of Y. H. Kim (2018) and J. O. Hwang & Y. H. Kim (2020), as shown in [Figure 1].

First, the 293 research articles selected for analysis were thematically organized by title of research, author(s), year of publication, published journal, and keywords.

Second, each of the four co-authors for this paper extrapolated 5 core keywords from each article based on their research topic and research focus. Some keywords were added or truncated in cases where a) the author of an article had listed less than 5 keywords, or b) two or more of the keywords presented by the author were semantically redundant. The modification process of keywords, for external validity, was consulted by four experts in the relevant field: one professor of education; one doctor of educational technology; and two doctoral candidates of global education development. During this process, similar yet semantically different keywords from different research articles were also changed to a single keyword to unify the usage of keywords. For example, similar keywords such as ‘German language education as a liberal arts subject’, ‘German education as a foreign language’, and ‘foreign language education’ were changed to ‘German language education’; ‘mandatory education’, ‘free education’, and ‘free mandatory education’ were changed to ‘free mandatory education’; and ‘lifelong education’, ‘continued education’, and ‘adult lifelong education’ were unified as ‘lifelong education’.

Third, on a regular basis, the co-authors conducted internal cross-verification of selected and modified keywords to ensure reliability and validity of data. Again, the verified keywords were then consulted and additionally verified by our aforementioned external reviewers.

Fourth, the core keywords of the finalized 1,465 keywords(5 each from 293 papers) were selected based on frequency of appearance, which was analyzed by the krtile.exe function of a keyword analysis tool – KrKwic. In this process, the co-occurrence and centrality of all keywords were also measured through the same program.

Lastly, the co-occurrence and centrality result produced by KrKwic(coocc.dbf) was graphed by NodeXL in order to show the correlation of all keywords. The ‘Fruchteman-Reingold’ algorithm was used to visualize(graph) the correlation, and the network centrality of keywords was estimated based on the PageRank algorithm. The size of each network node is shown to be proportionate to the network centrality degree, and the thickness of edges is proportionate to the frequency of co-occurrence.

## IV. Findings

### 1. Keyword Frequency Analysis

First, the frequency analysis result of 1,465 keywords presented by 293 academic articles published in Korean journals, from within the last decade(2010-2019), is shown in <Table 3>.

As the frequency analysis of keywords presents, ‘curriculum’ was shown to be the most frequently used keyword in Korean academic literature about German education; which was followed by ‘German language education’, ‘inclusive education’, ‘intercultural education’, ‘political education’, and ‘German language’, in descending order. The result shows that much like it was assessed in the literature review, there exists a tendency to research German curriculum as a model case for Korea. The high occurrences of ‘German language education’ and ‘German language’ also indicate that there have been a lot of research, by Korean scholars, about German language education as a foreign language. Lastly, ‘intercultural education’ – an leading area of Germany – and ‘German reunification’, as well as ‘inclusive education’ are

also shown to be considered as critical research topics according to the frequency analysis. Subject-specific frequency analysis resulted in ‘history education’, ‘vocational education’, and ‘literature education’ being the most frequent, whereas education level based analysis resulted in ‘lifelong education’, ‘higher education’, ‘adult education’, and ‘youth education’ to be the most frequent.

<Table 3> Frequencies of core keywords: 3 occurrences or above

Frequency	Keyword
30 or more	Curriculum(38)
20 or more & less than 30	German language education(22)
10 or more & less than 20	inclusive education(19), intercultural education(15), political education(15), German language(14), German reunification(12), history education(11), vocational education(11), special education(11), lifelong education(11), higher education(10), literature education(10), case study(10)
5 or more & less than 10	grammar education(9), democratic civic education(9), social integration(9), education reform(8), reunification education(8), teacher education(7), teaching method(7), education integration(7), multicultural society(7), culture education(7), culture and arts education(7), Bologna process(7), civic education(7), capacity based curriculum(7), Berlin(7), U.S.(6), adult education(6), New Federalism(6), young adults(6), primary school(6), teacher training(5), education system(5), Gymnasium(5), multicultural education(5), university education(5), democracy education(5), secondary education(5)
3 or more & less than 5	education law(4), education policy(4), education innovation(4), content analysis(4), senior education(4), German empire(Deutsches Reich)(4), research trend analysis(4), Bauhaus(4), parent education(4), comparative research(4), industrialization(4), research trend(4), UK(4), foreigner education(4), education for sustainable development(4), DaF(3), police(3), police education(3), education welfare(3), educational program(3), Christian education(3), Christian education pedagogy(3), technical education(3), North Rhine-Wesphalia(3), German culture(3), design education(3), free mandatory education(3), media education(3), comparative analysis(3), quality of life(3), people’s university(3), vocational and technical education(3), history textbook(3), cinema(3), foreign language education(3), convergence education(3), dualization(3), immigrant integration(3), physical education(3), learning motivation(3), learning objective(3), Korean reunification education(3)



&lt;Table 4&gt; Korean research articles about German education published by year

Rank	Keyword (frequency)	PageRank	Cb <sup>2)</sup>	Cc <sup>3)</sup>	Ce <sup>4)</sup>
1	curriculum(38)	4.093	839.416	.007	.047
2	culture education(7)	2.208	238.211	.007	.035
3	inclusive education(19)	2.092	201.258	.007	.032
4	political education(15)	1.947	145.533	.006	.022
5	German reunification(12)	1.910	186.480	.006	.027
6	German language education(22)	1.839	185.530	.006	.024
7	case analysis(10)	1.702	145.347	.006	.024
8	lifelong education(11)	1.656	113.131	.006	.015
9	intercultural education(15)	1.650	75.179	.006	.028
10	education policy(4)	1.601	138.498	.006	.023
11	education reform(8)	1.532	148.990	.006	.016
12	young adults(6)	1.500	209.323	.005	.010
13	education law(4)	1.492	220.495	.005	.014
14	higher education(10)	1.418	61.119	.006	.015
15	social integration(9)	1.373	58.601	.006	.021
16	history education(11)	1.368	44.022	.006	.023
17	reunification education(8)	1.355	172.495	.005	.015
18	secondary education(5)	1.291	77.554	.006	.018
19	teacher education(7)	1.280	61.783	.006	.014
20	multicultural society(7)	1.262	44.240	.005	.018
21	civic education(7)	1.261	60.806	.006	.021
22	university education(5)	1.209	39.323	.005	.013
23	teaching method(7)	1.191	51.829	.006	.013
24	cinema(3)	1.178	61.955	.005	.018
25	primary school(6)	1.144	31.602	.006	.019
26	multicultural education(5)	1.126	16.003	.005	.020
27	research trend(4)	1.092	48.217	.005	.014
28	U.S.(6)	1.062	28.169	.006	.014
29	New Federalism(6)	1.054	25.339	.006	.017
30	police(3)	1.000	.000	1.000	.000
31	police education(3)	1.000	.000	1.000	.000
32	German language(14)	.980	31.943	.006	.013
33	vocational education(11)	.968	49.784	.006	.011
34	comparative research(4)	.964	45.249	.006	.012
35	teacher training(5)	.961	23.296	.005	.014
36	democratic civic education(9)	.961	29.278	.006	.018
37	literature education(10)	.957	18.896	.005	.015
38	education integration(7)	.943	26.765	.006	.017
39	education system(5)	.942	21.951	.005	.014
40	Berlin(4)	.937	39.947	.006	.013

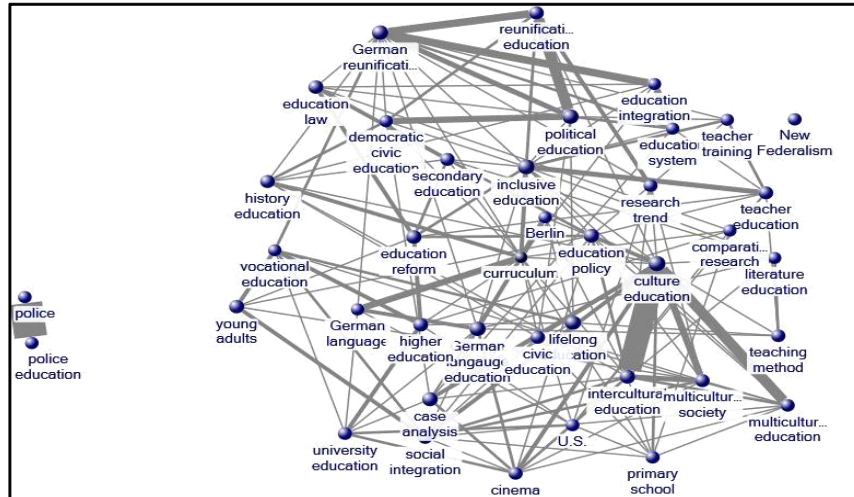
The PageRank network centrality result shows that ‘curriculum’, ‘culture education’, ‘inclusive education’, ‘political education’, ‘Geran reunification’, in descending order, are 5 of the most influential nodes. When this result is compared to that of the previously conducted frequency analysis, interestingly, keywords with high occurrences such as ‘German language(14 occurrences)’, ‘vocational education(11 occurrences)’, ‘literature education(10 occurrences)’, and ‘democratic civic education(9 occurrences)’ are shown to be relatively less significant in terms of centrality as analyzed by the PageRank algorithm(all below 30th place in terms of centrality). Such differences in between the order of frequency and centrality degree of these keywords indicate that despite the high volume of research relevant to the subjects of such keywords, literature concerning them are again contained among themselves, as it were. Conversely, research relevant to ‘curriculum’ were shown to be more connected and influential to other keywords as indicated by its high centrality degrees; PageRank centrality of 4.093, betweenness centrality of 839.416, closeness centrality of .007, and Eigenvector centrality of .047.

Despite high PageRank degrees of ‘political education’ and ‘intercultural education’, their betweenness centralities, which estimate how well a node mediates connectivity to others, were very low. Conversely, some of the lower PageRank nodes such as ‘reunification education(17th)’, ‘education law(13th)’, and ‘young adults(12th)’ were estimated to have high betweenness degrees, meaning that they mediate other nodes well despite their low network connectivity.

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2) Cb: Betweenness Centrality  
3) Cc: Closeness Centrality  
4) Ce: Eigenvector Centrality





[Figure 3] Network map of top 40 PageRank keywords

### 3. Cluster Analysis

In order to conduct a clustered analysis of the network map of core keywords used in Korean academic journals about German education, this research adopted the cluster analysis method using the Cluster-Newman-Moore algorithm; and visualized the cluster analysis result using the Harel-Korean Fast Multiscale layout to precisely, and concisely, conceptualize the cluster map. The result of our cluster analysis, as laid out in <table 5>, yielded 7 dominant clusters(groups). [Figure 4] shows the visualized cluster map of the same analysis.

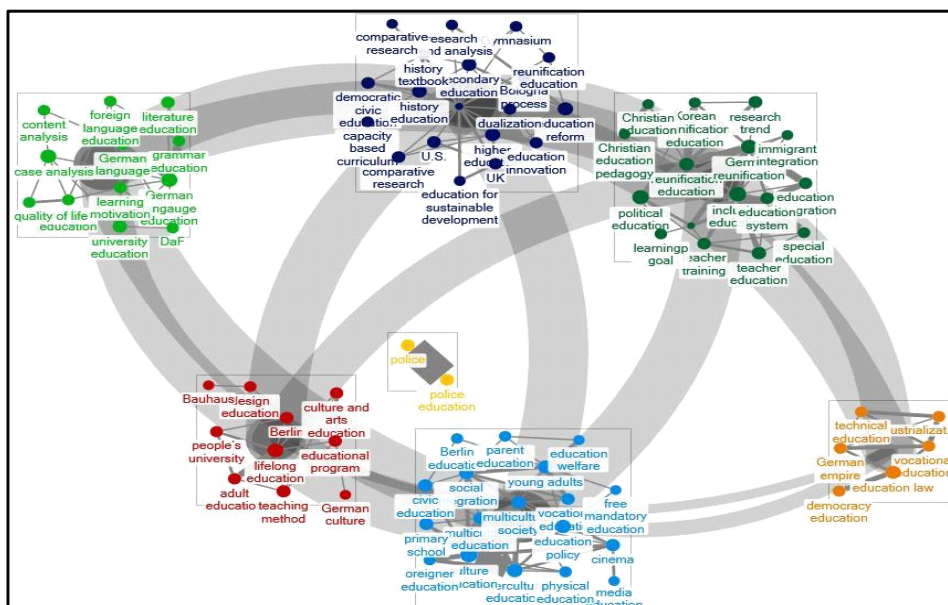
Group 1, which included curriculum and secondary education, had the most number of nodes(19), whereas Group 2 including culture education had the most number of edges(52). Group 5 showed the largest distance between nodes, which is indicated by MGD and AGD. Key words for each group are clustered into 7 groups as shown in <table 5>, and [figure 4] represents the visualized cluster map.

<Table 5> Core keywords by group

Group	Core Keywords
Group 1	curriculum, secondary education, U.S., comparative research, democratic civic education, UK, education innovation

Group 2	culture education, intercultural education, education policy, young adults, social integration, multicultural society, civic education
Group 3	inclusive education, political education, German reunification, reunification education, teacher education, research trend, teacher training
Group 4	German language education, case analysis, university education, German language, literature education, learning motivation, senior education, foreign language education
Group 5	lifelong education, education law, Berlin, culture and arts education, education program, civic education, people's university
Group 6	education law, industrialization, democracy education, vocational and technical education, German empire (Deutsches Reich), technical education
Group 7	police, police education

Each group is clustered around the following nodes: (Group 1) ‘curriculum’ ; (Group 2) ‘culture education’ ; (Group 3) ‘inclusive education’ ; (Group 4) ‘German language education’ ; (Group 5) ‘lifelong education’ ; (Group 6) ‘education law’ ; (Group 7) ‘police’ . However, (Group 7), as shown on [figure 4], has formed a separate cluster without any connection to other groups. As indicated in the previous part of our analysis, the group of literature centered around ‘police’ is not connected nor influential to the overall network of literature about German education.



[Figure 4] Cluster map of German education research

Additionally, the thickness of the edges between different groups indicate the level of inter-group connectivity and relation; it is then visible that (Group 1) centered on ‘curriculum’, (Group 3) centered on ‘inclusive education’, and (Group 6) centered on ‘education law’ are all highly connected with one another. At the same time, (Group 6) centered on ‘education law’ is shown to have low connectivity with (Group 5) and (Group 2) – ‘lifelong education’ and ‘culture education’.

## V. Conclusion and Discussion

The aim of this study was to systematically deduce Korea’s research topics that will require more academic focus pertaining to the various areas of German education based on scholarly journal articles about German education published within the last decade. The result of our analysis, primarily through analyzing the correlations of keywords representing research topics and themes, are summarized as the following:

First, frequency analysis of keywords presented in Korean journal articles about German education published within the last decade yielded that ① about 30 research articles about German education were consistently published annually without significant changes in number. Although the number of studies on German education is small, the consistency in which Korean academics are researching German education as a successful case of education system integration may serve as a critical foundation for North Korean education academics. ② Frequency analysis of core keywords revealed ‘curriculum’ to be the most frequently used keyword among all collected texts. This indicates that many of the researches attempted to find both useful and meaningful implications to Korean education, based on studying the German education curriculum. In addition, a significant sum of research efforts were focused on comparative analysis of Germany’s pre-unification and post-unification curriculum and curriculum design for cultural integration as a precedent of reunification. ③ Following ‘curriculum’, the most frequently used keywords were ‘German language education’, ‘inclusive education’, and ‘intercultural education’. The frequent occurrences of such words can be seen as a reflection of Korea’s growing interest in German language education as part of its foreign language education curriculum, as well as the growing significance of immigrant issues in Korea – and therefore looking

outwards to precedents of Germany's intercultural and inclusive education policies and practices. ㉔ In terms of the level of education under study, 'primary education' and 'secondary education' held significantly less relevance when compared to advanced levels of education such as 'vocational education', 'lifelong education', 'higher education', and 'adult education'. Resounding with Kim's research, more disciplined inquiry into Germany's primary and secondary education systems is required. Lastly, more scholars were interested in Germany's education of universal values such as 'culture education', 'multicultural education', 'civic education', 'reunification education', and 'democracy education', thwarting the expectation that there would be more interest in educational subjects of the German curriculum.

Second, network analysis of the same keywords are as follows. ㉑ In following with the frequent occurrence, 'curriculum' was confirmed to be the most influential keyword in comparison with other keywords, as represented by the high PageRank centrality degree and other centrality indicators - betweenness centrality, closeness centrality, and Eigenvector centrality. ㉒ 'Reunification education', 'education law', and 'young adults' showed a high degree of mediation for other keywords, with high betweenness centrality, despite their low PageRank indicators. And ㉓ despite the high occurrences of 'German language', 'vocational education', and 'literature education', these keywords were confirmed to have low centrality (ranking below 30th place). This means that though relatively frequent, research relevant to the foregone keywords rather form a literature group of their own without much connection to other topics. ㉔ It was also analyzed that research about 'teaching method' or educational methodologies and educators pertaining to 'teacher education' and 'teacher training' have low connectivity, which implies that further research about German education should more carefully consider the implications for educational practice based on inquiries about the roles of teachers and teaching-learning methodologies of Germany.

Third, the cluster analysis result of the same keywords is summarized as the following: ㉑ all researches about German education form clusters of relative connectedness centered around thematic keywords such as 'curriculum', 'culture education', 'inclusive education', 'German language education', 'lifelong education', and 'education law'. However, the 'police' group is shown to be unconnected to any of the clusters, indicating that the group has no significant connectedness to other groups. ㉒ Groups of

‘curriculum’, ‘inclusive education’ and ‘education law’ show relatively higher degrees of connectivity and influence among one another. ㉓ The group of ‘culture education’ consists of thematically cohesive researches with topics such as intercultural education, social integration, multicultural society, and civic education; this shows reflects the Korean academia’s interest in how Germany is taking practical and theoretical approaches in its sociopolitical state where immigrant issues are becoming more concerning to educators. Such a research trend allows us to confirm that intercultural education contingent to Germany does indeed have implications to the situation of Korea, which resounds with Oh & Bang (2016)’s findings. Considering the increasing multiculturalness of Korean society and the need to prepare for social and educational integration of a unified Korea, continued research about German cases of social integration through both intercultural and civic education is seems a necessity. ㉔ Lastly, the group centered on inclusive education consists of two thematically correlated bodies of keywords; ‘German reunification’ and ‘reunification education’, and ‘teacher education’ and ‘teacher training’. This implies the Korean academe’s predominant focus on the role of teachers as a critical component of reunification education. Therefore, it can be reasonably argued that the pervading disinterest in reunification of the Korean youth may be overcome by further inquiries into teacher education for reunification – as an alternative to the ongoing scrutiny into the attitudinal ambivalence of students as the cause of such disinterest.

Lastly, upon attempting to analyze the research trend of 293 scholarly texts generated within the last 10 years, it can be fairly said that educational research about Germany should expand in quantity and research topics be more diverse when compared to the aggregate number of research about Germany from in all disciplines. And though our cluster analysis showed that most of the Korean literature were systematically clustered into 6 groups(excluding those irrelevant to the overall network), it is further recommended that the topics and subjects of research be more diverse and specific. Also, the predominance of research on culture education, inclusive education, and civic education rather than those concerning general education subjects beckons our further focus on the areas where we lack it the most – matters of childhood and primary education as well as educational methodology and teacher education.

The analysis of the main themes and changes in academic papers on German education dealt within this study, and the comprehensively derived results, found several insufficient

research areas such as the subject and method of research on German education. In addition, salient recommendations for future research have been identified especially in the area of North Korean education insofar as studies about Germany's post-unification and post-war education provide implications to the context of Korea.

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