

Implementation Issues for an Interdisciplinary Convergence Curriculum Across the Humanities, Social Science and Arts in Korea

Lee, Hee-yong[†]

Abstract

This article aims to clarify a convergence education methodology and a mode of convergent thinking suitable for the convergence education field based on research results. In order to achieve the goal of this study, the researcher identified some problems of convergence education through analysis of precedent studies, implemented a Focus Group Interview (FGI), and then applied the results to the composition of a questionnaire. As a result of data collection, some recommendations for implementing convergence education programs are listed in the conclusion. The first suggestion is that convergent education methods should be employed in accordance with a curriculum based on the needs of the education field in order to improve convergence education, which currently possesses elements of solely practical and superficial education training. Secondly, in order for convergence education to reap desired outcomes, as intended by the original goals, education programs should exist that can foster educators with convergent competences or the methods for convergent education practice. Lastly, the curriculum for convergent educators should be established based on the interests of universities and on bold investments from the government and university authorities.

Key Words: *convergence education, convergence curriculum, convergence competence, convergence methodology, mode of convergent thinking*

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF- 2016S1A5A2A01026467).

[†] E-mail: leehy@stu.ac.kr

Ph.D. earned at: University of Tübingen

Current position: Professor, College of General Education, Seoul Theological University.

Received: April. 15, 2019, Revised: May. 7, 2019; Accepted: May. 16, 2019

사유양식과 방법론에 대한 연구:
인문사회 및 예술 분야의 학제 간 융합교육을 위해

<국문요약>

이 연구는 국내대학 인문사회 및 예술 분야에서 이루어지고 있는 융합교육 현장에 적합한 융합교육 방법론과 융합적 사유양식을 규명하는데 목적이 있다. 이 목적을 달성하기 위해 이 연구는 융합교육에 대한 선행연구를 통해 문제점을 확인하고, 그것을 기초로 전문가 심층집단상담 및 설문조사로 연구설계를 세우고, 그에 따라 연구를 진행하였다. 연구의 결과로 몇 가지 확인하였다. 첫째, 현재 시행되고 있는 실용적이고 피상적인 융합교육을 개선하기 위해서는 문제중심, 프로젝트 중심, 현장중심의 교육내용에 맞게 다양한 융합교육방법들이 배치되어야 한다. 둘째, 융합교육이 21 세기 창의적 융합인재 양성이라는 그 본래의 목적과 취지에 맞게 실효성을 거두려면 융합역량과 융합방식을 갖춘 교육자를 양성하거나 훈련시킬 수 있는 교육과정이 따로 마련되어야 한다. 마지막으로 융합교육이 그 본래의 취지에 맞게 정상 궤도에 오르기 위해 융합교육자를 위한 교육과정이 시스템적으로 구축되는데 무엇보다도 정부와 대학 당국의 관심과 과감한 투자가 이루어져야 할 것을 제안하였다.

주제어: 융합교육, 융합교육과정, 공유플랫폼, 융합방법론, 융합적 사유양식

I. Introduction

In an attempt to meet the demands of the times and our society and overcome the limitations of existing education, inter-disciplinary convergence research and education have been implemented to secure global competitiveness and foster creative human resources for the future through a synergistic combination of different fields. According to some research, convergence education has been offered in both national and private universities nationwide in various manners as public awareness on the importance of convergent education has spread, along with a growing effort to develop courses and programs to promote convergence curricula and convergent knowledge education at the general and major education levels (Lee Hee-yong, Yoon Ah-young and Kim Jae-deunk 2014, 195). In particular, convergence education has been implemented in multiple ways in undergraduate general education and convergence majors as an alternative to overcome closed thinking generated by the operation of two different curriculum tracks, liberal arts vs. natural sciences, in secondary education, based on divergent types of convergence education and basic models of many convergent courses. In this sense, there is a growing perception that convergence education in domestic universities is an essential educational phenomenon needed to foster competent individuals for the 21st century.

Despite the various efforts to promote convergence education in domestic universities' education fields, however, there is still much confusion concerning implementation since there is no practical curriculum framework established. According to previous studies, a critical analysis is required to examine whether convergence education is a proper education system for fostering creative human resources equipped with convergence competence and the relevant knowledge or for promoting some practical purposes. With regard to this, Hur Young-ju (2013, 63) raises a question over the convergent methods of convergence education currently being taught in domestic universities and points out the superficiality of current education based on existing methodologies, as opposed to a more complex education in which different disciplines are unilaterally put together. Instructors of the complex education have made no sincere efforts to promote integration among inter-disciplinary curricula and have only adopted a parallel scheme as a convergence method that allows students to take various academic fields and integrate the educational contents by themselves.

Meanwhile, Seo Min-Gyu and his collaborators (Seo Min-gyu, Seo Deok-hee and Lee Hee-yong 2014, 109) argue for the need to examine whether convergence education realizes its own education goals through its methods without being reduced to a prep-course for entering law school. In addition, Diana Rhoten (2004) has pointed out numerous problems involving inter-disciplinary research, which elicit many types of convergence education that appear to be interdisciplinary, yet only questionably produce talented people with convergent thinking capacity who can resolve complicated social problems. Park Seung-ug (2015a, 452) argues that convergence education cannot fulfill its intended goals and achievements if the processes of convergence education in universities are planned and executed only in terms of practicality. Park posits that independent research areas and the corresponding methodology should be established to sustain convergence education. If the departments gathered under the name of convergence education fail to share their own research areas, they can no longer continue conducting new research and education since departments are only performing complex activities within an outdated paradigm.

As mentioned, although convergence education in Korean universities has been provided as an alternative to existing education in an effort to meet social needs and strengthen universities' competitiveness, it seems, whatever its original goals, biased towards practical use. Therefore the current convergence education seems to be designed to produce practical complex knowledge, rather than to develop higher thinking abilities that can resolve complicated social issues or lead to novel creative thinking. In order to determine whether convergence education can function to develop higher thinking capacity that can comprehensively identify complicated and multi-faceted social problems, including practical knowledge capability, and produce innovative knowledge creation, educational leaders should experiment with various convergent programs and education systems and conduct research to clarify the most effective convergent methods.

In this sense, this study examines the current status of convergence education curricula and convergent methods in the fields of humanities, social science and arts, and clarifies characteristics of convergent thinking and the methodology of convergent education. The Research Design section sets out the problems in current convergent education that shape the ensuing research strategy of focus group interviews and surveys. Then, survey results are analyzed to identify the outcomes of awareness on convergence education, the current status of convergent curricula as well as the state of convergent education system. Finally, discussion of the results will lead to a presentation of a shared platform for convergence education, a convergence education methodology, and a mode of convergent thinking.

II. Research Design

To define a mode of convergent thinking and establish a convergent methodology, this study carried out reviews on the previous studies including literature reviews, expert interviews, and questionnaires to establish the Research Design and implement the research accordingly. First, the existing research results were reviewed on the current status and ways to ensure its stable operation and promotion of convergence education in the fields of humanities, social science and arts in domestic universities. Second, based on the previous studies, Focus Group Interviews (FGI) were conducted, mainly from experts with experiences in development or teaching of convergent education programs. Lastly, we conducted online and offline surveys were conducted on convergence education experts to find out the detailed conditions of convergence curricula with regard to a mode of convergent thinking and the methodology.

IIa. Previous Studies

There have been numerous studies on convergence education in the fields of humanities, social science and arts both at home and abroad. As the result, a wide variety of research papers have been published on topics ranging from the relevant course and subject development based on the need for convergent education and case studies concerning the status of convergent curricula and activation measures. In relation to the previous research on convergence education in the fields of humanities, social science and arts, this study will analyze them by dividing into three categories: 1) discussion about the needs and values of convergence education in the fields of humanities, social science and arts; 2) discussion about the status of convergence education; and 3) discussion about activation measures of convergence education. Based on these categories, an analysis of problems associated with

the current convergence education being taught in domestic universities will set the direction of the discussion.

IIa. 1) Discussion on the Needs and Values of Convergence Education

The discussion on the needs and values of convergence education has been dealt with by many scholars including Yokoyama Chiaki (2008), Hong Byung-sun (2009), Son Dong-hyun (2009), and Yun Rin, Kim In-sun, and Choi Byung-uk (2011).

Yokoyama (2008) discusses the reality of universities lacking the internal communications for cooperation that could transcend the isolation and disconnection faced by highly specialized education subdivided by majors, and suggests the needs to create an environment for communication between different disciplines. As a case in point, Yokoyama discusses Keio University where interaction among different departments is rare due to the prevalence of distinct vertical segmentations that implement their own curricular programs. Some forum should be established for communication where people can break away from isolation and try to resolve their common problems. On the other hand, Hong Byung-sun (2009) points out that the urgent tasks faced by universities are to secure their educational competitiveness and overcome disbelief stemmed from the existing discipline-based specialized education, and to presents convergence education as an alternative suitable for fostering creative individuals in response to the social needs. In other words, convergence education in a rapidly changing modern society is regarded as being fit for fostering competent individuals with problem-solving capabilities by enabling them to comprehend societal changes and the world through integrated perspectives beyond the basic academia or relying on conventional academic fields.

Instead of the needs for convergence education for science and arts, Son Dong-hyun (2009) argues that universities' research and education should be changed in accordance with the altered intellectual territories in the knowledge-based society, and the center of education should move from education for specialized knowledge towards education for basic competence, liberal arts, and convergence. Yun Rin, Kim In-sun, and Choi Byung-uk (2011) recognize that highly differentiated studies place limitations on nurturing the talent required by the 21st century with differentiated studies, and stress the importance of convergent education as the alternative. They identify fields for convergence education including cognitive science, nano- and biotechnology, and arts and technology, and find that convergence education is being actively implemented in different academic fields.

IIa. 2) Discussion on the Status of Convergence Education

Theoretical and empirical studies on the general status of convergence education have been conducted by Kwon Sung-ho and Kang Kyung-hee (2009), Lee Hee-yong (2011), Lee Hee-yong, Yoon Ah-young and Kim Jae-deuk (2014) and Seo Min-gyu, Seo Deok-hee and Lee Hee-yong (2014).

Kwon Sung-ho and Kang Kyung-hee (2009) emphasize the need for a convergence curriculum to actively respond to the topographical changes of research and education and nurture creative talent required by the global society, and show the current status of various types of convergence education being conducted in major universities in Korea. In relation to the state of convergence education, Lee Hee-yong (2011) suggests convergence courses and programs being implemented in universities at home and abroad by type. In this context, not

only multidisciplinary convergence courses, but also interdisciplinary convergence programs are presented. Usually subjects of humanities and social science and subjects related to humanities and arts are presented as transdisciplinary convergence models related to natural science and social science.

Lee Hee-yong (2014) and Seo Min-gyu, Seo Deok-hee and Lee Hee-yong (2014) comprehensively deal with the status of convergence education being conducted in the humanities, social science and arts in domestic universities. Seo's team identifies the status of convergence education being carried out in various types such as interdepartmental majors, interdisciplinary majors, student-designed majors, and convergence education, and argues that convergence education programs are relatively well diversified, compared to other areas. Lee Hee-yong presents the general state of convergence education in the fields of humanities, social science and arts, finding that 52 out of 217 four-year universities in Korea were implementing convergence education; that, despite regional differences, convergence education is being implemented nationwide; that the trend is towards gradual expansion in convergence education offerings; and that, despite its relative newness, the field of convergence education is diversifying as the number of relevant courses and programs is increasing at the basic general education and major education levels.

IIa. 3) Discussion on Activation Measures for Convergence Education

Convergence curriculum and its stable activation measures are dealt with by Kim Hye-young (2013), Kim Jung-sook and Song Ji-yeon (2013), Hur Young-ju (2013), and Lee Hee-yong, Seo Min-gyu and Kim Jae-deuk (2016).

Kim Hye-young (2013) points out the necessity for stable and effective operation of convergence education if it is to spread to universities nationwide, and comes up with a feasible method for identifying subjects in a pre-convergence education phase. Kim suggests ways to plan and operate basic convergence subjects to build up fundamental convergence capability as an alternative, given the reality of relevant education fields where most convergence education programs fall short of satisfying the goals of enhancing students' convergence capacity and increasing their convergent knowledge due to the lack of convergence methodology and a mode of convergent thinking.

In terms of basic education, Kim Jung-sook and Song Ji-yeon (2013) discuss a convergence methodology that allows implementation of values in terms of communication education through a college liberal arts education course "Value and Communication." Kim stresses that in their education students need to overcome stereotyped and authoritarian moral laws to build their own practical ethics. Furthermore, students should be able gradually to improve their thinking faculties to make their standpoints clear about major principles necessary for the maintenance and development of society, and then to provide rationale on their standpoints. They suggest dividing convergence education into vertical convergence and horizontal components, with values the focus of the former and the themes of communication education the subject matter of the latter. They conclude that such a methodology could serve as a realistic alternative to the triteness of conventional humanities education (e.g., classical seminars) and the lack of interest by students.

In a study on "analysis of existing university's convergence education and suggestion for its developing direction," Hur Young-ju (2013) summarizes the limitations of current convergence education in Korean universities in three areas and suggests measures to

improve each. First, desired talents and the paradigm of convergence education should be clarified. Such an effort will be able to enhance understanding on the potentials of convergence education for quality human resources. Second, convergence education should be carried out at both major and basic general education levels, coupled with their interrelations. Third, a fundamental and in-depth convergence curriculum should be established, rather than sticking to peripheral and shallow ones. Hur's analysis and improvement proposal should significantly contribute to energizing convergence education. However, the study remains at theoretical and literature levels, and has limitations in practical educational applications.

Lee Hee-yong, Seo Min-gyu and Kim Jae-deuk (2016) point out the limitations of most prior studies based on mainly theoretical or individual experiences. In order to overcome such limits, the co-authors discuss measures to stimulate the education on the basis of the present state and conditions of convergence education being implemented in domestic universities. The proposed stimulation measures are classified into three aspects such as administrative, financial and teaching-learning to discuss detailed measures. In particular, the teaching-learning aspect highlighted the argument that convergence education should focus on developing creative thinking and problem-solving capability, rather than on developing integrating capacity of their professional knowledge. Various relevant courses and teaching methods should be developed to improve students' capability and strengthen their convergence knowledge.

From the previous studies, the current study confirmed derived problems associated with current convergence education in Korean universities and set up the direction of the further discussions as follows.

First, convergence education implementation for the humanities, social sciences and arts in Korean universities has mainly been carried out in a top-down manner in accordance with the interests of national policy and the university, without discussion leading to consensus among relevant educators. To resolve such problems, convergence education should be organized in a "problem-oriented" manner, instead of a top-down one-sided combination of disparate disciplines (Lee Hee-Yong, Seo Min-gyu and Kim Jae-deuk 2016, 56-58).

Second, convergence education should undergo thorough changes that move it beyond the superficial (Weingart and Padberg 2014). If in their quest for creative convergence education educators seeks only the most obvious surface connections of multiple disciplines without guaranteeing that each maintains its individual professional standards and depth of research, the resulting education can no longer serve its original purpose. The aforementioned disparities point out the need of interconnected convergence education that can ensure various experiences towards extensive thinking and learning based on development of various convergence courses from the very basic education process of university and stable operation, and further in-depth convergence major education.

Third, convergence education in domestic universities needs to deal with the paucity of qualified instructors nurtured with the relevant competence and methodology. Successfully dealing with this reality is closely related to the stable operation and sustainable development of convergent education. Instructors by themselves should be able to converge interdisciplinary and multidisciplinary knowledge and perspectives based on educational content, teaching-learning methods, and competences for assessment measures. In reality,

though, that is seldom the standard by which university administrators and department leaders select instructors. Fostering professional instructors with convergence capability is a major prerequisite for developing the field (Lee Hee-yong 2011, 20; Hur Young-ju 2013, 70).

Iib. Focus Group Interviews (FGI)

This study conducted Focus Group Interviews (FGI) as a preliminary research process in an effort to prepare questionnaires in line with convergence curriculum and the field conditions. Opinions offered by relevant experts provide crucial information for setting research directions and evaluating the results (Creswell 2002). A list of names of ten professors with relevant education experiences was therefore prepared. After they were contacted personally, four were selected based on their relevant teaching experience in the humanities, social sciences, and arts (Table 1).

Table 1. FGI Participants

Category	Name	University and Department	Area of Study	Converged Area
Humanities and Social Sciences	Professor A	A University, Institute for Basic Convergence education	Social Philosophy	Humanities, Social Science
	Professor B	B University, Division of General Education	Science Philosophy	Humanities, Technical Science
	Professor C	C University Minerva College	Administration	Humanities, Social Science
Arts	Professor D	D University, Department of Music Education	Ethnomusicology	Humanities, Arts

Over the three-hour FGI the research team first asked questions in order, and then interviewees freely expressed their ideas. The questions used for the FGI were based on a theoretical review of results from previous studies and were categorized into four areas: 1) awareness and direction of convergence education; 2) system and curriculum of convergence education; 3) convergent methodology; and 4) modes of convergent thinking.

Iic. Implementation of Survey

The survey was carried out twice to investigate a mode of convergent thinking and convergence methodology that can ensure educational competence for stable activation of the education in humanities, social science and arts in Korean universities in two different ways, online and offline. An offline survey was conducted on the members of the Korean Society of Culture and Convergence, while an online survey was performed on the educational professionals with relevant teaching or research experiences. The survey questions were prepared based on the FGI results.

Table 2. Survey Information

Classification		Number of respondents/ participants	Survey period	Response rate
Convergence education professionals	Unexperienced	30/45	May 10 to Jun. 15, 2016	67%
	Experienced	12/18	Oct. 1 to Oct. 20, 2016	66%

The survey includes universities located in many different regions nationwide: 11 in Seoul, 11 in Gyeonggi province (Incheon), twelve in Chungcheong province (Daejeon), three in Gyeongsang province (Ulsan, Daegu, and Busan), two in Jeolla province (Gwangju), one in Gangwon province, and two in Other areas.

Among 45 professionals selected for the offline survey (Table 2), 30 people participated, with a response rate of 67%. In another survey conducted of professors of convergence education based on research results of universities nationwide, questionnaires were distributed to 18 professors without prior consent. Among them 12 participated in the survey and the response rate was 66%.

In order to reflect accuracy of the statistics, supplementary research was conducted with the consideration of demographic distribution rate of the survey participants. For high representability and credibility, survey participants were selected equally by regions and universities.

III. Analysis on Survey Results

Following is an analysis of the survey results divided into three areas: education process and methodology; modex of convergent thinking; and convergent methodology. From the survey results, only the part directly related to this study was excerpted and organized.

To summarize the results on educational process and methodology (Table 3), 90.5% of respondents feel that they have a methodology for connecting data and perspectives in a fresh manner, and concur with the current government-led free opening of convergence departments and majors. Given that every single respondent felt the need for an education program for convergence course instructors, establishment of such programs should be an urgent priority. In regard to teaching methods, 92.8% of respondents were found to consider team teaching more effective than individual teaching in convergence education. The most negative result was on the appropriateness of the current number of convergent classes offered by the respondents, with 69% demurring.

The results were then further analyzed using a t-test² in order to compare respondents' perception between national and private universities and find out what made the difference,

IIIa. Analysis Results of Education Process and Methodology

Table 3. Analysis Results of Education Methodology and Process

Question	Mean	SD	Strongly agree	Mostly agree	Agree	Slightly disagree	Strongly disagree
I have a methodology to accept various knowledge and perspectives and connect them in a totally different manner.	3.54	.80	9.5% (4)	45.2% (19)	35.7% (15)	9.5% (4)	.
I agree with the free opening of convergence departments and majors as promoted by the current government.	3.52	.86	14.3% (6)	33.3% (14)	42.9% (18)	9.5% (4)	.
In convergence education team teaching is more effective than individual teaching.	3.64	.93	19.0% (8)	35.7% (15)	38.1% (16)	4.8% (2)	2.4% (1)
As I implement convergence education, I felt there should be an education program for convergence course instructors.	3.92	.77	26.2% (11)	40.5% (17)	33.3% (14)	.	.
I think the number of convergence classes that I am offering is appropriate.	2.23	.72	.	4.8% (2)	26.2% (11)	57.1% (24)	11.9% (5)

if any (Table 4). With regard to convergence education areas between national and private universities, when asked if the respondents think the number of their convergence classes is appropriate, there were statistically significant differences, with a significance level of 0.05, $t=2.333$, and $p=0.025$. In terms of appropriateness of number of the class times, the results showed the difference between national universities (2.75) and private universities (2.11) with the mean of 0.63, which indicates that national universities better maintain the number of the class times than private universities. Study results indicate that the reason why national universities relatively highly rated in this factor is due to the higher reception rate of government grants for national projects.

² A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups.

Table 4. T-Test Results on Convergence Education Process

Category		Mean	SD	Difference	T	P
I have a methodology to accept various knowledge and perspectives and connect them in a totally different manner.	National univ.	3.62	1.18	.09	.300	.766
	Private univ.	3.52	.70			
I agree to the current government-led free opening of convergence department and the major.	National univ.	3.87	.83	.43	1.291	.204
	Private univ.	3.44	.85			
Team teaching than individual teaching is more effective in convergence education.	National univ.	3.87	.83	.28	.779	.441
	Private univ.	3.58	.95			
As I implement convergence education, I felt there should be an education program for convergence course instructors.	National univ.	4.00	.75	.08	.286	.777
	Private univ.	3.91	.79			
I think the number of convergence classes that I am offering is appropriate.	National univ.	2.75	.88	.63	2.333	.025
	Private univ.	2.11	.64			

Professors at both national universities (2.75) and private universities (2.11) were dubious about the number of convergence classes they were offering. In order to become truly converged disciplines, it seems there should be serious discussion over class contents and teaching methods.

Most people think that isolated boundaries of individual disciplines should be broken down to facilitate social and cultural development and keep up with the times, but they are not sure about how to carry out such a plan. However, when asked if individuals agree to the current government-led free opening of convergence department and the major, national universities showed a higher agreement rate of 3.87, compared to a rate at private universities of 3.58, revealing the mean difference of 0.43 between the two university types.

Meanwhile, national universities showed higher mean values in all questions compared to private universities in terms of convergent curriculum areas, but the results showed no significant difference ($F=2.915$, $p>.05$) between them.

IIIb. Analysis Results of Mode of Convergent Thinking

Analysis of modes of convergent thinking (Table 5) showed that 64.3% of respondent professors think there is a special model of convergent thinking and methodology suitable for Korean education, while 35.7% disagreed, with the mean of 2.80. An interpretation can be made as to which mode or methodology is suitable for Korean education and which convergence can be interlinked with disciplines of non-major areas. It could be understood that respondents think that integrated education encompassing humanities, social science, and arts provide opportunities to develop problem-solving ability through thinking.

Table 5. Analysis Result of Mode of Convergent Thinking

Question	Mean	SD	Strongly agree	Mostly agree	Agree	Slightly disagree	Strongly disagree
There is a special mode of convergent thinking and methodology suitable for Korean education.	2.80	.80	2.4% (1)	14.3% (6)	47.6% (20)	33.3% (14)	2.4% (1)
Different disciplines can be integrated based on a mode of thinking.	3.16	1.05	14.3% (6)	14.3% (6)	52.4% (22)	11.9% (5)	7.1% (3)
Characteristics and individuality of each discipline area hamper convergence between disciplines.	2.64	1.05	7.1% (3)	14.3% (6)	21.4% (9)	50.0% (21)	7.1% (3)
I think a mode of convergent thinking is the basis for creativity and diversity.	4.16	.88	45.2% (19)	28.6% (12)	23.8% (10)	2.4% (1)	.
A mode of convergent thinking can be taught or trained.	3.90	.84	26.2% (11)	42.9% (18)	26.2% (11)	4.8% (2)	.

In addition, 81% of professors responded that different disciplines can be integrated through a mode of thinking. Only 42.9% said the unique characteristics of each discipline area hamper convergence between them, while 57.1% disagreed. The results appear to require some efforts to create new knowledge through organic combination between the existing and new disciplines. Such results means instructors recognize interdisciplinary boundaries and respect areas of other disciplines, but regard breaking down the boundaries as an attempt to cooperate, rather than to infringe. In particular, the vast majority (97.6%) of respondents feel that convergent thinking is the basis for creativity and diversity. Among respondents 95.2% believed that a mode of convergent thinking can be taught or trained, which shows that they appear to think that convergence education can unite segmented professional knowledge of disciplines and combine learning with practicality by reflecting the needs of the times and society. In this sense, researchers found convergent thinking is essential in fostering creative talents with diversity that the current society needs.

The t-test results (Table 6) further classifying the mode of convergent indicate that in general statistically significant differences did not exist between national and private universities in relation to mode of convergent thinking. However, national universities (4.37) were found to have higher possibilities of educating or training than private universities (3.79), with the mean difference of 0.58.

Table 6. T-Test Results of Mode of Convergent Thinking

Category		Mean	SD	Difference	F	T	P
There is a special mode of convergent thinking and methodology suitable for Korean education.	National	2.62	1.06	-.22	2.800	-.718	.477
	Private	2.85	.74				
Different disciplines can be integrated based on a mode of thinking.	National	3.12	.99	-.05	.100	-.122	.903
	Private	3.17	1.08				
Characteristics and individuality of each discipline area hamper convergence between disciplines.	National	2.75	.88	.13	.457	.316	.754
	Private	2.61	1.10				
I think a mode of convergent thinking is the basis for creativity and diversity.	National	4.50	.75	.41	.486	1.195	.239
	Private	4.08	.90				
A mode of convergent thinking can be educated or trained.	National	4.37	.74	.58	.085	1.785	.082
	Private	3.79	.84				

IIIc. Analysis Results of Convergent Methodology

With regard to convergent methodology (Table 7), 90.5% of participants stated that there is a methodology which enables to accept various knowledge and perspectives that can be connected in a completely new manner. Moreover, the entire set of respondents said more converged research or development of new converged majors would be the best ways to foster relevant experts in reality, and it is urgent to develop convergent education methodology fit to Korean university education, which indicates the need for developing convergent education methodology. In addition, 97.6% agreed to the creation of a converged platform where various perspectives and knowledge with the change of times can meet, and responded with support for presenting a united method or an ideal solution for converged education or mode of convergent thinking is required in the present university education.

Concerning convergent methodology as shown in Table 7, respondents stated their agreement to create a converged platform where various perspectives and knowledge with the change of times can meet, showing a high level (4.04) of agreement to the creation of a convergent platform. Such results can be analyzed and represent an agreement to accept diverse knowledge or perspectives without concerning about the results and produce new outcomes surpassing expectations. At the same time, it appears that a close bond and study groups are required among educators, exclusive prejudice and perception towards other majors should be eliminated, and dialogue and opportunities are needed.

Table 7. Analysis Results of Convergent Methodology

Question	Mean	SD	Strongly agree	Mostly agree	Agree	Slightly disagree	Strongly disagree
There is a methodology that enables to accept various knowledge and perspectives and connect them in a completely new manner.	3.42	.76	7.1% (3)	38.1% (16)	45.2% (19)	9.5% (4)	.
More converged research or development of new converged majors are the best way to foster relevant experts in reality.	3.66	.68	11.9% (5)	42.9% (18)	45.2% (19)	.	.
It is urgent to develop convergent education methodology fit to Korean university education.	4.02	.78	31.0% (13)	40.5% (17)	28.6% (12)	.	.
I agree to the creation of converged platform where various perspectives and knowledge with the change of times can meet.	4.04	.79	31.0% (13)	45.2% (19)	21.4% (9)	2.4% (1)	.
Presenting a united method or an ideal solution for converged education or mode of convergent thinking is required in the present university education.	3.80	.89	23.8% (10)	38.1% (16)	35.7% (15)	.	2.4% (1)

For further classification of convergent methodology analysis (Table 8), t-test results showed that there was no statistically significant difference concerning the question whether respondents think that more converged research or development of new converged majors are the best way to foster relevant experts in reality, as the significance level was set at between 0.05 and 1.552, $p=0.129$. This implies that there is no difference in the possibility of education or training between national and private universities. However, national universities (4.00) were found to have higher possibilities in education and training than private universities (3.58), with the mean difference of 0.41. Meanwhile, results showed that methodology leading to a new method ($F=.316$, $p>.05$), urgency of methodology development ($F=.124$, $p>.05$), and creation of convergent platform ($F=.167$, $p>.05$) were not statistically significant.

IV. Clarification of Convergence Methodology and Mode of Convergent Thinking

IVa. Demand and Values of Convergent Method

The biggest challenge to sustaining and resulting in desired outcomes commensurate with the intended goals and purposes of convergence education beyond its practical use is whether different perspectives and knowledge proposed between different disciplines and systems can be horizontally, equally exchanged or not. Shin Dong-Hee (2011, 143) points out “the importance of consilience enabling horizontal values of every knowledge and organic integration” to overcome such a challenge, stressing that we need to break away from a

certain mindset to strengthen the existing barriers of school system, and “promote integration from the equal footing with interactive and two-way perspectives.”

Table 8. T-Test Results of Convergent Methodology

Category		Mean	SD	Difference	F	t	P
There is a methodology that enables to accept various knowledge and perspectives and connect them in a completely new manner.	National	3.75	.70	.39	.316	1.325	.193
	Private	3.35	.77				
More converged research or development of new converged majors are the best way to foster relevant experts in reality.	National	4.00	.92	.41	3.014	1.552	.129
	Private	3.58	.60				
It is urgent to develop convergent education methodology fit to Korean university education.	National	4.12	.83	.12	.124	.403	.689
	Private	4.00	.77				
I agree to the creation of converged platform where various perspectives and knowledge with the change of times can meet.	National	4.12	.83	.09	.167	.303	.764
	Private	4.02	.79				
Presenting a united method or an ideal solution for converged education or mode of convergent thinking is required in the present university education.	National	3.75	.88	-.07	.060	-.208	.836
	Private	3.82	.90				

Note * $p < .05$, ** $p < .01$, *** $p < .001$

Then, how is convergence possible from the equal footing between different disciplines? What is needed most is to allow different knowledge and perspectives to meet across interdisciplinary boundaries and horizontally and equally interact with each other. That means we need something that can make it possible for perspectives and knowledge of each discipline to be horizontally and equally integrated.

In a discussion about hermeneutics Gadamer (1986) proposed prospect convergence as something which enables true understanding (knowledge). He criticized romantic hermeneutics which abandons prospect of interpreter (including the interpreter’s intension and perspective) for objective understanding and emphasizes to focus on prospective of the subject to be interpreted (including author’s intension and perspective). He argues that “understanding is always a fusion of horizons (*Horizontverschmelzung*) supposedly existing by themselves” (290). However, the prospect convergence Gadamer proposed fails to make it possible for an interpreter’s perspective to horizontally meet with an author’s intension or perspective, since prospect convergence is formed depending on the thinking capacity of an interpreter at the present prospect. Thus, prospect convergence cannot serve as a venue where different prospects and positions can equally meet and interact with each other.

Then, how can we secure a possibility for horizontal and equal interactions to ensure interdisciplinary convergence? What we need most to enable a true meaning of convergence (consilience), rather than pseudo-convergence which unilaterally brings together and mixes different knowledge and perspectives, is to have an open mind toward a shared platform where different ideas and point of views can meet and interface.

Does the shared platform have to be existed separately or be shared by different convergent educators? In order to facilitate collaboration among experts from different majors, there should be a shared platform in place. The shared platform can come in various types. One type can be the form of a venue in which researchers can share and exchange information or a group of people can share problems or knowledge for recombination in different contexts. Or, perhaps it could be a concept connecting areas or contents.

Park Seung-ug (2015a, 453) points out the humanities and life science have long failed to cooperate although they both deal with life issues. He said that the reason behind that is a lack of a shared platform across which they can communicate and share knowledge at an equal level. According to him, because the humanities approach life issues from the ethical perspective, they have a fundamentally different position from life sciences that view life as the results of mechanical metabolic process of chemical molecules. For this reason, it is difficult for the researchers with the two different perspectives to communicate and cooperate. For heart-to-heart communication between the two sides, a new perspective is necessary for them to recognize that life can be dealt with in such a different context. Only then, the concept of life can serve as a shared platform for interdisciplinary convergence.

As seen by the survey results in which 97.6% of respondents agreed to creation of converged platform, the spread of perception about a shared platform will contribute to relieving conflicts over convergence method which were presently undergoing in Korean universities. In accordance with the highly rated survey results (92.8%) of the question “team teaching than individual teaching is more effective in convergence education,” the recognition of shared platform will become a realistic basis for active team teaching in the field of convergence education.

IVb. Clarification of Convergence Methodology

The survey results show most respondents agreed upon the urgency to develop converged education methodology suitable for Korean universities. A variety of opinions concerning convergence education methodology to be developed were suggested, including: i

Opinion A: A convergence methodology is needed that can correct problems or shortcomings arising from individual disciplines and ultimately form united knowledge or discipline, while sharing achievements of individual disciples or school systems.

Opinion B: Convergence education methodology should allow to accept various knowledge or perspectives without concerning results and produce completely new outcomes.

Opinion C: Convergence methodology enables creative thinking, problem-solving ability, planning and practicing of team activities and projects, mutual discussing with other disciplines or departments, creating values to collect opinions and producing outcomes.

Opinion D: A convergence curriculum should be based on a relevant education methodology that can cultivate abilities to extract common factors, while maintaining characteristics of each discipline or theme at both general and major education levels.

According to these experts' opinions, convergence methodology appears to be related to creating converged knowledge, higher thinking or perspectives which were impossible from the existing individual disciplines. In this sense, the convergence education field seems to be somewhat aware of the methodology and wants a clearer understanding of it, rather than to require a new methodological understanding.

Then, how can we be more specific about the methodology? Convergence is a novel methodology to resolve complicated social phenomena or complex problems. For Hong Sung-wook (2013, 33-34), convergence is a method for better research and education, as well as to facilitate expression of creative ideas. One of the most important reasons to pay attention to such a convergent research method or education method lies in the limits of the existing specialized education or research methods. Modern society's complicated and multifaceted problems are not easily solved by existing methods. Problems that could not be solved through a professional perspective or knowledge can be addressed now by multidisciplinary knowledge and perspectives. In such a context, convergence can be understood as a methodology offering crucial new possibilities to promote higher thinking capability and advancement of knowledge to resolve novel and complicated social issues. Therefore, it should not an end in itself.

However, as in the past, the possibility issue of convergence as a method is raised. The question lies in the scope of the method and possibility. We need to examine convergence methodology to determine whether there are any limits to its ability to combine various heterogeneous issues, and if so, what they consist of. Park Seung-ug (2015a, 455) takes species as an example to explain parallels. There are certain limits in scope for two different species to biologically combine. Hares and tortoises are not suitable, but there can be successful reproduction between lions and tigers. Some questions are raised from this case. Is there a possibility to apply a similar story to convergence of disciplines? Should there be an understanding, for instance, concerning a convergence of disciplines which use a similar type of methodology, and a convergence of disciplines which utilize completely different methodologies, in the same context? To understand the methodology for convergence, the issue should be further examined.

Wilhelm Dilthey clearly separated methodologies between mental science and natural science and would say there is no choice but to take different methods for different disciplines or school systems. C. P. Snow (2011, 64) tried to fill the gap created between two cultures, the humanities and natural sciences. However, Snow did not suggest a methodology to bridge the gap between heterogeneous cultures. Stressing the unity of knowledge, E. O. Wilson (2005, 459-460), convinced that only in reductionism⁴ and causal analysis can we develop comprehensive knowledge beyond individual disciplines and

⁴ Reductionism is a method adopted to realize scientism ideal through consilience. Wilson (2005, 114) clarified that reductionism is "a research strategy adopted to enter incredibly complex systems that cannot be penetrated by any other methods... Reductionism is the only method to understand the complexity. The love of complexity without reductionism makes art; the love of complexity with reductionism makes science."

proposed a universal consilience (unity of knowledge) program. Meanwhile Lee Nam-in (2009, 33) criticized Wilson's consilience program as "methodological imperialism." Lee argued that "when attempting to apply a methodology being used in a specific discipline to every field of study without recognizing unique methodological characteristics of each discipline, it could lead to a methodological imperialism, which is the main culprit standing in the way of a true convergent research."

Coupled with such a critical balance, we need to deal with methodological issues of new convergence in a flexible manner. In order for convergent research or education to bear tangible fruit, researchers should take a flexible approach that recognizes each individual or school system's own methodological characteristics, at the same time that it accepts the differences between each methodology. Park Seung-Ug (2015a, 456) takes an example of N. Levy's neuroethics as a case in point. The case was a problem associated with body integrity identity disorder⁵, for which various disciplines cooperated to cope with the disease. By respecting the methods of each discipline and system, while accepting their differences with regard to dealing with the given issue, convergence educators "are allowed to view an object in different contexts, which can lead to a higher chance of taking a multi-dimensional approach toward issues. Moreover, this approach will eventually lead to see things which could not be seen from the linear, parallel or mixed perspectives."

Selecting convergent educators who can communicate in related to given issues while respecting methodological differences has shown a clear limit to date. This is not an issue of finding and selecting such a good convergence educator. Rather, researchers should understand the deep relation to the issue of training instructors with such competences.

IVc. Clarification of Mode of Convergent Thinking

After all, the fate of convergence education will be determined by how convergent educators can foster individuals with a mode of convergent thinking. Min Gyung-chan (2009, 35) points out the difficulty to resolve complex social issues people face today through individual discipline or mindset. He argues that there are three different modes of thought: philosophical or religious, natural scientific and mathematical, and says individuals can resolve complex social issues by utilizing the three modes of thinking. Educational leaders need to clarify whether different types of thought are converged to enhance learners' convergent knowledge and strengthen their convergent competence for higher thinking, or other capabilities are required in order to build convergent thinking capacity.

Creative convergent people intended by convergent education refer to people with competences who can view given issues from diverse perspectives and comprehend them from integrated points of views to find a new solution. "Creative convergent is meant to seek

⁵ The ethical dispute caused by body integrity identity disorder was mainly focused on whether body amputation can be allowed as a means to treat diseases. This issue cannot be solved only by the science of mind, or cannot be properly assessed as long as we don't understand the disease. In order to understand it, combination with science associated with it is required. Neuroscience, psychiatry, psychology have their own role in resolving this ethical issue. Body integrity identity disorder is not a problem that science of mind or ethics can solve alone.

a new way of dealing with problems, breaking away from stereotype problem-solving algorithm which existing disciplines have. In this sense, the core competence of convergent thinking is a creative ability to solve problems” (Park Seung-ug 2015a, 457).

To make it possible to solve problems in a creative method, it is necessary to approach to complex problems or phenomena from a different perspective and at the same with a multi-dimensional mindset. Gadamer criticized interpreting and understanding problems and situations well through a strict process of method, and argued that researchers should take different views and perceive problems in a multi-dimensional manner possible through convergent and integrated thinking, rather than rational or professional thought. As a methodology to produce better knowledge or to trigger creative thinking, convergence requires collaboration in two ways: one is contents,⁶ and the other is a mode of thinking producing the contents. The two are separable, but are not divided and collaborate with one another. Then, how can we define a mode of convergent thinking?

Park Seung-ug proposes two modes of thinking which convergence has. One mode is heuristic thinking, the other embodying thinking. The former finds problems and seeks ideas or methods to resolve them, while the latter materializes findings in consideration of actual conditions in reality.

To be more specific, heuristic thinking is a cognitive mechanism that helps us figure out what we cannot see based on what we are able to see. Educators with this mode of thinking are capable of allowing learners to see issues from a different point of view, expanding the issue’s meaning-associated networks, and eventually finding a good solution to resolve it. On the other hand, the mode of embodying thinking is a cognitive mechanism which allows educators to see what can be found through intelligence in realistic terms. Heuristic thinking can be applied to establish practical procedures and structures in order to resolve social problems in reality, and can be found in artists’ artistic activities to express their artistic world (Park Seung-ug 2015b, 20). These two modes are not exclusive, but rather coexist in integrated relations. The capacity of convergent thinking will be dependent on whether convergent educators can have complementary relations in harmony with others in the convergent education process.

V. Conclusion

This study was conducted on critical consciousness, whether researchers fail to establish a convergence curriculum and methodology suitable for the education which has been actively implementing in humanities, social science and arts, stable and effective operation of the convergent education would be impossible. Moreover, the current education can be tilted towards practical use and commercialization, as opposed to its intended goals and purposes, which can aggravate the burden on education consumers by generating ill-prepared generalists in our society. Based on such a critical mindset, this study aims to figure out empirically convergent curriculum and convergent method through qualitative and

⁶ Contents can be humanities, or interdisciplinary subjects or issues. The issues involving contents will no longer dealt with in this paper.

quantitative research, and present a convergent methodology and a mode of convergent thinking fit for education field of Korean universities.

Considering the aforementioned discussions, convergent education being implemented in humanities, social science and arts reveal many problems to be addressed. First, the implementation of the education has been conducted in a top-down manner influenced by the interests of national policy and universities. As a result, professors and instructors have failed to have their competence and methods integrated into interdisciplinary knowledge and perspectives. In turn, convergent education has been reduced to a mere practical education, and has been operated as a superficial complex education designed just to deliver knowledge in parallel. To resolve such problems, various convergent education methods should be employed in accordance with the needs of the education field. However, what is more important is that educators equipped with convergent capacity and methods through training and education participate in the field.

Second, as suggested in the survey results, current data dose not reveal whether relevant educators have accurate understanding of convergent methods. Such a result has significant implications for us. Educational leaders are expected to drastically improve the current convergent educator selection process by selecting relevant experts with diverse knowledge as convergent educators and dispatch such educators to the education field. In order for education to achieve its desired outcomes as intended by the original goals, education programs should exist which can foster educators with convergent competences or the method. Unfortunately, the implementation of the relevant curriculum has not been carried out along the ideal format, despite a growing need for them from the education field.

Third, such a convergence curriculum should be operated in connection with majors as well as basic general education levels. Currently, convergence education curricula have been independently without being interconnected, and individual educators have not been interacting with their fellow instructors. Educational leaders need to move boldly to establish education programs for instructors as well as for major students. Such a process will generate educators with required competences and convergent methods. Only through such measures can convergence education realize its goal and mission of fostering creative talents for the 21st century.

Lastly, a curriculum for convergent educators should be established based on the interests and a bold investment from the government and university authorities. In addition, the direction and contents of this curriculum should be clearly defined. In order to strengthen students' convergence capability, educators should have a clear understanding of the convergent method and are able to cultivate the desired capability through the curriculum. The study results will contribute to helping individual convergent educators understand convergent methods and to serving as a basis for setting the direction and creating content for a curriculum relevant to our present and future.

References

- Chang Eun-Ju. 2008. "A Search for New Road to 'Liberal Arts Education' through the Interdisciplinary Education." *Korean Journal of General Education* 2 (2): 117-136.
- Creswell, John W. 2002. *Educational Research: Planning, Conducting, Evaluating Quantitative and Qualitative Research*. Upper Saddle River, N. J.: Merrill Prentice Hall.
- Gadamer, Hans-Georg. 1986. *Hermeneutik I:Wahrheit und Methode*. Tübingen: J.C.B. Mohr.
- Hong Byung-sun. 2009. "Social Demand to College's Education and Search of Alternative." *Korean Journal of General Education* 3 (2): 51-78.
- Hong Sung-wook. 2012. *What is Interdisciplinary Research? Introspecting the Future of Interdisciplinary Research from its Past*. Seoul: Science Books.
- Hur Young-ju. 2013. "A Study on Analysis of Existing University Convergence Education and Suggestions for Its Developing Direction." *The Journal of Educational Research* 11 (1): 45-79.
- Kim Jeong-sook and Song Ji-yeon. 2013. "Theoretical Design of Values and Communication Education through Convergence Methodology." *Korean Journal of General Education* 7 (2): 39-72.
- Kim Hye-young. 2013. "The Proposition of the Directions about Convergence-based Courses and Basic Convergence Subjects for Systemed Convergence Education." *Korean Journal of General Education* 7 (2): 11-38.
- Kwon Sung-ho and Kang Kyung-hee. 2008. "Practical Approach to Integrated Curriculum of Undergraduate Liberal Arts Education." *Journal of General Education* 2 (2): 7-24.
- Lee Hee-yong. 2011. "Development of Liberal Education Curriculum for the Convergent Knowledge Education." *Korean Journal of General Education* 5 (2): 11-37.
- _____. 2012. "Development Status of the Convergent Subject in General Education and Its Development Direction." *Korean Journal of General Education* 6 (4): 263-292.
- Lee Hee-Yong, Seo Min-gyu and Kim Jae-deuk. 2016. "A Study on Promoting Interdisciplinary Education of Humanities, Social Sciences and Arts in Korean Universities." *Culture and Convergence* 38 (4): 51-88.
- Lee Hee-yong, Yoon Ah-young and Kim Jae-deunk. 2014. "A Study on the Present State of Humanities and Arts Convergence Education in Korean Universities." *Studies in Humanities and Social Sciences* 44 (2): 183-223.
- Lee Nam-in. 2009. "Convergence Research and Contribution of Humanities." *Forum of Humanities Policy*, National Research Council for Economics, Humanities

- and Social Sciences 2: 31-34.
- Levy, Neil. 2011. *Neuroethics*. Trans. by Neuro Research Society. Seoul: Bada Press.
- Min Kyung-chan. 2009. "Convergence Research and Convergence Education." *Forum of Humanities Policy*, National Research Council for Economics, Humanities and Social Sciences 2: 35-38.
- Park Seung-ug. 2015a. "A Condition for Successful Convergence: Character of Convergent Thinking." *Autumn Academic Conference*: 449-459.
- _____. 2015b. "Liberal Arts Education and Creative Problem-solving." *Thinking and Expression* 8 (3): 7-31.
- Rhoten, Diana. 2004. "Interdisciplinary Research: Trend or Transition." *Items and Issues* 5: 6-11.
- Seo Min-gyu, Seo Deok-hee and Lee Hee-yong. 2014. "A Study on the Current Status of Humanities-Social Sciences Interdisciplinary Education in Korean Universities." *Korean Journal Educational Research* 52 (2): 81-115.
- Shin Dong-hee. 2011. *Smart Convergence and Consilience 3.0*. Seoul: Sung Kyun University Press.
- Snow, C.P. 2011. *The Two Cultures*. Trans by O Young-hwan. Seoul: Science Books.
- Son Dong-hyun. 2009. "The Basis of Integrative Education and the Role of University College." *Journal of General Education* 3 (1): 21-32.
- Suh Young-sik. 2012. "Philosophical Underpinnings and Theoretical Foundations of Convergent Education." *Journal of the New Korean Philosophical Association* 67 (1): 145-163.
- Weingart, Peter, and Britta Padberg, eds. 2014. *University Experiments in Interdisciplinarity: Obstacles and Opportunities*. Bielefeld: Transcript Verlag.
- Wilson, Edward O. 2005. *Consilience: The Unity of Knowledge*. Trans. by Choi Jae-cheon and Jang Dae-ik. Seoul: ScienceBooks.
- Yokoyama Chiaki. 2008. "The Contribution of Interdisciplinary Course to Convergent Education." *Korean Journal of General Education* 2 (1): 171-184.
- Yun Rin, Kim In-sun, and Choi Byung-uk. 2011. "A Study on Convergence Education Research: A Case of Hanbat National University." *Journal of Engineering Education Research* 14 (3): 55-60.