

A Study on Faculty's Perceptions on Convergence Education in N-University

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〈요 약〉

The purpose of this study was to investigate the perceptions of faculty as a foundation for establishing a convergence education model at N-University. In September 2019, a survey was conducted using an online survey system, and a total of 80 responses were obtained. SPSS 23 was used for analysis, and a t-test, ANOVA, and multiple regression analysis were performed. First, the female faculty were significantly more positive about linked-major expansion than were the male faculty. Second, assistant faculty were significantly more positive about convergence curriculum establishment than were associate faculty. Third, as a result of the multiple regression analysis, the preference for multimajor expansion was the most significant and positively influencing factor on the convergence curriculum establishment. Universities must provide various incentives to form a consensus among university faculty. The Ministry of Education must support individual universities through the establishment of clearer guidelines and a kind of convergence education support center.

Key words: College Students, Convergence Education, Linked Major, Multi Major, Faculty's Perception

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I . Introduction

In the rapidly changing era of the 4th Industrial Revolution, it is necessary to have integrated talents who actively respond to the environment and creatively solve the problems at hand. As society gradually developed and became more complex, it became undeniable that the need for multilateral academic research was growing more than ever as it faced the reality that it is difficult to meet the diverse social needs of the 21st century with a differentiated academic system. In the 21st century knowledge system where convergence is important, science, technology, and society are centered on ecosystems, and they exist as areas of convergence rather than separate scientific texts. Each university also emphasizes the necessity of convergence education, feeling that there is a limit to talent development for the 21st century with a differentiated academic system (Yoon et al., 2011).

The Ministry of Education, as a follow-up to the 'University Academic System Improvement Plan' prepared in December 2016 to allow the university to flexibly operate the undergraduate system, featured the main topics such as "Introduction of the convergence major system, multi-semester system, intensive class, and major selection system". The partially revised draft of the 「Enforcement Decree of the Higher Education Act」 was passed at the State Council in May 2017. Many universities have operated convergence majors, convergence departments, and convergence subjects in various forms.

In the case of Sungkyunkwan University, multidisciplinary convergence

design courses were opened to enhance the ability of five engineering department students to converge not only engineering design but also various aspects of consumer, social psychology, and management (Lee, 2010). Through the D-School program, the Stanford University in the United States provides education that enables students to comprehensively think about the arts, social sciences, and management based on engineering design methods. Handong University's GEA (Global Edison Academy) is evaluated as a representative example of convergence education. In GEA, the goal is to cultivate creative entrepreneurship through science and technology convergence, management and law convergence, arts and society convergence, vision and achievement education (Yoon et al., 2011).

Recognizing the importance of convergence education first, universities that have newly started convergence majors or developed and operated convergence courses have been convinced that there are many preparations and difficulties to realize convergence education. In addition, it was emphasized that institutional support is necessary because convergence education has many difficulties to be promoted by individual departments or individual faculty (Yoon et al., 2011). Convergence is recognized as a way to solve future problems that cannot be solved properly with the current partition system, but questions have been raised as to whether convergence is properly implemented in college curriculum (Shin, 2013). In the restructuring and introduction of the convergence education model, the agreement of faculty in a university will be the most important key for successful implementation as they could propose convergence curriculum to colleges or they could teach convergent courses for students.

N-University is currently in the process of constructing a model of convergence education suitable based on the experience of operating a linked-major in order to achieve educational innovation in response to changes and demands of the times. While reorganizing the major curriculum and the undergraduate system, a model for convergence education is tried to build, but it is not without the opposition and resistance of members. Among these, this study intends to analyze what the faculty's perception of convergence education at N-University is, and whether there is a difference by gender or job status in the perception.

II. Theoretical Backgrounds

1. Concept of Convergence Education

Convergence is a phenomenon in which different objects meet and become one (Choi, 2015). Several words such as 'composite', 'convergence', and 'integration' are mixed, and scholars have different perspectives and understandings. In 1972, the OECD agreed on the concept of convergence in three basic terms: multi-disciplinary, inter-disciplinary, and trans-disciplinary(Shin, 2013).

In the early days when interest in convergence emerged, scholars mainly focused on emphasizing the need for convergence as a way to overcome the lack of communication and exclusive barriers between disciplines in different fields. STEM and STEAM are the examples which aimed to transcend cross-relationship between science, technology, engineering, art,

and mathematics for the purpose of breaking down the natural sciences' standstill(Choi, 2016).

In the academic world, convergence means creating new knowledge by linking and integrating subdivided academic fields together. It started with a reflection that the current academic system was too fragmented to understand the phenomenon and that there was a limit to grasping the overall appearance and meaning(Shim, 2009). Convergence education is when two or more subjects or knowledge systems meet to form a completely new knowledge system or subject (Shin, 2013).

2. Ministry of Education's Proposal for Convergence Education

The Ministry of Education (2016) announced in December 2016 the "University Academic System Improvement Plan for Cultivating Creative Innovation Talents" and announced the "Introduction of convergence (shared) major system" in the section of "Various learning opportunities". The reason for the convergence major system is that students have limited opportunities to acquire new knowledge because of the mandatory programs for students. Although it is possible to introduce multi-majors, linked-majors, and student-designing majors, convergence majors are needed to respond to rapidly changing social needs.

The convergence(shared) major proposed by the Ministry of Education means that the department (major) and the department (major) jointly form a new major program, and the students belonging to take a new major rather than the original major. It is a form in which new majors can be

newly established in a software-like manner without the need for an organizational system such as a reorganization of departments(hardware). The opening of a new major without departmental reorganization and quota system is currently known as 'linked Major' at N-University. Although in the model proposed by the Ministry of Education, graduation is possible only by convergence majors without majoring in the original departments, in N-University, linked-major is a concept similar to multiple major and students doing linked-major have to take main courses of the original departments.

3. N-University Convergence Education Status

In the mid to long-term development plan, N-University draws a picture of convergence with the goal of cultivating future industry-based convergence working talents. 'Convergence' means to lead the innovation system by establishing a convergence system between departments, colleges, and academic fields in relation to the university's undergraduate system, educational content and methods, system and infrastructure. Currently, there is a linked-major as a concept of convergence education in N-University. It started with three majors (Medical Tourism, China Trade, AR/VR), and now there are China Trade and AR/VR. Linked-majors are operated with the concept of multiple majors, and 39 major credits are needed for linked-majors. Linked-majors are defined in Section 4, Article 44 of the Academic Regulations in N-University as "Majors that provide a new discipline by linking two or more departments." The Curriculum

Deliberation Committee can determine linked-majors and have a responsible faculty for each linked-major.

III. Research Methods

1. Subjects

The faculty's perception survey in N-university was conducted in September 2019 using the university's questionnaire system. 80 responses to online survey links were analyzed. 59(73.8%) respondents were male, and 21(26.3%) were females. 25(31.3%) were assistant faculty, 29(36.3%) were associate faculty, and 26(32.5%) were tenured faculty in the survey. As for the affiliates, 10 (12.5%) were of General Education College, 22(27.5%) of Engineering Colleges, 11(13.8%) of Art Colleges, 19(23.8%) of Business Colleges, and 18(22.5) of Health Colleges.

<Table III-1> Background Information of Survey Participants (N: 80)

Classification		No.	%	Classification		No.	%
Gender	Male	59	73.8	College	General Education College	10	12.5
	Female	21	26.3		Engineering College	22	27.5
Status	Assistant	25	31.3		Arts College	11	13.8
	Associate	29	36.3		Business College	19	23.8
	Professor	26	32.5		Health College	18	22.5

2. Questionnaire

The questionnaire was formed to find out the faculty's perception related to convergence education in this university. The questions to explore opinions on the expansion of multiple majors, opinions on multi-major obligations, opinions on linked-major expansion and opinions of convergence curriculum establishment were asked with a 4-point Likert (1=very negative, 2=negative, 3=positive, 4=very positive). The questions were like "What is your opinion on expanding of multiple majors in order to give students an opportunity to complete their course in various ways?", "2.What are your opinions on making multiple majors mandatory for students in our university?" etc.

3. Data Analysis

The survey data was analyzed using SPSS version 23.0. First, the perception of faculty' convergence education was analyzed by descriptive statistics such as the frequency, minimum score, maximum score, average and standard deviation. Second, the difference between faculty' perception of convergence education by gender and status was analyzed by t-test and ANOVA. Lastly, multiple regression analysis(ENTER) was performed to identify factors influencing the level of agreement with convergence curriculum establishment.

IV. Research Results

1. Faculty's Perception of Convergence Education in N-University

The survey for convergence education is largely based on a 4-point scale, which is a maximum of 4 points. The total average was 2.80. Multi-major expansion was the highest at 3.14 and the lowest at 2.54 for multi-major obligations, 2.79 for the expansion of the linked-curriculum and 2.86 for the convergence curriculum establishment were shown. Currently, N-University offers two courses as linked-major, and there are no other convergence courses.

<Table IV-1> Descriptive Statistics of Main Variables

Variables	No.	Minimum score	Maximum score	Mean	SD
Multi-major Expansion	80	2.00	4.00	3.14	0.59
Multi-major Obligation	80	1.00	4.00	2.54	0.76
Linked-major Expansion	80	1.00	4.00	2.79	0.72
Convergence Curriculum Establishment	80	1.00	4.00	2.86	0.69

2. Perceptual Differences on Convergence Education by Gender

Regarding the difference in the perception of convergence education between male and female faculty for the six variables, only statistically significant difference was shown for the linked-major expansion ($t=.046$,

p<.05). In terms of linked-major expansion, female faculty responded more positively than male faculty (male 2.71 and female 3.00). There were no statistically significant statistical differences for the other items.

<Table IV-2> Perceptual Differences on Convergence Education by Gender

Classification		N	M	SD	t
Multi-major Expansion	Male	59	3.07	0.58	.076
	Female	21	3.33	0.58	
Multi-major Obligation	Male	59	2.47	0.80	.218
	Female	21	2.71	0.64	
Linked-major Expansion	Male	59	2.71	0.79	.046*
	Female	21	3.00	0.45	
Convergence Curriculum Establishment	Male	59	2.81	0.73	.228
	Female	21	3.00	0.55	

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

3. Perceptual Differences on Convergence Education by Status

As a result of investigating the perceptual differences by status for 4 variables, as shown in <Table IV-3>, linked-major expansion (F=3.847, p<.05) and convergence curriculum establishment (F=5.414, p<.01) showed statistically significant differences. Regarding these 2 items, the assistant faculty's reaction was the most positive in order of professor and associate faculty. It appeared that the associate faculty showed the most conservative position for the matter of convergence curriculum establishment and the expansion of the linked-major.

<Table IV-3> Perceptual Differences on Convergence Education by Status

Classification		N	M	SD	f
Multi-major Expansion	Assistant	25	3.24	0.66	1.287
	Associate	29	3.00	0.60	
	Professor	26	3.19	0.49	
Multi-major Obligation	Assistant	25	2.64	0.81	.986
	Associate	29	2.38	0.73	
	Professor	26	2.62	0.75	
linked-major Expansion	Assistant	25	3.08	0.57	3.847*
	Associate	29	2.55	0.83	
	Professor	26	2.77	0.65	
Convergence Curriculum Establishment	Assistant	25	3.20	0.50	5.414**
	Associate	29	2.62	0.82	
	Professor	26	2.81	0.57	

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

4. Factors Influencing faculty' Perception on Convergence Curriculum Establishment

Enter multiple regression analysis was performed to find out the factors affecting on the agreement level of convergence curriculum establishment out of multi-major expansion, linked-major expansion, personal variables as gender, status, and school board member experience(Table IV-4). First, the level of explanations of the variables was 79.4% ($\Delta R^2=.794$), and this regression model was statistically significant ($F=61.912$, $p<0.001$). As a result of analyzing the standardization coefficient in order to grasp the relative influence, it was confirmed that the level of agreement on the expansion of the linked-major was the only significant factor ($\beta=0.882$,

$p < 0.001$). To confirm the multicollinearity problem, Tolerance and VIF statistics were checked. As a result, the Tolerance value was less than 1.0, the VIF value was less than 10, and the Durbin-Watson value was 2.114, which was close to 2, so there was no problem of multicollinearity.

<Table IV-4> Multiple-Regression Analysis for Factors Influencing faculty' Perception on Convergence Curriculum Establishment

	B	SE B	β	t	p	Model
(Constant)	.055	.239		.232	.817	$\Delta R^2 = .794$ $R^2 = .807$ $F = 61.912$ $p = .000$
Multi-major Expansion	.008	.065	.007	.121	.904	
linked-major Expansion	.953	.063	.882	15.062	.000	
Gender	.070	.089	.045	.780	.438	
Status	.088	.089	.059	.982	.329	
Board Member Experience	.026	.078	.018	.332	.741	

Dummy Gender(1=Male, 0=Female), Status-a(Assistant=1, Associate, Professor=0), Board Member Experience(1=Yes, 0=No)

V. Discussion and Conclusions

This study is intended to find out the faculty's perception of convergence education in the process of constructing the N-University convergence education model, as discussions are actively taking place along with the flexible policy of the academic system of the Ministry of Education. In the restructuring and introduction of the convergence education model, the agreement of faculty in a university will be the most

important key for successful implementation(Yoon, et al., 2011).

The faculty of N-University were at a high level of positive attitude toward multi-major expansion, but showed the lowest response to multi-major obligations. This means that they are in favor of expanding multi-major obligations but in the opposition against making it mandatory. In addition, it was found that the convergence major was considered a little more positive than the linked-major expansion, which means that they feel the need for taking convergence curriculum beyond the linked-major. As of 2020, it is being developed to the stage of accepting and examining proposals from faculty who wish to establish a convergence curriculum.

The female faculty' opinion on linked-major expansion was found to be significantly more positive than male faculty. This can be interpreted as a female faculty preferring stable operation by expanding the type of linked-major currently underway at N-University rather than making new convergence educational programs. By status, the assistant faculty with the shortest employment experience was the most positive and the associate faculty was the most conservative. The assistant faculty feel more the need for a convergence curriculum establishment that reflects recent educational trends. On the other hand, it can be seen that the associate faculty reflected the tendency to stick to the existing one rather than the new one. Assistant faculty participates more actively in the college's educational policies than associate faculty or professors(Yoon et al., 2011; Kim, et al., 2020).

When the factors influencing the consent of convergence curriculum

establishment were analyzed, the level of agreement with multi-major expansion was significant. This suggests that the position in favor of the diversification and flexibility of the academic system due to multi-major expansion is the biggest factor in the acceptance and support of the convergence curriculum. Therefore, it can be seen that it is necessary to inform the students that a flexible and diverse academic system is needed for student when seeking the understanding and consent of members for convergence curriculum establishment and expansion within the university. In Seo's study (2014), the most common type of interdisciplinary education in humanities-social science field in Korean universities was the linked-major. It seems that linked-major is the step to go up to convergence education program.

It is not easy to introduce and expand a convergence curriculum at a university. It is difficult and cautious to change the existing academic system, to reach consensus among internal members, and to make sure that no one is harmed by these changes. Therefore, it is necessary for university authorities to prepare incentives for the formation and participation of university faculty. Various incentives can be prepared through lecture responsibility time, overtime allowance, differentiation of lecture fees, and additional points for convergence education in teaching achievement evaluation(Yoon et al., 2011). In addition, clearer guidelines and support from the Ministry of Education are required. At the national and educational community level, it would be good to create a convergence education research support center to share a good case and to prepare a system to support university access in stages.

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국문요약

N-대학의 융합교육에 대한 교수의 인식조사 연구

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본 연구는 N-대학에서의 융합교육 모델 설정을 위한 기초연구로 교수들의 인식을 알아보고자 하는 것을 목적으로 하였다. 2019년 9월에 온라인 설문시스템을 이용하여 설문조사를 실시하였으며 총 80개의 응답을 얻었다. 연구분석을 위해서 SPSS 23을 사용하였으며, t-test, ANOVA, 다중회귀분석을 실시하였다. 첫째, 여교수가 남교수에 비해서 연계전공확대에 대해서 유의미하게 긍정적이었다. 둘째, 조교수가 부교수에 비해 융합교육과정 개설에 대해서 유의미하게 긍정적이었다. 셋째, 다중회귀분석결과 복수전공확대에 대한 선호도가 융합교육과정 개설에 가장 크게 유의미한 긍정적인 영향을 주는 요인으로 나타났다. 대학에서는 대학 교수의 공감대 형성과 참여를 위해서 다양한 인센티브를 제공하고, 교육부에서는 좀 더 명확한 가이드라인과 융합교육지원센터 등의 설립을 통해서 개별 대학을 지원하는 것 등이 요구된다.

주제어 : 대학생, 융합교육, 연계전공, 복수전공, 교수자 인식

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