

The Converging Effects of Complete Science Subjects in High School on the Grades of Basic Nursing Sciences and Major Nursing Subjects of Nursing Students of one University

In-Sook Jung

Dept. of Nursing, Chodang University

고등학교 과학과목 이수가 일 대학 간호학도의 기초간호과학 및 전공간호학성적에 미치는 융합적 효과

정인숙

초당대학교 간호학과

Abstract This study is to find the converging effects of the Complete Sciences Subjects(CSS) in high school before entrance to University on the scores of Basic Nursing Sciences(BNS) and Major Nursing Subjects(MNS) of 111 senior nursing students of one university. Using the SPSS 19.0, t-test, Pearson's correlation coefficient, multiple and simple linear regression were carried out. The mean scores of the groups that have completed the subjects of Biology I & II, Chemistry I & II were high on Anatomy, Physiology and Pathology. There was a significant difference between the group of completed Biology II and incompleting Biology II on the mean scores of MNS($p<.05$). There were positive correlations between the CSS and the scores of BNS and MNS, a moderate correlation between Chemistry II and BNS($r=.303$) and a strong correlation between BNS and MNS($r=.796$). Explanation rate of CSS on the scores of BNS, and MNS were 18.2%, 8.2% respectively, and on the scores of BNS on MNS was 63.8%. The result of this study can be used in assessing university entrance procedure after repeated study, extended location and more participants, and to use for making pre-school program for the freshmen who didn't CSS.

• Key Words : Convergence, complete science subjects(CSS), basic nursing sciences(BNS), major nursing subjects(MNS), nursing students, nursing curriculum

요약 본 연구는 고등학교과학과목(이하, 과학과목)이수가 대학 입학 후 기초간호과학과 전공간호학성적에 미치는 융합적 효과를 조사하기 위해 일 대학 간호학과 4학년 111명 대상으로 시도되었다. SPSS 19.0으로 t 검정, Pearson 상관계수, 다중 및 단일회귀분석을 시행한 결과, 생물 I, 생물 II, 화학 I, 화학 II 이수집단의 해부학, 생리학, 병리학 평균이 유의하게 높았고, 생물 II 이수집단의 전공간호학평균이 유의하게 높았으며, 과학과목이수와 기초간호과학 및 전공간호학 간, 화학 II 이수와 기초간호과학 간, 기초간호과학과 전공간호학 간 양의 상관관계가 있었다. 과학과목이수의 기초간호과학, 전공간호학에 대한 설명력은 각각 18.2%, 8.6%이었고, 기초간호과학의 전공간호학에 대한 설명력은 63.8%였다. 이 연구결과는 대상과 지역을 확대하여 반복연구 후 입학사정 시 참고자료로 활용될 수 있고, 입학 전 과학과목을 이수하지 않은 신입생의 기초간호과학의 효과적인 수업을 위한 준비프로그램의 기초자료로 사용될 수 있을 것이다.

• 중심어 : 융합, 과학과목이수, 기초간호과학, 전공간호학과목, 간호학생, 간호교육과정

*Corresponding Author : In-Sook Jung(irisleejung@naver.com)

Received August 29, 2016
Accepted October 20, 2016

Revised September 30, 2016
Published October 31, 2016

1. Introduction

1.1 Importance of the study

Nursing students are having difficulty adjusting in the department immediately after admission because of unfamiliar medical terminology[1], as well as excessive workload in the learning process of basic subjects like anatomy, physiology and etc. Heavy burden of major studies to be completed in a short period of time can lead to university life maladjustment[2,3]. Furthermore, in case of basic nursing science, there is a vast concept and content to be learned. They have not only insufficient teaching hours but also lecture focused theory-oriented education, which have made nursing students having difficulty in understanding the contents of the concept[4].

In Korean education, Basic Nursing Science is divided into anatomy, physiology, pharmacology, microbiology, and pathophysiology[5], which is an indispensable comprehensive knowledge in nursing students[6]. Being trained to be accurate and having logical thinking through experiment and observation in science curriculum before admitting nursing school can be the basis for understanding the pathophysiology of patients[7,8].

However, recently depending on changes in high school curriculum reform and nursing college entrance examination system the students who have not completed chemistry or biology have been enrolled in nursing department. Furthermore, depending on the increasing ratio, the lecture content of basic nursing science has not been able to be delivered more effectively[4,9,10].

In nursing curriculum, bioscience is the fundamental subject to clinical practice, that allows nurses to help in making decision through an understanding of the concepts and results of physiological diseases, and to integrate knowledge and intervention[11]. Lack of knowledge on the basic nursing science will act as impediments in making clinical guidelines based on evidence that will eventually act as barriers to appropriate care[12].

Changes in the healthcare environment due to the rapid development of science requires highly trained nursing professionals with the reasoning system based on the basic knowledge necessary to perform nursing practice[4]. In addition, nursing practice requires the interventions based on the knowledge of bioscience and to develop nursing along with own professional practice with multidisciplinary research are essential[6]. However, nurses have difficult in practice due to the lack of knowledge of basic nursing science[5,13,14]. In certain areas, nurses on continuing education survey showed the demand for more basic nursing scientific knowledge appeared the highest. It can be seen that the clinical nurses feel a lack of knowledge of basic nursing science in nursing services performed as professionals[15]. In nursing education through the qualitative improvement in basic nursing science education emission of experienced nurse, it is important to seek the quality and safety of patient care[16,17].

Although nursing students consider basic nursing science as the most difficult subject, it is needed to increase understanding of basic nursing science, which is the basis of evidence based nursing through well organised education in nursing curriculum[18,19]. In fact, sometimes some nursing students pointed out the need for a more in-depth study and prior learning in those lines by increasing the basic nursing science class[4].

Therefore, this study has been examining the effect of complete science subject in high school on nursing students' basic nursing science and major nursing grades, will be guidelines for students' assessment into entrance procedure for nursing school, for making pre-school program before admission in the nursing department and for nursing students to become more efficient nurses in the future[20].

1.2 Purpose of the study

The purpose of this study is to investigate the effect of completing science subjects in high school on the scores of basic nursing science and major nursing

subject of nursing students and the specific purposes are given below:

- 1) Find a difference on the scores in basic nursing science and major nursing subject, between a group of students who completed science subject in high school and those who did not.
- 2) Check the relationship between students who completed science subjects in high school and basic nursing science; and between who completed science subjects and major nursing subject scores.
- 3) Determine the effect of completing science subjects in basic nursing science and major nursing subject scores.

1.3 Definitions of terms

- 1) Complete Science Subjects in High School

The Science Subjects in High School in the Republic of Korea belongs to intensified optional subject included in common curriculum: Physics I and II, Chemistry I and II, Geoscience I and II, and Life and Science[21].

Whereas, in this study, high school science subjects refers to general science, biology I, biology II, chemistry I and chemistry II. These subjects are in line with basic nursing science and major nursing subjects.

- 2) Basic Nursing Science

Basic nursing science refers to anatomy, physiology, pharmacology, pathology, and microbiology[18].

In this study it refers to anatomy, physiology, pharmacology, pathology, microbiology are included in basic nursing science and nursing curriculum of University C.

- 3) Major nursing courses

It refers to Nursing Theory, Basic Nursing, Child and Youth Nursing, Adult Nursing, Women's Health Nursing, Mental Health Nursing, Community Health Nursing, Elderly Nursing, Nursing Management,

Rehabilitation Nursing, Critical Care Nursing, Nursing Statistics, Nursing Informatics, Nursing Research, Critical Care Skills, Health Care Policy and Health Regulations, etc[21].

In this study, it refers to the basic subjects like basic nursing, adult nursing, pediatric nursing, maternity nursing that is based on the physiology of the human body.

2. Methods

2.1 Design

This study is a descriptive research to examine the effect of completion of science subjects in high school on the scores of basic nursing science and major nursing subjects of the students who were fourth year in one university.

2.2 Participants and Data Gathering

This study was conducted in 2015 in University C in Chonnam area. The participants were fourth year students who learned basic nursing science and major nursing subjects. Participants learned every subject with the same professor.

The students who participated were 116 at the beginning of the study. After all the requirements, purpose of the study, method of the study, questionnaire and confidentiality of the study had been explained, the participation agreement had been signed and only voluntary participants may participate, there were 111 students participated.

2.3 Equipments of the study

General characteristics of study involved students, written questionnaires of completed science subjects and basic nursing science and major nursing grades of each person collected with their consent.

2.4 Analysis of Data

The collected data were analyzed using the SPSS

19.0 as follows .

- 1) General characteristics of the subjects calculated frequency, percentage, average and standard deviation through descriptive statistics.
- 2) The difference between completion of science subjects and basic nursing science and major nursing scores used independent t-test.
- 3) Relationship between complete science subject and basic nursing science scores; and relationship between complete science subject and major nursing scores, used Pearson correlation coefficient.
- 4) Effect of complete science subjects in basic nursing science and major nursing subjects were determined by multiple regression analysis and simple regression analysis.

3. Results

3.1 The general characteristics of the participants

Among 111 participants, 105 (94.6%) were female and 6 (5.4%) were male. On the basis of age, 93 (83.8%) were 21~23years, 4 (3.6%) were above 27 years and the mean age of all subjects was 23.29 (\pm 2.095) years. There were 57(51.3%) don't have religion, 39 (35.1%) were christian, more than 1/2 of total did not have their religion. The most common reason to admit nursing department was 'to consider job opportunity' 55 (49.5%) which was more than 34 (30.6%) who admit according to aptitude. By high school series humanities students were 44(39.6%), and science students were 67 (60.4%)<table 1>.

3.2 Basic Nursing Science scores according to Complete Science Subjects

There was a significant difference in pathology and pharmacology scores between the group that completed and incompleting general science; there was a significant difference in anatomy, physiology and pathology score between the group that completed and

incompleting biology; and there was significant difference in anatomy, physiology, microbiology, pathology scores between biology II completed and incompleting group ($p < .05$).

<Table 1> Characteristics of Participants <N=111>

Characteristics	Categories	n (%)	M(SD)
Sex	Male	6(5.4)	
	Female	105(94.6)	
Age	21-23	93(83.8)	23.29(2.095)
	24-26	14(12.6)	
	27 \leq	4(3.6)	
Religion	Christianity	39(35.1)	
	Catholic	9(8.1)	
	Buddhism	6(5.4)	
	None	57(51.3)	
Motive of Admission	to match Grade	14(12.6)	
	to fit Aptitude	34(30.6)	
	to consider Job opportunity	55(49.5)	
	etc	8(7.2)	
High School Department	Humanities	44(39.6)	
	Science	67(60.4)	

In addition there was a significant difference in anatomy, physiology, pathology scores between chemistry I completed and incompleting group; and there was a significant difference in anatomy, physiology, pharmacology, pathology and microbiology scores between Chemistry II completed and incompleting group ($p < .05$). Therefore, completion of each four subjects biology I, II, chemistry I, II influenced the anatomy, physiology, pathology scores, and completion of 5 science subjects had an effect on all pathology scores <table 2>.

3.3 Mean Difference of Major Nursing Subject scores according to Complete Science Subjects

Among the complete science subjects, the mean scores of the group that completed biology II was significantly higher than the group that did not complete science subject in high school. There was no significant difference in the mean scores between completed and incompleting group of other four science

<Table 2> The Scores of Basic Nursing Sciences according to complete science subjects

<N=111>

	General Science	Biology I	Biology II	Chemistry I	Chemistry II
	F(p)				
Anatomy	0.285(.444)	0.056(.001)	1.898(.019)	0.648(.002)	0.944(.001)
Physiology	4.562(.226)	0.011(.010)	1.962(.001)	0.066(.010)	0.859(.008)
Pharmacology	2.032(.011)	0.102(.423)	2.888(.159)	0.054(.229)	0.198(.028)
Pathology	0.469(.018)	0.023(.034)	0.454(.001)	0.042(.020)	0.146(.025)
Microbiology	5.344(.039)	0.064(.256)	0.958(.041)	0.217(.274)	0.409(.013)

Note: $p < .05$

<Table 3> The Scores of Major Nursing Subjects according to complete science subjects

<N=111>

	General Science	Biology I	Biology II	Chemistry I	Chemistry II
	F(p)				
Adult Nursing	0.013(.349)	0.004(.658)	2.051(.071)	0.103(.194)	0.666(.700)
Maternity Nursing	2.580(.138)	0.463(.475)	1.377(.054)	0.021(.207)	0.022(.272)
Child Nursing	0.247(.808)	0.230(.201)	2.799(.016)	0.213(.055)	0.287(.125)
Fundamental Nursing	2.460(.040)	1.797(.607)	1.899(.051)	1.963(.368)	3.070(.019)
GPA* of MNS**	2.049(.189)	0.494(.428)	2.286(.027)	0.235(.144)	0.395(.151)

Note: $p < .05$

*grade point average ** major nursing subjects

subjects. There was a significant difference in the mean scores between general science and chemistry II completed and incompleted group; there was a significant difference between the mean scores of pediatric nursing the completed and incompleted biology II ($p < .05$) <table 3>.

3.4 Correlation between Complete Science Subjects and Basic Nursing Science; Complete Science Subject and Major Nursing Science

It showed the moderate positive correlation between chemistry II completion and basic nursing science mean score ($r = .303, p = .001$), there was a weak positive correlation between completion of General Science ($r = .207, p = .029$), Biology I ($r = .232, p = .014$), Biology II ($r = .288, p = .002$), Chemistry I ($r = .239, p = .012$) and basic nursing science mean score. Among the science subjects between completion of science subjects and basic nursing science, there was moderate correlation between biology I and anatomy ($r = .305, p = .001$); biology II and physiology ($r = .307, p = .001$) and Pathology ($r = .305, p = .001$); chemistry II and anatomy ($r = .354, p = .001$) respectively. It showed a

weak positive correlation between general science and anatomy; biology I and anatomy; biology I and physiology; biology I and pathology; biology I and microbiology.

Related to science subject completion and major nursing scores, it showed weak positive correlation between biology II and major nursing subject scores ($r = .210, p = .027$). There was a strong positive correlation between average of basic nursing science scores and major nursing subject scores ($r = .796, p < .001$) <table 4>.

3.5 The effect of complete science subject on the scores of basic nursing science and major nursing subject

The Explanatory rate of the multiple regression model, to investigate the effect of complete science subject on the scores of basic nursing science and major nursing subject, was 18.2% ($p < .001$), Durbin-Watson value 1.911 can be seen to be independent as it is so close to 2, Range of VIF (Variation Index Factor) was 1.097 ~ 4.355 less than 10, so there was no problem in multicollinearity. Complete general science, biology I, II, and chemistry I for major nursing subject score was found to have explanatory

<Table 4> Correlations among Subjects

<N=111>

	General Science	Biology I	Biology II	Chemistry I	Chemistry II	Anatomy	Physiology	Pharmacology	Pathology	Microbiology	GPA of Adult Nursing	GPA of Maternity Nursing	GPA of Child Nursing	GPA of Fundamental Nursing	GPA of BNS	GPA of MNS
General Science	1															
Biology I	-.218 (.021)	1														
Biology II	-.153 (.108)	.565 (.001)	1													
Chemistry I	-.247 (.009)	.867 (.001)	.580 (.001)	1												
Chemistry II	.033 (.730)	.367 (.001)	.535 (.001)	.408 (.001)	1											
Anatomy	.073 (.444)	.305 (.001)	.222 (.019)	.293 (.002)	.354 (.001)	1										
Physiology	.142 (.136)	.244 (.010)	.307 (.001)	.245 (.010)	.252 (.008)	.648 (.001)	1									
Pharmacology	.241 (.011)	.077 (.423)	.134 (.159)	.115 (.229)	.208 (.028)	.412 (.001)	.541 (.001)	1								
Pathology	.224 (.018)	.207 (.029)	.305 (.001)	.221 (.020)	.213 (.025)	.512 (.001)	.670 (.001)	.607 (.001)	1							
Microbiology	.196 (.039)	.109 (.256)	.194 (.041)	.105 (.274)	.236 (.013)	.564 (.001)	.774 (.001)	.566 (.001)	.739 (.001)	1						
GPA of Adult Nursing	.090 (.349)	.042 (.658)	.172 (.071)	.124 (.194)	.037 (.700)	.500 (.001)	.632 (.001)	.600 (.001)	.624 (.001)	.578 (.001)	1					
GPA of Maternity Nursing	.142 (.138)	.069 (.475)	.183 (.054)	.121 (.207)	.105 (.272)	.438 (.001)	.681 (.001)	.564 (.001)	.686 (.001)	.648 (.001)	.806 (.001)	1				
GPA of Child Nursing	.023 (.808)	.122 (.201)	.229 (.016)	.183 (.055)	.147 (.125)	.510 (.001)	.639 (.001)	.587 (.001)	.624 (.001)	.645 (.001)	.837 (.001)	.819 (.001)	1			
GPA of Fundamental Nursing	.195 (.040)	.049 (.607)	.186 (.051)	.086 (.368)	.223 (.019)	.502 (.001)	.664 (.001)	.607 (.001)	.641 (.001)	.647 (.001)	.721 (.001)	.744 (.001)	.725 (.001)	1		
GPA of BNS**	.207 (.029)	.232 (.014)	.288 (.002)	.239 (.012)	.303 (.001)	.756 (.001)	.898 (.001)	.726 (.001)	.854 (.001)	.891 (.001)	.706 (.001)	.733 (.001)	.725 (.001)	.739 (.001)	1	
GPA of MNS***	.125 (.189)	.076 (.428)	.210 (.027)	.140 (.144)	.137 (.151)	.532 (.001)	.718 (.001)	.645 (.001)	.707 (.001)	.690 (.001)	.923 (.001)	.930 (.001)	.923 (.001)	.871 (.001)	.796 (.001)	1

Note: r(p)

*grade point average **basic nursing sciences

*** major nursing subjects

<Table 5> The Effects of Complete Science Subjects on the Scores of Basic Nursing Sciences and Major Nursing Subjects

<N=111>

	Basic Nursing Sciences					Major Nursing Subjects				
	B	S.E	β	t(p)	VIF	B	S.E	β	t(p)	VIF
(constant)	71.241	2.242		31.771 (.001)		78.581	1.686		46.601 (.001)	
General Science	5.286	1.848	0.264	2.860 (.005)	1.097	2.467	1.378	0.172	1.790 (.076)	1.065
Biology I	1.001	3.172	0.057	.316 (.753)	4.126	-2.962	2.399	-0.233	-1.234 (.220)	4.120
Biology II	2.441	1.847	0.159	1.321 (.189)	1.853	2.418	1.276	0.219	1.895 (.061)	1.543
Chemistry I	1.755	3.124	0.103	.562 (.576)	4.355	3.133	2.344	0.257	1.337 (.184)	4.276
Chemistry II	2.381	1.747	0.146	1.363 (.176)	1.475					
R ² =0.182, F=4.688, p<.001					R ² =0.086, F=2.478, p<.048					

rate of 8.6% ($p < .05$). Durbin-Watson value 2.003 so close to 2 to be considered as independent, Range of VIF is 1.065~4.276 less than 10, so there was no problem in multicollinearity (table 5). The Explanatory rate in simple regression model, to investigate the effect of basic nursing science on the scores of major nursing subject scores, it was 63.3% ($p < .001$) (table 6).

<Table 6> The Effects of Basic Nursing Sciences on Major Nursing Subjects <N=111>

	Major Nursing Subjects			
	B	S.E	β	t(p)
(constant)	36.283	0.335		10.878 (.001)
Basic Nursing Sciences	0.572	0.042	0.796	13.709 (.001)
$R^2=0.633, F=187.929, p<.001$				

4. Discussion

This research, investigated the effects of complete science subject in high school before admitting to nursing department on the scores of basic nursing science and major nursing subjects.

Based on the science subject completion, in analysis on the mean scores of basic nursing science, the mean score of pathology of group that completed each 5 subject was statistically significant compared to the group that did not complete science subject. Completion of biology I, chemistry I and biology II showed significant differences in pathology, anatomy and physiology scores. There was a significant differences between complete chemistry II and anatomy, physiology, pharmacology, pathology and microbiology.

Due to the lack of related studies, it was not easy to do the comparative analysis. But, based on this study, having complete science subjects in high school has positive effect in studying basic nursing science. It is similar with the following results of studies that there is a correlation between the complete science subjects before admission to medical school. and the score of clinical subjects[22]; National Certificate of Education

Attainment in biology in high school were predictors of year 1 GPA in nursing, pharmacy, and health sciences programmes[23].

And, there are positive correlation between complete science subjects and nursing subjects[7]. Therefore complete science subjects in high school is necessary and there is a need to complement for a broad content and in depth study of bioscience[24,25]. Knowledge of anatomy, pathology, pharmacology, physiology and microbiology is important to monitor the condition of patient and for efficient job activity[18], as basic science knowledge is the most important factor for the quality and efficiency of patient care and safety in clinical practice, research, education field during implementation of nursing activity[26].

In this study completion of general science, chemistry II and biology II showed significant differences in basic nursing scores and pediatric nursing score respectively. This is related to the result of research that showed the significant correlation between complete science subject and nursing study, and passing the nursing national examination[7]. Particularly the group of the students who completed biology II have significantly higher score deem the necessity to consider prerequisite subject during admission in nursing department.

In this study, based on the group of complete science subject in correlation analysis of basic nursing science and major nursing subject, it showed the moderate positive correlation of completion of biology I and chemistry II in anatomy, and completion of biology II in physiology and pathology scores. Our results are similar with these; There is a strong correlation between biology test score of medical school in admission and the GPA of 1st and 2nd year of medical school students; There is a correlation between biology score in pre-medical school and comprehensive medical licensing exam of 1st and 2nd year medical students. There is a strong correlation between complete science subject in high school and biology score in entrance exam of medical school and the GPA (general point

average) of 1st and 2nd grade of medical school[22]. In addition, this study showed a strong correlation between the scores of basic nursing science and major nursing subject, as a result of Higgins B for the successful completion of nursing process attempting the effective learning of basic nursing science before admission can be regarded as an important point[7] after identifying students' areas of weakness in the academic side.

In this study, the explanatory rate of the multiple regression model based on the results of complete science subject in basic nursing science was 18.2% and general science, biology I, II, chemistry I in major nursing subject was 8.6% respectively. In addition, it was confirmed that the basic nursing science score in the major nursing subject has an explanatory rate of 63.3%. Since the participants of this study were limited in one university, in one area, in order to generalize the result of this study, we have to regard and consider a bigger group and a need to repeat the study, with extended location and increasing number of participants. The results of this study, complete science subject in high school affects major nursing subject and major medical subject, have something in common with the following results; complete science subjects affects on the scores of basic nursing science and major nursing subject and national exam of nurses[7]; there is a correlation between complete science subject and the score of 2nd grade clinical practice osteopathology comprehensive medical license exam[22]. Recently, many universities and nursing schools are increasingly incorporating non-academic criteria into their admission processes. So, significant numbers of nursing students encounter difficulties in understanding and applying basic nursing science. As results of this study there is a need to help them preparing through understanding and applying the knowledge in delivering care in clinical practice.

5. Conclusions

This study investigated the converging effect of

complete science subject in high school on the scores of basic nursing science and major nursing subjects, targeting the nursing students who had different science subjects in high school before they learn too many basic nursing sciences and major nursing subjects in a short period of time after the admission to nursing schools.

Based on the complete science subject, there was a partly significant difference in mean scores of basic nursing science and major nursing. There was positive correlation between complete science subject and mean scores of basic nursing science, and there was also a strong correlation between the mean scores based on basic nursing science and major nursing subjects. The explanatory rate of the multiple regression model based on the results of complete science subject in basic nursing science was 18.2% and general science, biology I, II, chemistry I, in major nursing subject was 8.6% respectively. and it was confirmed that the basic nursing science score in the major nursing subject has an explanatory rate of 63.3%. Finally, complete science subject affects not only on the scores of basic nursing science and major nursing subjects, but basic nursing science has an converging effect on major nursing subjects.

Therefore, complete science subjects in high school can be regarded as the influencing factor in completing nursing course. In addition, results of the study after repeated studies expanding the participants and area can be used not only as the reference materials in nursing admission assessment but can be used as a base line data for the new students who have not completed the science course before admission to help them in basic nursing course.

REFERENCES

- [1] E. A. Kim, K. I. Park, "Factor affecting adjustment of freshmen nursing students to College Life", The Journal of Korean Academic Society of Nursing Education, Vol. 20, No. 2, pp. 234-243, 2014.

- [2] Y. K. Kwag, "Effect of self-esteem, ego-resilience, social support on nursing student's adjustment to College", *Journal of the Korea Academia-Industrial cooperation Society*, Vol. 14, No. 5, pp. 2178-2186, 2013.
- [3] Y. J. Kim, "Type of Coping with Stress of Nursing Students", *Journal of the Korea Convergence Society*, Vol. 5, No. 3, pp. 29-39, 2014.
- [4] J. S. Yoo, J. A. Ahn, K. S. Yeo, S. H. Chu, "The Study to Reorganize the Course of Basic Nursing Science in a College of Nursing", *Journal of Korean Biologic Nursing Science*, Vol. 10, No. 2, pp. 162-169, 2008.
- [5] M. A. Choe, G. J. An, J. S. Jeong, "A Coorientation Analysis of Perception on Bionursing between Clinical Nurses and Nursing Professors", *Journal of Korean Biologic Nursing Science*, Vol. 14, No. 3, pp. 212-220, 2012.
- [6] E. C. Cármió, "Basic sciences and nursing", *Review of Latin American Enfermagem*, Vol. 19, No. 5, pp. 1061-1062, 2011.
- [7] B. Higgins, "Strategies for lowering attrition rates and raising NCLEX-RN pass rates", *Journal of Nursing Education*, Vol. 44, No. 12, pp. 541-547, 2005.
- [8] S. H. Park, "The Effectiveness of Learning Community for the Development of Convergence of University Students", *Journal of digital Convergence*, Vol. 13, No. 9, pp. 29-37, 2015.
- [9] K. S. Lee, E. O. Choi, J. S. Jeong, "Survey of Curriculum for 4 Subjects (Structure and Function of Human Body, Clinical Microbiology, Pathophysiology, & Mechanism and Effect of Drugs) of Biological Nursing in Undergraduate Nursing Education", *Journal of Korean Biologic Nursing Science*, Vol. 16, No. 1, pp. 17-25, 2014.
- [10] H. Y. Jung, "The Study on Essential Competencies for University Students in consideration of University Specialization and Major: Focusing on Hotel and Tourism Management", *Journal of digital Convergence*, Vol. 13, No. 10, pp. 19-32, 2015.
- [11] E. Shackell, M. Gillespie, "The Oxygen Supply and Demand Framework: a tool to support integrative learning", *Dynamics*, Vol. 20, No. 4, pp. 15-19, 2009.
- [12] A. King, J. J. Stellar, A. Blevins, K. N. Shah, "Dressings and Products in Pediatric Wound Care", *Advanced Wound Care (New Rochelle)*, Vol. 3, No. 4, pp. 324-334, 2014.
- [13] J. M. Kim, Y. S. Choi, "Effect of practice education using the simulator, critical thinking, problem solving ability and nursing process confidence of nursing students", *Journal of digital Convergence*, Vol. 13, No. 4, pp. 263-270, 2015.
- [14] N. S. Ha, S. Y. Pak, M. J. Lee, "A literature Review (1996-2014) on Critical Thinking in Korean Nursing Education for the Era of Convergence", *Journal of digital Convergence*, Vol. 13, No. 9, pp. 341-349, 2015.
- [15] K. S. Lee, "The needs of continuing education among hospital nurses in Dae-Jeon", M. A. dissertation, Eulji University, 2011.
- [16] R. L. Aäri, M. Ritmala-Castrén, H. Leino-Kilpi, T. Suominen, "Biological and physiological knowledge and skills of graduating Finnish nursing students to practice in intensive care", *Nurse Education Today*, Vol. 24, No. 4, pp. 293-300, 2004.
- [17] H. S. Oh, "The Effects of Team-Based Learning on Outcome based Nursing Education", *Journal of digital Convergence*, Vol. 13, No. 9, pp. 409-418, 2015.
- [18] M. A. Choe, "Special Topic : Perspectives on bionursing science", *Perspectives in Nursing Science*, Vol. 9, No. 2, pp. 61-70, 2012.
- [19] E. H. Park, H. R. Park, H. S. Kim, "Approaches to Convergence Curriculum for Healthcare-Affiliated Students with Clinical Competence Assessment Program", *Journal of the Korea Convergence Society*, Vol. 6, No. 3, pp. 76-86, 2015.
- [20] M. H. Han, S. M. Bae, "A study on the relationship between college adaptation, academic achievement, and admission type in one nursing school", *The Journal of Korean academic society of nursing education*, Vol. 21, No. 1, pp. 46-53, 2015.
- [21] <https://www.google.co.kr/webhpsourceid=navclient>

&hl=ko&ie

- [22] D. Dixon, "Prediction of Osteopathic Medical School Performance on the basis of MCAT score, GPA, sex, undergraduate major, and undergraduate institution," *Journal of American Osteopathic Association*, Vol. 112, No. 4, pp. 175-181, 2012.
- [23] B. Shulruf, M. Li, J. McKimm, M. Smith, "Breadth of knowledge vs. grades: What best predicts achievement in the first year of health sciences programmes?" *Journal of Educational Evaluation for Health Professions*, 2012. doi: 10.3352/jeehp.2012.9.7.
- [24] J. Salvage-Jones, J. Hamill, M. Todorovic, M. J. Barton, A. N. Johnston, "Developing and evaluating effective bioscience learning activities for nursing students", *Nursing Education Practice*, Vol. 19, pp. 63-69, 2016.
- [25] M. Birks, N. Ralph, R. Cant, E. Hillman, T. Y. Chun, "Teaching science content in nursing programs in Australia: a cross-sectional survey of academics" *Bio Med Central Nursing* Vol. 14, No. 24, 2015. doi: 10.1186/s12912-105-0074-x
- [26] C. G. Kim, M. K. Cho, S. M. Park, "A study on perceived connectivity between pharmacological knowledge and clinical practice, and the need for pharmacology education contents in undergraduate courses among clinical nurses", *Journal of Korean Biologic Nursing Science*, Vol. 16, No. 1, pp. 41-51, 2014.

저자소개

정 인 숙(In-Sook Jung)

[정회원]



- 1988년 3월 : Graduate School of AUP(Master of Science in Nursing)
- 2004년 8월 : 가톨릭대학교 대학원(간호학박사)
- 2013년 3월 ~ 현재 : 초당대학교 간호학과 조교수

<관심분야> : 1. 아동간호 2. 기초간호과학 3. 간호교육방법