

## A study on the nursing student experience PBL class using Q methodology



MeeSuk Wang\*

Department of Nursing, Hanseo University, Seosan, South Korea

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### ABSTRACT

Students who enter universities should be trained as human resources needed in the present society. In addition to the chronological changes, nursing students are required to solve problems, have creative thinking, cooperation, and have interpersonal relationships in the field. Nursing students also complain of difficulties in interpersonal and emotional relationships. Nursing students' active learning abilities and problem-solving are needed to perform work after graduation. 36 third- and fourth-year university students attending H University in Chungcheongnam-do were required to classify 35 statements about their PBL Class experience. The statement used 35 sentences, which were finally extracted after reviewing the sentences collected through literature and interviews by university students by two major professors, two Ph.D. students, and five nursing students. The collected data are analyzed for Q factors using the QUANAL1 PC Program. The analysis results of PBL classes experienced by Nursing Students were divided into three types. Three types of PBL Class experiences for Nursing Students are "fulfillment in cooperation and problem-solving," "the importance of collecting diverse feedback," and "lack of knowledge and difficulty in communication." To cultivate talented individuals in the era of the fourth industrial revolution, various learning methods are recommended to convert thinking through new learning, personality, and understanding majors. Therefore, we would like to check the subjective consciousness of nursing students who have experienced PBL Class and provide basic data on various learning problems by characteristics and development and operation of the learning process through differences in consciousness among individuals.

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### 1. Introduction

As the core competencies needed to live in 21st-century society, the importance of this is also re-emphasized in the World Economic Forum in 2018 Future Jobs Report. It is changing from existing knowledge acquisition education to practical education using knowledge. It requires a nurse with a certain level of work capacity. Especially in the education world, how to teach and measure creativity and critical thinking skills is emerging as an urgent concern (Bean and Melzer, 2021). According to the 2020 Education Development Institute's survey of exploratory research on teaching and learning quality improvement

strategies and curriculum survey of teaching and learning, the percentage of respondents who said they were "satisfied" with the overall satisfaction of major classes averaged 2.84 points out of 5, and the percentage of respondents who said they were "satisfied" in 2014 was 64.3% with 5 points, a steady decline compared to 83% in 2011 (Kim et al., 2020).

Choosing a major in university is the first step in finding the best job for you in modern society. In a society where knowledge and information are overflowing and rapidly changing, it is urgent to identify and apply the characteristics of learners. It has become easier for learners to find any information with a cell phone or laptop in an Internet-enabled area. For training talented individuals for future society, universities are applying various new forms of teaching-learning methods to university classes, such as flipped learning, blended learning, and discussion. Despite these efforts, however, textbooks consist of as many teaching-learning methods as possible, and learners perceive that it is natural for teachers to explain all parts of the textbooks. Still, not only teachers but

\* Corresponding Author.

Email Address: [mwang@hanseo.ac.kr](mailto:mwang@hanseo.ac.kr)<https://doi.org/10.21833/ijaas.2022.06.009>

Corresponding author's ORCID profile:

<https://orcid.org/0000-0002-0491-4008>

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also learners in the classroom prefer traditional teaching-learning methods and feel stable.

In a teacher-centered information top-down class, learners listen passively, understand, and end up making a summary of the main points. Self-directed learning through free and creative thinking activities was impossible. Students living in the future need to be more flexible in dealing with changes in knowledge and require autonomous thinking, learning, and problem solving skills to adapt to reality (Barrows, 1994). Times change and universities in the Fourth Industrial Revolution society require talent with problem-solving skills, self-directed learning, cooperation, and creativity. We are trying to apply various teaching methods to train these talents. Most university students prefer traditional test methods in evaluation. This seems to be related to the tendency that values for fair evaluation are important in the competitive culture that university students have experienced over the years. The application of alternative class forms to the current generation of university students is perceived as uncertainty in the evaluation criteria and tends to feel unfair to the evaluation results. Due to the lack of clear assessment tools in the PBL class, many university students perceive the grading method according to lecture courses and paper-based examinations as fair. It is difficult to resolve conflicts between small groups where participation and cooperation are emphasized, and team members from team-based cooperative activities. Some students demand to move to another team due to conflicts between team members.

Problem-based learning (PBL), which emphasizes the responsibility of individual learners in team-based cooperative learning, is a teaching-learning method in which learners collaboratively and voluntarily explore and collect necessary information for surrounding real-world problems or problem situations to find appropriate solutions (Lee, 2018). Based on the modern constructivist theory of cognitive development, knowledge is being applied to educational sites as an alternative to lecture-oriented traditional teaching-learning methods, attracting attention that knowledge is not provided externally but is made up from cognitive and social interactions. It is very important to solve the actual problems at a time when the complexity of health care sites and patient safety rights are emphasized. Knowledge, skills, and attitudes must be integrated to solve problems. It is an effective way to provide nursing students with opportunities to acquire these abilities (Morales-Mann and Kaitell, 2001; Kang et al., 2018).

According to a precedent research report on PBL classes, PBL classes have a positive impact on learners' learning motivation and creative problem-solving skills, and the 'participative' learning type has a high correlation with learning motivation and creative problem-solving skills. It can develop a learning model that can conduct self-directed discussion activities through PBL classes and found that PBL classes are effective in improving learners'

cooperative skills, self-directed learning skills, and communication skills (Allen et al., 2011). Looking at several precedent types of research related to PBL classes, it was found that comparative research by class type including PBL classes and the effects of PBL classes are the main focus. It suggests to learners that the characteristics of individual learners should be considered and more diverse team-based activities should be developed in order to enhance the effectiveness of PBL classes. However, research on the analysis of PBL class's effectiveness according to the characteristics of individual learners who are the main subjects of learning is insufficient. Therefore, in order to achieve more meaningful academic performance in university classes, it is necessary to provide a variety of classes suitable for individual learners' learning styles and motivations. After developing and applying women's health nursing major classes to nursing students as PBL, data were collected and analyzed through a reflection of students, journals, lecture evaluation questionnaires, and observation logs of researchers. After graduation, there will be a gap between clinical and university education, and changes are also needed in nursing education to improve the lack of clinical knowledge and skills, problems of decreased job performance in clinical work without the knowledge, and lack of coping ability in emergency situations to foster nurses who adapt well to clinical practice (Milentijevic et al., 2008).

Accordingly, this research was conducted to identify learners' creative problem-solving abilities according to their learning types according to PBL classes and to present basic data for differentiated curriculum development and professors' diverse feedback.

## 2. Methods

### 2.1. Research design

To achieve the goal of the research, it is to examine literature, media data, and precedent research on university students' PBL, and then discover subjectivity for nursing students to view the type of subjective perception of PBL classes. The method invented by Stephenson is to objectively measure an individual's attitude or subjectivity to a particular object. A Q methodology was used to classify types for PBL classes of Nursing Students and explore their characteristics. The Q-sort obtained through the sorting process is analyzed through Q-factor analysis using the PQ method. In this way, the experience of PBL classes experienced by nursing students was applied.

### 2.2. Research instrument

The Q population was derived through domestic and international relevant literature reviews, open questionnaires, and individual in-depth interviews

to extract comprehensive statements about PBL classes that nursing students have experienced. Data were collected using open questionnaires and 100 sentences were drawn. In order to collect various opinions on PBL classes, PBL classes were conducted at H University and extraction was conducted for university students who were interested in and willing to participate in this survey. After explaining the purpose of the research to seven nursing students, the focusing interview was conducted to draw 90 sentences. Through this process, 190 Q populations were derived. In addition, a total of 80 Q populations were derived from the integration of literature collected through domestic and international relevant literature reviews. For the selection of Q samples in this research, 20 to 100 samples or 35 to 60 samples are common. Based on a total of 270 Q populations extracted under this premise, the final 35 Q samples with high discrimination were selected through a secondary review and refinement process by one Q methodology expert, two nursing professors, two master's students, and 10 Nursing Students.

### 2.3. Data gathering procedure

Q-methodology is a qualitative survey that emphasizes individual subjectivity, focusing not on individual differences, but on individual internal semantics or significance, based on the small sample doctrine, which is that as the P sample increases, a

number of people are biased toward one factor and the characteristics are not clearly revealed (Lim et al., 2022). The P sample of this research selected a total of 36 H nursing students who agreed to participate in the research.

A total of 270 questions were extracted from the Q sample, of which 180 questions were through literature and journals, and 90 questions were directly interviewed by nursing students. This process extracts a total of 190 Q populations. The 270 sentences related to the university student adaptation program were extracted into 100 sentences through two nursing professors, two Ph.D. students in nursing, and five nursing students. For the final 100 sentences, nursing students were asked to choose sentences for PBL classes, and the final 35 sentences were selected. The final 35 selected Q samples were constructed to balance positive, neutral, and negative. The classification of this item is the process of forcibly distributing the extracted Q sample to the Q sample distribution table, and the principle of Q methodology is used to approximate a normal distribution. After reading the 35 samples prepared, the cards most similar to their views were equally forced to be distributed equally, with 2 positive (+6) cards, 6 neutrals (0) cards, and 2 active negatives (-6) cards. The following scores were +6 with 13 points, followed by 12, 11, and 10 points, neutral with 5 points, -5 with 1 point, and then followed by 2, 3, and 4 points (Fig. 1).

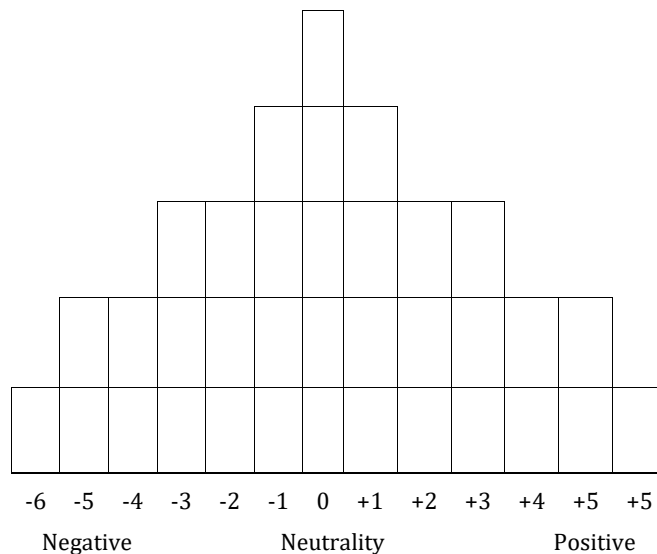


Fig. 1: The classification of this item is the process of the Q sample distribution table

The Q classification process is the process by which research subjects selected for the P sample create an operant definition of the PBL program by classifying it as a forced normal distribution method with statements from the Q sample. It is called Q-sorting. Classification is the process by which individuals model their own mental attitudes toward complex topics or issues, each respondent will read the statement and then force it into a constant distribution to do a forced normal distribution. First of all, the day when data collection is available was

allocated for research. Then, the subject selected as P-sample collected data by consulting on the time to respond. Q cards were given and collected using them. The place for data collection was selected as the place that the subject wanted, such as a meeting room or a lounge space that was quiet and could maintain the privacy of the participants, and the time was determined by the agreement at the desired time that does not interfere with the fatigue of the subject. Data were collected using Q cards for patients who were conscious, communicable, and

agreed to this research. The time it took each subject to complete the Q-classification was mostly 30-40 minutes.

## 2.4. Data analysis

The collected data were based on cards forcibly distributed into the Q-sample distribution table, scoring the transformed scores given to each of them, such as -4 with 1 point, neutral with 5 points, and +5 with 9 points. The transformed scores given were coded in the order of Q sample numbers and processed as principal factor analysis by the PQ method. To decide the ideal number of factors, based on the Eigenvalue of 1.0 or higher, the number of factors was variously inputted, and three types, which were determined to be ideal, were finally selected from the calculated result.

The data analysis was processed using PQ methods, and the Q-factor analysis was conducted using the principal component factor analysis method. The mean and standard deviation of the factor were analyzed using the SPSSWIN 21.0 program.

## 3. Results

### 3.1. Characteristics of each type of university life adaptation program recognized by nursing students

The Q-factor analysis of the subjectivity of PBL classes experienced by nursing students using the PQ method showed three types.

To analyze the subjectivity of the perceived PBL classes experienced by nursing students by type, the characteristics of each type were first described, focusing on statements belonging to each type. The Q response of the P sample (research participants) was divided into high and low questions and two factors were extracted. In the Q methodology, the higher the factor weight among people belonging to each type, the more typical or ideal the type represents.

To analyze the characteristics of each type of PBL class, the classified statement was interpreted with meaning focusing on statements with a z-score of  $\pm 1.00$  or more. In this research, 16 persons with a factor weight of 1.0 or higher belonged to Type 1, 14 persons to Type 2 and 6 persons to Type 3 (Table 1).

The subjects were 28 women and 8 men, a total of 36. The average age was 23.3 years old, and the average experience frequency of PBL classes was 1.4 times. Religion was found to be 9 Christians, 6 Catholics, 2 Buddhists, and 19 those without religion. A total of 36 people participated in the study. As a result of analyzing the subjectivity of nursing students' PBL classes using the PQ method, it appeared in three types, accounting for 52.98% of the total variable.

The first type was 44.4%, the second type was 38.9%, and the third type was 16.7%. As the first type has 44.4% explanation power, it can be seen as

the type that most accounts for the experience of PBL classes in nursing students (Table 2). Out of the total 36 people surveyed, 16 were identified as Type 1, 14 as Type 2, and 6 as Type 3. In this research, high and low questions were grouped into one group for three types of factors for the perception of PBL classes.

The correlation coefficients between the three factors are shown in Table 3. This shows the degree of similarity between each type, and of the three types, the correlation coefficient of Type 1 and Type 2 is .546, Type 1 and Type 3 are .606, and Type 2 and Type 3 are .423. Type 2 and Type 3 correlated in large quantities compared to other types. It can be seen that each type exists independently. However, for Type 2 and Type 3, the correlation between factors in the Q method, unlike the factor analysis method in quantitative studies, focuses on finding factors without presupposing full independence between them, so there is no controversy over-extraction methodology according to high and low correlation.

### 3.2. Analysis for each type

To present the subjectivity types of PBL classes experienced by nursing students calculated by these types of analysis methods are as follows (Table 4).

### 3.3. Analysis by type

We would like to check and categorize the perception of nursing students who have experienced PBL classes. Q sorting was conducted for the Q sentences distributed. The type was produced through factor analysis. To present the types of PBL class experiences for nursing students produced by factor analysis methods are as in the following sections.

#### 3.3.1. Cooperation and fulfillment in problem-solving

The career exploration classified as Type 1 consisted of 16 people (Table 3). To better understand the characteristics of Type 1, the results were analyzed as follows. The most positive aspects of Type 1 were 'I learned how to approach the problem by cooperating with team members' (1.87), 'The process of solving problems by collecting opinions from each other through lead instruction was good (1.95), 'It has become possible to analyze the problem from various angles' (1.62), 'It was able to feel fulfillment in solving problems between team members' (1.28) and 'It was able to reach an efficient and reasonable outcome' (1.07), and 'It was able to learn to respect each other's opinions among team members' (1.04).

The most negative aspects of Type 1 were 'There was a conflict of opinion and difficulty in communication between the team members' (-2.21), 'I wanted to try to solve the problem repeatedly' (-

1.63), 'There was difficulty in approaching from a variety of perspectives due to lack of prior knowledge of the problem' (-1.56), 'It was most difficult to bring the opinions of the team members together' (-1.55), 'It took a lot of time to

communicate through team activities' (-1.31), The process of looking at the problem and thinking of IDEA was difficult (-1.28), and the subjects with the highest factor weights for Type 1 were No. 29 (1.5215) and No. 22 (1.1175).

**Table 1: Demographic characteristics, PBL class factor weight for P-sample (N=36)**

Classification	Characteristics	Weight	Gender	Age	PBL Experience(No)	Religion
Type 1	2	.4785	Female	22	2	Catholic
	3	.3745	Female	23	2	Catholic
	5	.6791	Male	21	2	None
	10	.4176	Female	22	2	Christian
	13	.6236	Male	23	2	Christian
	14	.3776	Female	24	1	None
	18	.4212	Female	33	2	Christian
	19	.5643	Male	24	1	Catholic
	22	1.1175	Female	25	1	None
	24	.6270	Female	22	1	Christian
	26	.4465	Female	23	1	Christian
	27	.7012	Female	24	1	None
	29	1.5215	Female	24	2	None
	32	.3578	Female	23	2	None
	33	.6065	Female	22	2	Buddhism
Type 2	36	.6707	Female	23	2	Catholic
	1	.6124	Male	23	1	None
	4	.9135	Female	22	1	Catholic
	7	.5406	Female	24	1	None
	8	1.0378	Male	25	0	None
	9	.5261	Female	22	1	Christian
	12	.6495	Female	23	1	None
	15	.3693	Female	23	1	Christian
	16	.3642	Male	23	2	Catholic
	17	.4285	Female	24	2	None
	20	.1520	Female	24	1	None
	21	.7505	Female	23	2	Christian
	23	.9562	Female	25	1	None
	25	.5744	Female	22	1	None
	34	.7968	Male	22	1	None
Type 3	6	.3330	Female	24	1	None
	11	.7439	Male	23	2	Buddhism
	28	1.0355	Male	22	1	None
	30	.4277	Female	24	2	Christian
	31	.9763	Female	22	2	None
	35	.9306	Female	22	1	None

**Table 2: Eigenvalue, variance, and cumulative percentage**

Classification	Type I	Type II	Type III
Eigen Value	12.9.68	3.0368	2.0486
Variance (%)	.3585	.0844	.0569
Cumulative Frequency	.3585	.4429	.4998

**Table3: Correlations between type scores**

Classification	Type I	Type II	TypeIII
Type I	1		
Type II	.546	1	
Type III	.606	.423	1

Those with the lowest factor weight were No. 32 (.3578) and No. 3 (.3745). The most positive sentences from subject 23 (weight: 1.5215) with the highest weighted value were 3, 4, 26, and the most negative sentences were 17, 30, and 35. Subject 23 mentioned, "through the problem approach and cooperation between team members, I could solve the problems and learned diversity and creativity from the opinions of team members." The subject with the lowest weighted value was subject 3 (weight: .3745). The most positive sentences were 32, 15, 21, and the most negative sentences were 30, 17, and 19. He/she mentioned, "through PBL class, it was able to solve problems in various ways and

knowledge was shared with each other." Therefore, it is named 'Fulfillment in cooperation and problem solving' because it has the characteristics of cooperating with team members to collect opinions and solve problems well.

**3.3.2. The importance of collecting diverse opinions**

The information acquisition required for adaptation classified as Type 2 consisted of 14 people (Table 3). To better understand the characteristics of Type 2, the results were analyzed as follows. The most positive aspects of Type 2 were

'I realized that communication skills between team members are important' (2.16), 'It was important to faithfully perform each respective role' (1.69), 'I learned how to approach the problem by

cooperating with team members' (1.45), 'I learned to respect each other's opinions among team members' (1.39), 'I was able to get various opinions about the problem in the class' (1.21) and "problems."

**Table4:** Q-statements on PBL class type of representative items and Z-scores (N=36)

Type	No	Representative items	Mean(SD)	Z-score	
Type1 (N=16)	3	I learned how to approach the problem by cooperating with team members.	3.37(1.302)	1.87	
	26	The process of solving problems by collecting opinions from each other through lead instruction was good.	10.81(1.682)	1.95	
	2	It has become possible to analyze the problem from various angles.	10.44(1.931)	1.62	
	11	It was able to feel fulfillment in solving problems between team members.	9.44(2.756)	1.28	
	22	It was able to reach an efficient and reasonable outcome.	9.19(2.428)	1.07	
	9	It was able to learn to respect each other's opinions among team members.	9.50(1.862)	1.04	
	17	There was a conflict of opinion and difficulty in communication between the team members.	2.44(1.548)	-2.21	
	30	There was difficulty in trying to persuade based on my opinion.	3.63(2.217)	-1.63	
	5	There was difficulty in approaching from a variety of perspectives due to a lack of prior knowledge of the problem.	3.94(2.487)	-1.56	
	31	It was most difficult to bring the opinions of the team members together.	3.56(1.315)	-1.55	
	16	It took a lot of time to communicate through team activities.	4.31(2.676)	-1.31	
	18	The process of looking at the problem and thinking of IDEA was difficult.	4.19(2.257)	-1.28	
	27	I realized that communication skills between team members are important.	10.86(1.994)	2.16	
	8	It was important to faithfully perform each respective role.	10.29(1.437)	1.69	
	Type2 (N=14)	3	I learned how to approach the problem by cooperating with team members.	9.57(2.954)	1.45
		9	I learned to respect each other's opinions among team members.	9.57(1.342)	1.39
6		I was able to get various opinions about the problem in the class.	9.29(2.199)	1.21	
2		It was able to analyze the problem from various angles.	9.29(2.268)	1.19	
14		I was stimulated by the active attitude of the team members.	3.50(1.653)	-1.81	
17		There was a conflict of opinion and difficulty in communication between the team members.	3.79(2.940)	-1.75	
19		I wanted to try to solve the problem repeatedly.	4.07(1.817)	-1.63	
13		Self-directed learning skills have improved in the course of problem-solving	4.57(3.100)	-1.21	
31		It was most difficult to bring the opinions of the team members together.	5.07(3.100)	-1.08	
30		There was difficulty in trying to persuade based on my opinion.	4.93(2.433)	-0.98	
35		The leadership and the role of mediation of the team leader were important.	11.17(2.787)	1.90	
26		The process of solving problems by collecting opinions from each other through lead instruction was good.	10.00(2.000)	1.31	
24		It could be easily solved with the solution to a similar problem.	9.33(2.066)	1.18	
8		It was important to faithfully perform each respective role.	9.67(1.633)	1.02	
Type3 (N=6)	27	I realized that communication skills between team members are important.	9.67(2.251)	0.93	
	28	PBL classes are essential since nursing requires practical courses.	9.33(2.160)	0.90	
	31	It was most difficult to bring the opinions of the team members together.	2.17(0.983)	-2.10	
	5	There was difficulty in approaching from a variety of perspectives due to a lack of prior knowledge of the problem.	2.83(1.941)	-1.92	
	17	There was a conflict of opinion and difficulty in communication between the team members.	3.00(1.265)	-1.78	
	30	There was difficulty in trying to persuade based on my opinion.	3.67(1.862)	-1.47	
	7	It took a long time to solve the problem, but it resulted in a better outcome.	3.67(1.751)	-1.26	
	16	It took a lot of time to communicate through team activities.	4.17(2.317)	-1.14	

The most negative aspects of Type 2 were 'stimulated by active attitudes of team members' (1.81), 'conflict and communication difficulties between teams' (1.75), 'I wanted to solve problems repeatedly' (1.63), 'it was the most difficult' (1.21), and 'It was able to analyze the problem in various angles' (1.19). The most negative aspects of Type 2 were 'I was stimulated by the active attitude of the team members,' There was a conflict of opinion and difficulty in communication between the team members (-1.75), 'I wanted to try to solve the problem repeatedly' (-1.63), 'Self-directed learning skills have improved in the course of problem-solving' (-1.21), It was most difficult to bring the opinions of the team members together (-1.08), 'There was difficulty in trying to persuade based on my opinion' (-0.98), and the subjects with the highest factor weights for Type 1 were No. 8 (1.0378) and 23 (.9562). Those with the lowest factor weight were No. 20 (.1520) and No. 16 (.3642). The type had communication skills between team members and characteristics of problem-solving through each role. The most positive sentences from subject 8 (weight: 1.0378) with the highest weighted value were 3, 4, 26, and the most negative sentences were 17, 16, and 31. Subject 8 mentioned, "cooperation and collaboration were required in the problem-solving process, and it was a meaningful process of respecting each other and

deriving results." The subject with the lowest weighted value was subject 20 (weight: .1520). The most positive sentences were 5, 21, 31, and the most negative sentences were 29, 24, and 28. He/she mentioned, "through the PBL class, there were feelings of lack of experience and nursing knowledge similar to simulation classes." Therefore, Type 2 was named 'the importance of collecting diverse opinions.' This document is a template. An electronic copy can be downloaded from the journal website. For questions on paper guidelines, please contact the journal publications committee as indicated on the journal website. Information about final paper submission is available from the journal website. These guidelines include complete descriptions of the fonts, spacing, and related information for producing your proceedings manuscripts.

### 3.3.3. Lack of knowledge and difficulty in communication

A sense of belonging to the university and fulfillment through the selection of programs classified as Type 3 consisted of six people (Table 3). In order to better understand the characteristics of Type 3, the results were analyzed as follows. The most positive aspects of Type 3 were "The leadership and the role of mediation of the team leader were important' (1.90), "The process of solving problems

by collecting opinions from each other through lead instruction was good' (1.31), 'It was important to faithfully perform each respective role' (1.02), I realized that communication skills between team members are important' (0.93), and 'PBL classes are essential since nursing requires practical courses' (0.90).

The most negative aspects of Type 3 were 'It was most difficult to bring the opinions of the team members together' (-2.10), 'There was difficulty in approaching from a variety of perspectives due to lack of prior knowledge of the problem' (-1.92), 'There was a conflict of opinion and difficulty in communication between the team members' (-1.78), 'There was difficulty in trying to persuade based on my opinion' (-1.47), 'It took a long time to solve the problem, but it resulted in a better outcome' (-1.26), and 'It took a lot of time to communicate through team activities' (-1.14), and the subjects with the highest factor weights for Type 3 were No. 28 (1.0355) and No. 31 (.9763). Those with the lowest factor weight were No. 6 (.3330) and No. 30 (.4277). The type of 'Lack of knowledge and difficulty in communication' emphasized the role of the team leader who gathered each role and had confidence in solving the problem. It has the characteristic that the role of the team leader is important in collecting knowledge for solving problems and collecting opinions among team members. The most positive sentences from subject 28 (weight: 1.0355) with the highest weighted value were 4, 23, 28, and the most negative sentences were 5, 16, and 31. Subject 28 mentioned, "due to lack of preliminary knowledge, it was difficult to effectively implement the class, and it took time to integrate many opinions." The subject with the lowest weighted value was subject 6 (weight: .3330). The most positive sentences were 3, 10, 11, and the most negative sentences were 7, 30, and 31. He/she mentioned, "through the PBL class, the team members cooperated with each other and performed their duties responsibly." Therefore, Type 3 was named 'Lack of knowledge and difficulty in communication.'

#### 4. Discussion

Through subjective data on PBL classes experienced by nursing students, it was attempted to provide data for continuous changes and development of PBL classes. It is intended to check the types of PBL classes of nursing students and to identify the characteristics of each type. We enter the university and research various liberal arts and major subjects. In addition, various learning methods are being carried out for each subject. This requires proper feedback on PBL classes experienced by nursing students. This is the process of improving especially creative thinking, cooperation, communication, and problem-solving skills through new learning methods, and making self-determination through self-directed learning. Through this decision-making, we need to help them make everything on their own as much as possible. If

relationships and communication are not smooth, there will be many difficulties such as adapting to university life, applying for credits and taking PBL classes. As a result of this research, the types of PBL classes experienced by nursing students were identified as Type 1 'Fulfillment in cooperation and problem solving,' Type 2 'Importance of collecting diverse opinions,' and Type 3 'Lack of knowledge and difficulty in communication,' and we would like to discuss the characteristics of each of these types.

#### 4.1. Comparison of type 1 and type 2

As a result of comparing Type 1 and Type 2, No. 13 'Self-directed learning skills have improved in the course of problem-solving' (Different score: .568, -1.214, 1.782), No. 26 'The process of solving problems by collecting opinions from each other through lead instruction was good' (Different score: .615, -.139, 1.754), No. 14 'I was stimulated by the active attitude of the team members' (Different score: -.291, -1.814, 1.523). No. 11 'It was able to feel fulfillment in solving problems between team members' (Different score: 1.072, -.444, 1.516), No. 4 'I learned to think critically and creatively' (Different score: .782, -.330, 1.112) showed the largest positive score difference. No. 21 'I realized that I lacked nursing expertise' (Different score: -.562, .451, -1.014), No. 18 'The process of looking at the problem and thinking of IDEA was difficult' (Different score: -1.284, -.267, -1.017), No. 8 'It was important to faithfully perform each respective role' (Different score: .637, 1.691, -1.053), No. 25 'Choice and application were needed to make solution in a lot of knowledge' (Different score: -.451, .611, -1.062), No. 27 'I realized that communication skills between team members are important' (Different score: .204, 2.159, -1.956), No. 35 'The leadership and the role of mediation of the team leader was important' (Different score: -1.011, 1.077, -2.088) showed the largest negative score difference. It was confirmed that the subjects positively change the learner's understanding of the problem situation and learning attitude (Kim, 2010; 2017).

#### 4.2. Comparison of type 1 and type 3

As a result of comparing Type 1 and Type 3, No. 7 'It took a long time to solve the problem, but it resulted in a better outcome' (Different score: .630, -1.264, 1.894), No. 1 'I've become able to assert my opinion logically' (Different score: .536 -.912 1.448), No. 3 'I learned how to approach the problem by cooperating with team members' (Different score: 1.948, .702, 1.246), No. 6 'I was able to get various opinions about the problem in the class' (Different score: .582, -.593, 1.174) showed the largest positive score difference.

No. 14 'I was stimulated by the active attitude of the team members' (Different score: -.291, .710, -1.000), No. 28 'PBL classes are essential since nursing requires practical courses' (Different score: -.240, .903, -1.143), No. 24 'It could be easily solved

with the solution to a similar problem' (Different score: -.303, 1.179, -1.482 ), No. 35 'The leadership and the role of mediation of the team leader was important' (Different score: -1.011, 1.895, -2.906) showed the largest negative score difference. According to the subjects, they expertly coped with problem-solving through various opinions, and their cognitive flexibility was improved (Milentijevic et al., 2008; Kim, 2017).

#### 4.3. Comparison of type 2 and type 3

As a result of comparing Type 2 and Type 3, No. 7 'It took a long time to solve the problem, but it resulted in a better outcome' (Different score: .909, -1.264, 2.173), No. 6 'I was able to get various opinions about the problem in the class' (Different score: 1.205, -.593, 1.798), No. 9 'I learned to respect each other's opinions among team members' (Different score: .451, -.909, 1.360), No. 21 'I realized that I lacked nursing expertise' (Different score: .451, -.909, 1.360), No. 27 'I realized that communication skills between team members are important' (Different score: 2.157, .925, 1.234), No. 5 'There was difficulty in approaching from a variety of perspectives due to lack of prior knowledge of the problem' (Different score: -.874, -1.922, 1.048), and No. 31 'It was most difficult to bring the opinions of the team members together' (Different score: -1.082, -2.096, 1.014) showed the largest positive score difference. No. 28 'PBL classes are essential since nursing requires practical courses' (Different score: -.231, .903, -1.133), No. 24 'It could be easily solved with the solution to a similar problem' (Different score: .010, 1.179, -1.170), No. 19 'I wanted to try to solve the problem repeatedly' (Different score: -1.631, -.346, -1.285), No. 12 'I learned more about the problem-solving process' (Different score: -.611, .707, -1.318), No. 11 'It was able to feel fulfillment in solving problems between team members' (Different score: -.444, .891, -1.336), No. 13 'Self-directed learning skills have improved in the course of problem solving' (Different score: -1.214, .201, -1.415), No. 26 'The process of solving problems by collecting opinions from each other through lead instruction was good' (Different score: -.139, 1.314, -1.453), No. 14 'I was stimulated by the active attitude of the team members' (Different score: -1.814, .710, -2.523) showed the largest negative score difference. According to the subjects, they played the role with responsibility for role allocation through PBL classes, and the communication skills that have been felt difficult were improved (Kim, 2017; Seo and Ji, 2020).

#### 5. Conclusion

This study is a qualitative research conducted to identify types of nursing students who conducted PBL classes in the nursing department. The subjects of the research are third-year and fourth-year nursing students at H University located in S, a small and medium-sized city in Chungcheongnam-do. A

total of 36 questionnaires were analyzed using PQ methods, excluding 4 inappropriate respondents, out of 40 randomly sampled questionnaires. The mean and standard deviation were analyzed using SPSS Window 20.0 and the results were as follows. We experience PBL classes in the university life of the subjects, identify subjective perceptions, and categorize them. The three types of PBL Class experience are 'Fulfillment in cooperation and problem solving,' 'Importance of collecting diverse opinions,' and 'Lack of knowledge and difficulty in communication.' The type of 'Fulfillment in cooperation and problem solving' had the characteristic of working with team members to collect opinions and solve problems well. The type of 'Importance of collecting diverse opinions' had the characteristics of communication skills among team members and problem-solving through each role. The type of 'Lack of knowledge and difficulty in communication' emphasized the role of the team leader who collected each role and had confidence in solving the problem. Through this, it showed learners' active learning attitude, comprehensive knowledge acquisition, improvement of adaptability to clinical site issues, cooperation, improvement of communication skills, and responsibility. Also, various forms of learning can be developed and applied in the course of learning, knowing new problem solving cases. In order to achieve more meaningful academic performance in PBL classes, it is necessary to provide various classes suitable for individual learners' learning styles and motivations. Considering the characteristics of the team, according to this type and check the parts in question during the class proceeding. It is necessary to appropriately mediate the parts that students request or need. It is an important part of the teacher's role during the course of the class. While maintaining a student-centered learning process, it is important to be able to articulate strategies to support the PBL goals of helping students construct causal explanations, reason effectively, and become self-directed learners.

Therefore, it suggests to the subjects that various learning forms or learning speeds can be adjusted through team diagnosis before proceeding with the class. It is also necessary to encourage subjects to actively participate in PBL classes. Through the PBL class, students and instructors communicated interactively. Students also exchanged opinions. Students solved problems through communication and cooperation. Identifying the three types of students before class and conducting the class is an appropriate help for the students. This research is a meaningful study for effective PBL class.

Based on the results of this study, I would like to suggest the following:

- First, classes according to the type are required by using the checklist for each type classified for PBL classes in this research.
- Second, a follow-up study is required to confirm satisfaction with the class based on the



characteristics of each type of PBL class classified in this research.

- Third, customized PBL classes are required through the characteristics of each type for PBL classes classified in this research.

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### Compliance with ethical standards

### Ethical considerations

It was explained to the subject that it could be discontinued at any time during the research after obtaining voluntary agreement from the subject before the research. In order to respect the rights of the subject and ensure privacy and confidentiality, all information collected in this research ensured secrecy by Q sorting, and coding secret throughout the data analysis process.

### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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