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Nursing students' and instructors' perception of simulation-based learning

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Abstract

The degree of mutual understanding between nursing students and instructors regarding simulation-based education remains unknown. The purpose of this study was to identify the subjectivity of nursing students and instructors about simulation-based learning, and was intended to expand the mutual understand by employing the co-orientation model. Q-methodology was used to identify the perspectives of 46 nursing students and 38 instructors. Perception types found among students in relation to simulation-based learning were developmental training seekers, instructor-dependent seekers, and learning achievement seekers. The instructors estimated the student perception types as passive and dependent, positive commitment, demanding role as facilitators, and psychological burden. Perception types found among instructors included nursing capacity enhancement seekers, self-reflection seekers, and reality seekers. The students classified the instructors' perception types as nursing competency seekers, learning reinforcement seekers, and debriefing-oriented seekers. As a result of the analysis of these relations in the co-orientation model, instructors identified psychological burden and passive and dependent cognitive frameworks among students; however, these were not reported in the students' perspectives. Likewise, the reality seekers type found among the perception types of instructors was not identified by the students. These findings can help develop and implement simulation-based curricula aimed at maximizing the learning effect of nursing students

Keywords: *co-orientation, faculty, perception, Q-methodology, simulation, student*

1. INTRODUCTION

In Korea, nursing students' clinical practice training consists of, mainly, observation-focused practices, limiting their chances to perform actual nursing tasks for the purpose of protecting patients' safety and rights. Moreover, with a rapid increase in the number of student entering nursing school from 11,147 in 2006 to 18,869 in 2015 [1], nursing colleges are experiencing difficulties securing institutions for clinical practice. As such, the importance of simulation-based learning has emerged as an alternative to clinical practice training and nursing colleges must provide simulation-based learning from 2017 based on the Korean Nursing Education Accreditation Criteria [2].

Simulation-based learning in nursing refers to an activities replicating clinical practices using patient simulators and realistic clinical scenarios [3]. In simulation-based learning, interactions between students, instructors, and simulators is important [3]. According to the simulation framework created by Jeffries [3], simulation learning consists of five factors: facilitator (instructors), participants (students), educational

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practices, a simulation design, and an outcome. These factors need to be considered for effective simulation-based learning. Thus, it is necessary to examine the perception of facilitators and participants about simulation-based learning.

According to prior studies on the perception of nursing students and instructors regarding simulation-based learning, both groups recognized that simulation-based learning is an effective training method in terms of promoting critical thinking, effective communication, and field adaptability among students [4-8]. However, with regard to the perception of the role of an effective instructor, nursing students perceived the relationship between themselves and instructors as highly important for effective learning, whereas the instructors consider their personal technological skills more significant [9]. In addition, students were immersed in simulation-based education and perceived as a pleasant experience, but instructors perceived that students were less engaged. These results suggest that there is a difference in perceptions between these two groups [6]. For more efficient simulation-based learning, it is necessary to establish a learner-centered teaching strategy by identifying and analyzing the differences between instructors' and students' perceptions and reflecting them in the design of simulation-based learning. Unfortunately, the existing previous studies have been conducted on the individual perception of these two groups [5, 7-11], and few studies have identified the differences between instructors' and nursing students' perceptions. Furthermore, as simulation-based learning is an individual experience based on clinical scenarios and situational development including changes in simulator response, lab results, and voice by the students' action or nursing intervention, rather than a simple technique, students may have different subjective perceptions of it, even if they have experienced the same scenario in a simulated exercise.

Therefore, this study uses Q-methodology in order to identify nursing students' and instructors' subjective viewpoints on simulation-based learning. The study also applies the co-orientation model, which is used to identify any differences in perception between individuals or groups towards an object, in order to analyze the degree of mutual understanding between instructors and learners.

2. THEORETICAL FRAMEWORK

This study uses the co-orientation model as designed by McLeod and Chaffee [12] for its theoretical framework. The co-orientation model is used to identify and compare the differences in perspectives between two groups by looking at the differences in their perceptions of a particular object [12].

This model consists of three categories: agreement, congruency, and accuracy. Agreement refers to the extent to which group A's and group B's perceptions of object X coincide. Congruency refers to the extent to which one person's own perception matches with their views of another person's perception. It consists of person/group A's self-perception as well as their perception of person/group B's perception (congruency A), and, in turn, person/group B's self-perception and their perception of person/group A's perception (congruency B). Accuracy refers to the extent to which one person's estimation of the other's perceptions matches with what the other person really thinks, and reflects the level of perfect communication between two people [12].

Of these three criteria, this study analyzes accuracy in order to identify the differences between the instructors' and students' self-perception, as well as their perception of each other regarding simulation-based learning exercises. It is expected to help develop and more effectively operate future simulation-based learning courses (Figure 1).

2. METHODS

2.1 Study Design

Q-methodology was used to systematically elicit viewpoints about both instructors' and students' viewpoints regarding simulation-based learning, and then to explain the characteristics of each type.

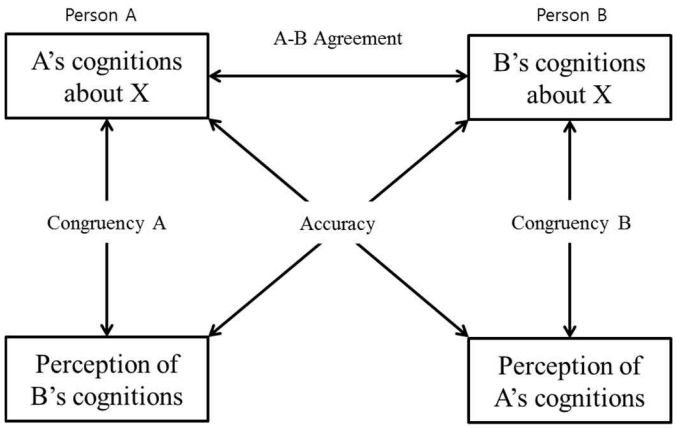

Figure 1. The co-orientation measurement model. Adapted from McLeod et al. (1973)

2.2 Q-Methodology

Q-methodology is a specific research approach that aims to examine the subjective views, opinions, beliefs, and attitudes of individuals, and which enables researchers to understand the types and characteristics of each person according to their unique subjectivity structure [13]. Moreover, Q-methodology is a research approach that combines both quantitative and qualitative paradigms, and which classifies an individual's subjective perceptions of the subject, as well as their opinions of a particular object or phenomenon, through quantitative analysis. It allows for a hypothetical approach that serves to draw a differentiated view of existing phenomena or issues, enabling the creation of new hypotheses [13].

The Q-methodology procedure consists of the following: construction of a Q-population, development of Q-samples, construction of P-samples, the Q-sorting process, and Q-data analysis and interpretation (Figure 2).

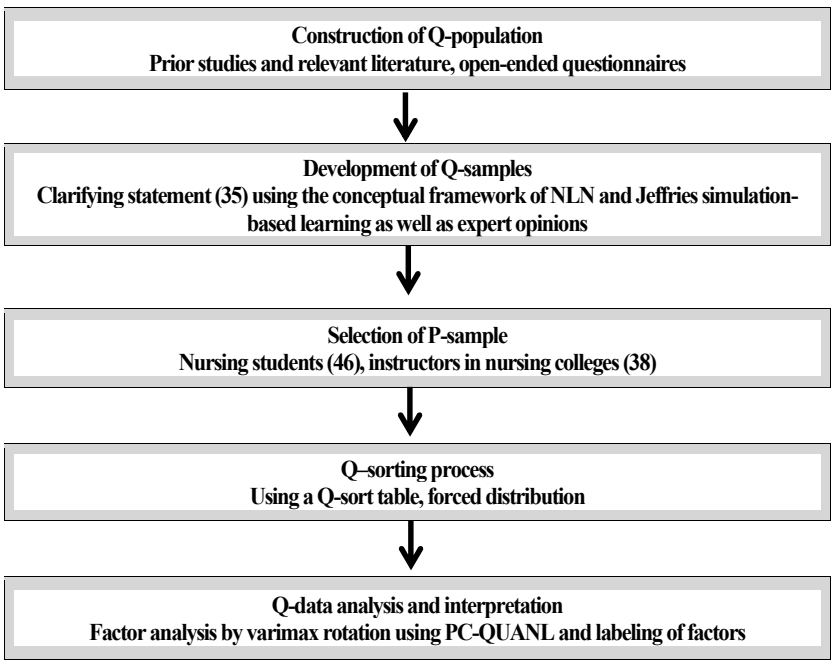

Figure 2. Research procedure of Q-methodology

2.3 Q-population

The Q-population is an overview statement of the research topic and can be developed through a variety of materials; including literature reviews, in-depth interviews, expert opinions, and newspapers [14]. To extract a statement for the Q-population, this study reviewed previous research [7,9,15] on instructors' and students' experiences in simulation-based learning, as well as conducted written interviews, using open-ended questionnaires, targeting 32 nursing students on their subjective experiences of this form of learning. Finally, 110 Q-populations were then extracted.

The extracted Q-populations were sorted into the five factors as identified by the NLN and Jeffries Simulation Framework [3]; these are, 23 participant factors, 11 facilitator factors, 27 educational practices factors, 22 simulation design factors, and 27 expected results factors.

2.4 Q-sample

The Q-sample is a final statement extracted from the defined Q-population. In general, 40 to 60 Q-samples are sufficient to indicate differing views [16]. The final 35 Q-samples best representing this research topic were selected through a process of eliminating duplicate questions in the 110 Q-populations, and categorizing/combining similar questions. A total of 35 statements were ultimately verified for validity by three experts with ample experience in simulation-based learning, one simulation coordinator, and one clinical nurse.

2.5 Selection of P-sample

P-sample refers to the study participant who sorts the Q-sample. As Q-methodology addresses perceived importance within individuals and not between them, and following the small sample theory that, when the sample gets larger, several people become biased towards one factor so that the characteristics of each type are not clearly revealed, the number of P-samples is usually around 40~60 participants [17]. In this study, 46 nursing students and 38 instructors were recruited from 3 nursing colleges and 28 nursing colleges in Korea, respectively. Inclusion criteria for nursing students were a junior or a senior who had undergone simulation-based learning experiences in nursing colleges. Instructors were included as subjects if there was at least one experience in operating simulation-based learning.

2.6 Q-sorting and data collection method

Q-sorting refers to the forced normal distribution of a Q-sample into a Q-sample distribution table. In this study, the Q-sample distribution table consists of a range from –4 to +4 (a 9-point scale). The "+" sign refers to a positive agreement to the statement, a response of "0" means neutral feelings, and a "-" sign refers to a participant's disagreement.

After reading the 35 provided statements, the participants conducted a forced distribution of the data onto a 9-point scale, based on the degree to which they were consistent with their views (Figure 3). After sorting the Q-samples, they were then instructed to provide their reasons for choosing statements placed in the extremes of either the most positive (+4) or most negative (-4). This was then used to understand and interpret the characteristics of each type of participant [16]. In addition, for the co-orientation analysis, the nursing students sorted their estimations of their instructor's perceptions, with the instructors sorting their estimations of the students' perceptions in turn. The data collection period lasted from June 15 to September 10, 2017, with the time required for Q-sorting being 30 minutes to one hour.

2.7 Data Analysis

Data were analyzed using a principal component analysis, with the varimax rotation, using the PC-QUANL program. To determine the number of factors that best explains participants' similar viewpoints related to simulation-based learning, Eigen Values of 1.0 and above were selected based on the results obtained after variously inputting the number of factors and their overall explanatory power. To understand the characteristics of the extracted factors, the Z-scores (above +1.0 for positive views, below -1.0 for negative views) and

statements with extreme scores (-4, -3, +4, and +3) were selected for creating the interpretations. In addition, in order to discover how accurately they understood the simulation-based learning experiences of each other, the co-orientation model was used.

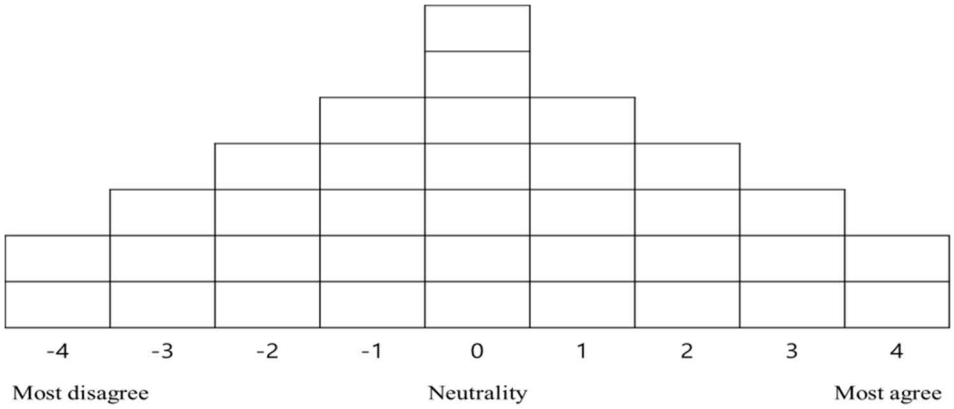

Figure 3. Q-sort table

2.8 Ethical considerations

This study was conducted with permission from the Institutional Review Board of G University. The purpose and procedures of the study were explained to the participants before data collection, and informed consent was received from each one. Participants were informed that their data would be kept anonymous and confidential and that they could withdraw from the study at any time without suffering any penalties. They were given a small gift after completing the survey.

3. RESULTS

3.1 Nursing students' own viewpoints

3.1.1 Type 1: Developmental training seekers

The developmental training seekers factor was found to account for 36.2% of variance in this model. Participants with this type strongly agreed that simulation-based learning improves overall clinical performance, and helps to establish a person's professional career. They, however, disagreed with the notion that it is difficult to immerse oneself in the simulations, due to the use of simulators and virtual scenarios. One student (No. 8), who had the highest factor weighting for Type 1, responded, "By doing it myself, I can identify what went wrong or right and apply it to clinical practice. In addition, through undergoing simulation-based learning before clinical practice, professionalism can be established in advance." Participants in this type believed that they could extend their personal knowledge and nursing skills learned in class by undergoing a simulation-based training exercise.

3.1.2 Type 2: Instructor-dependent seekers

The instructor-dependent seekers factor accounts for 10.2% of variance in this model. This participant type reportedly thought that the unexpected situations in the simulation-based learning were embarrassing, and that the instructors' abundant clinical careers and pre-briefings were important. Conversely, this type disagreed with the idea that simulation learning was a pleasant experience. One student (No. 22) stated that, "As the instructor needs accurate judgment in regards to the student's performance, a wide range of clinical experience is required." This type of participant considered it important that instructors have various competencies and roles in simulation-based learning so that they could present clear learning objectives and communicate

positively with students.

3.1.3 Type 3: Learning achievement seekers

The learning achievement seekers factor accounts for 4.9% of variance within this model. This participant type strongly agreed that receiving feedback on performance through debriefings was helpful for learning and self-reflection. In addition, this type of participant emphasized the importance of receiving feedback on simulator responses, such as changes in clinical lab data and voices, according to situational developments within simulations. They also emphasized the importance of scenarios that are based on real world cases in simulation-based learning. In contrast, this participant type disagreed with the notion that team members who practiced together in a simulation should all receive the same scores. One student (No. 30) stated, "If we practice with a simulator that makes no response, I will be frustrated when I actually meet a sick patient in a clinical setting. I learn more when the professor gives me feedback and tells me about the case than when I think about what I did wrong on my own." Therefore, Type 3 believed that motivations around learning, such as practicing in a realistic environment and instructors' feedback, were important for the entire process of simulation-based learning, in order to improve overall academic achievement.

3.2 Perception of instructors as estimated by nursing students

3.2.1 Type 1: Nursing competency seekers

The nursing competency seekers factor accounts for 41.4% of the total variance in this model. This group strongly agreed with the idea that simulation-based learning improves students' clinical performances through the application of nursing skills and processes. They also perceived that it helps to establish a professional image by allowing them to work like practicing nurses. On the other hand, they disagreed with the idea that sharing experiences and discussions among learners through debriefings do not assist learning. They also did not agree with the statement that there is a limit to stimulating motivations for learning through simulation-based practice. One student (No. 35) stated, "The professor probably thinks that simulation learning brings positive effects to the students in terms of the improvement of clinical skill and proficiency through repeated trainings." Namely, the instructor's perception about simulation-based learning as estimated by the nursing students is that they believe that simulation-based learning is an effective method in improving clinical nursing competency.

3.2.2 Type 2: Learning reinforcement seekers

The learning reinforcement seekers factor accounts for 5.3% of variance. This type reportedly perceived that the instructors' feedback on students' performances is important during simulation-based learning and that instructor's competencies, such as their judgment and communication skills, are also needed to promote educational outcomes. They also recognized that simulation-based learning is effective as it allows students to perform skills directly rather than through observations. One student (No. 20) responded, "During simulation learning, I think that the professor is likely to think that there will be a learning enhancement effect by giving feedback to students on complementary points and the good point and through doing supplementary learning." In other words, Type 2 of the instructors' perceptions as estimated by the students recognized the importance in improvements of the learning effect through using positive feedback and direct learning opportunities in simulation-based learning.

3.2.3 Type 3: Debriefing-oriented seekers

The debriefing-oriented seekers factor accounts for 4.1% of variance in this model. This type of participant emphasized the role of the instructor in helping students to think about and make correct conclusions in the simulation-based training. This group also recognized that any form of debriefing (e.g. video-based debriefings

based on group learning strategies, or instructor-student debriefings) is necessary for students' self-reflection. In addition, this type did not feel embarrassed when their mistakes were pointed out during the simulations. One student (No. 7) stated, "The professor will think that debriefing is necessary because feedback shows how students can improve. The professor probably thinks that the instructor's role is important. He will think the student is prone to make mistakes." Therefore, it becomes clear that nursing students' estimations of their instructors' perceptions were that they felt students' self-reflections are necessary, and that debriefing is important.

3.3 Instructors' own viewpoints

3.3.1 Type 1: Nursing capacity enhancement seekers

The nursing capacity enhancement seekers factor accounts for 40.0% of variance within the model. This participant type thought that simulation-based learning could improve students' nursing competence via the integration of practical knowledge and skills, as well as through exposing them to direct nursing care practices. They also perceived that this form of education encourages greater learning motivation, and improves students' critical thinking and problem-solving skills. To accomplish these goals, they recognized that it is important to repeat certain simulations and encourage student engagement during sessions. One instructor (No. 3) said, "Simulation-based classes give the feedback needed to build professionalism and are more effective than lecture-based classes. Also, students' critical thinking processes are very important." Therefore, Type 1 instructors cognized simulation-based learning as an effective educational method that improves students' nursing abilities by integrating both knowledge and practical skills through actual practice.

3.3.2 Type 2: Self-reflection seekers

The self-reflection seekers factor accounts for 7.7% of variance in this model. This type of instructor strongly agreed that debriefing is necessary for self-reflection among students and that the instructor should help their students have positive learning experiences through simulation-based learning. The notion to which this type disagreed with (a different response compared to the other groups) was that simulation-based learning is an enjoyable experience as it allows students to act as real nurses. One instructor (No. 19) said, "After a simulation exercise, students seem to experience more guilt and lower self-esteem about their shortcomings, than confidence; so, I think it will be most effective when the instructor gives positive feedback and encourages their positive aspects to enhance students' self-esteem and confidence." Based on the above response, this type of instructor emphasizes the role of positive feedback in order to enhance students' positive learning experiences and self-esteem, as well as the consequent self-directed and lifelong reflective learning achieved through debriefings.

3.3.3 Type 3: Reality seekers

The reality seekers factor accounts for 4.8% of variance in this model. This instructor type felt that simulation-based learning is important to the instructors' clinical careers, rather than simply as an educational experience, as this type of learning method requires many actual and real world cases. They also recognized that the learning environment, such as the utilized scenarios and the simulators' responses (e.g. voice, vital sign, and clinical lab data), should be embedded during the simulations' running. This type thought that simulation-based learning could not improve clinical nursing performance through only applying nursing skills and processes, and felt that it is difficult for students to establish a professional image. One instructor (No. 34) said, "Simulation learning should be based on simulated lab environments and scenarios similar to clinical practice environments, which can enhance the effectiveness of training skills, such as critical thinking and decision making." Therefore, Type 3 instructors recognized that the professional experiences of the instructors, as well as the clinical environment itself, were important in reproducing real world clinical situations, and they believed that this then enhances the effectiveness of simulation-based education.

3.4 Perceptions of nursing students as estimated by their instructors

3.4.1 Type 1: Passive and dependent

The passive and dependent factor accounts for 32.2% of variance within this model. This instructor type strongly agreed with the idea that simulation practice is burdensome due to the presence of extra observers and the occurrence of video recordings, and that the students felt embarrassed when faced with unexpected situations during simulations. This group perceived that students tended to rely on their peers, as they are placed in groups in simulation labs, and negatively perceived the effectiveness of simulation-based training in areas such as setting priorities and making decisions on nursing problems. One instructor (No. 15) said, "I think students feel embarrassed if they make a mistake related to the score. They do not act naturally because video is recorded and the instructor is watching." This type of instructor estimated that their students were sensitive to the eyes of the observers, which resulted in them relying on their team members and having difficulties in fully engaging with the simulation training.

3.4.2 Type 2: Positive commitment

The positive commitment factor accounts for 11.7% of this model's variance. Type 2 instructors perceived simulation-based learning as an enjoyable experience, as if the students were actually nurses, and that the simulated lab environments were similar to those of actual hospitals, which could then help students to better concentrate on nursing practice. Conversely, they thought that students were not embarrassed when their mistakes were pointed out during the simulation exercises, a different result to other instructor types. One instructor (No. 3) stated, "Students are embarrassed, but they will realize what they have done wrong and will remember it for a long time. Although students will perform in a scenario in the simulations, they will be able to concentrate just as well in real cases as their reactions (e.g. with vital signs) will vary according to the situation." Thus, for this type, the instructors estimated that their students would perceive simulation-based education as a pleasant learning experience via their engagement in it, rather than becoming embarrassed or afraid to practice.

3.4.3 Type 3: Demanding role as facilitators

The demanding role as facilitators factor accounts for 5.5% of variance in this model. This type of instructor thought that an orientation should be provided prior to simulation-based learning, and that signs of support and encouragement given by the instructor are important. This instructor type felt that instructors' judgments and communication abilities were related to the exercise's overall educational effect, and that simulation-based learning is not a pleasant experience. One instructor (No. 22) states, "Students may feel confident during the simulation-based learning through the proactive exposure to nursing that is difficult to perform directly in the clinical field. And, even if the students are in the same simulation situation, they think that differences in the educational effect would occur depending on the qualities and abilities of the instructor." Therefore, Type 3 instructors predicted that students would be more aware of the role of their instructors, such as their teaching methods and skills, in maximizing learning rather than promoting an enjoyable experience during simulation education.

3.4.4 Type 4: Psychological burden

Type 4 instructors recognized that students felt embarrassed and frustrated when faced with unexpected situations during the simulations. This group strongly disagreed that simulation-based learning could establish students' careers or that they are pleasurable experiences that allow students to feel as if they were actually nurses themselves. One instructor (No. 7) said, "If students are unfamiliar with clinical situations, they can be very frustrated and may feel it as playing. In addition, simulation experiences can be traumatic when performing nursing work in real clinical practices." Therefore, Type 4 instructors perceived that students might feel uncomfortable, embarrassed, or unhappy about simulation-based learning and that this could, in turn,

influence their work as nurses due to these negative experiences, rather than helping them to establish professional occupations.

3.5 Analysis using the co-orientation model

The factor of accuracy was analyzed in order to investigate the differences in perception between nursing students and instructors on simulation-based learning using a co-orientation model analysis (Figure 4). Accuracy was identified through comparing the characteristics of each type of student's (and instructor's) perception and the instructor's (and student's) estimations of the other's perception on simulation-based learning. Higher similarity levels indicate a higher mutual understanding between these two groups [12].

A comparison of the students' perceptions of simulation-based learning and the instructor's perception of the student's perceptions showed that the characteristics between the "developmental training seekers" type of students and the "positive commitment" type of instructors were similar. In addition, the two types of nursing college students, including "instructor-dependent seekers" and "learning achievement seekers," were similar to the instructor type "demanding role as facilitators." Conversely, the "passive and dependent" and "psychological burden" estimation types of instructors did not appear in the responses of the nursing students.

Regarding the actual perceptions of the instructors on simulation-based learning and those as estimated by students, "nursing capacity enhancement seekers" type of instructors was similar to that of "nursing competency seekers" as estimated by the students. The "self-reflection seekers" type of instructor is similar to the "debriefing-oriented seekers" type as estimated by the students in regards to the importance of positive feedback from instructors during the debriefing process. In addition, "self-reflection seekers" type of instructor is also similar to the "learning reinforcement seekers" type as estimated by nursing students, in that they agree that the support and encouragement of instructors improve the simulations overall learning effect. Conversely, the "psychological burden" type, as identified by the instructors, did not emerge in the responses of participating students.

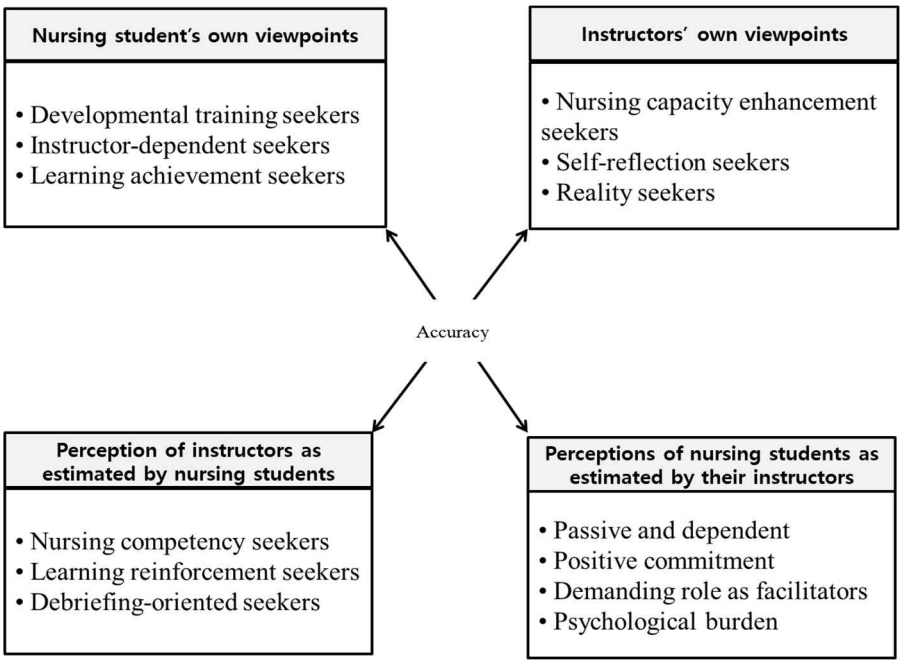

Figure 4. Nursing students and instructors on simulation-based learning using a co-orientation model analysis

4. DISCUSSION

This study explored nursing students' and instructors' perception of simulation-based learning methods using Q- methodology, as well as compared and analyzed the perception of these two groups based on the co-orientation model.

Regarding the perceptions of students on simulation-based learning, both students and instructors agreed on the importance of sufficient prior orientations, clear learning objectives, learning motivation, self-reflection through debriefings, support, and encouragement. However, the instructors estimated that the nursing students' perception of the simulation exercise was an embarrassing, anxiety-inducing, and overall unpleasant experience, while, the students, themselves, did not show this perception in their responses. According to a prior study [18], sophomore nursing students reportedly experienced negative emotions (such as fear, helplessness, and anxiety) during simulation-based learning processes. Conversely, junior and senior students reported that they became increasingly confident through the vivid lab experiences, which were similar to actual hospital environments, and that it was an overall positive experience [19-20]. In this study, most of the participating nursing students were either juniors or seniors. These results suggest that the perceptions of simulation-based learning may vary according to an individual's grade level. In particular, sophomores may experience frustration or anxiety as they have no experience of clinical practice and, therefore, simulation-based learning would be new to them. These results suggest that the simulation design should take into account grade-specific experiences or levels of achievement when arranging the training content. In addition, the various pre-briefing activities, like learning orientation, fictional contracts, and concept mapping, increase students' psychological safety [21-23], and are therefore necessary in the simulation-based learning process.

Regarding the instructors' perception of simulation-based learning, both instructors and students cognize that this form of learning enhances nursing work performance, reinforces learning through actual practice and immediate feedback, and that the instructors' guidance and roles during debriefing are important. These results are similar to those of a Q-methodology study [7] which also identified the views of instructors and students on simulation-based learning. However, one of the instructor perception types, "reality seekers," did not appear in nursing students' perceptions of instructors' perception. Reality seekers are those that value realism and fidelity, and feel that simulation-based classes should resemble actual clinical settings in order to enhance their effectiveness. For instructors, both reality and fidelity are important because they relate to higher levels of student commitment and subsequent clinical competence [24]. In a previous study, it was reported that instructors have difficulty in carrying out simulation classes because students do not treat the simulator as a real patient [6]. Therefore, instructors need to make efforts aimed at increasing both the fidelity and reality of simulation-based learning experiences to compensate for this factor. In addition, they should utilize a fictional contract during pre-briefing activities in order to help students fully engage in practice as they would in actual, real world situations.

This study is significant in that it compared and analyzed the hitherto unexplored mutual understandings between nursing students and instructors regarding their perceptions of simulation-based learning. However, this study was conducted on nursing students from three nursing colleges in certain geographical areas. As a result, subjects with diverse simulation experiences and backgrounds may be limited. Therefore, it is necessary to conduct replication studies targeting those with experiences in simulation-based learning different to that of this study.

5. CONCLUSIONS

This study compared and analyzed nursing students' and instructors' perceptions of simulation-based learning, utilizing the co-orientation model. The results show that there are subtle differences between nursing students' and instructors' understandings of simulation-based learning. The instructors appeared to cognize that some students would feel an increased psychological burden when undergoing simulation training, be too dependent on their team members, and be passive in simulation practices. However, the students prioritized the learning outcomes and improvement of nursing skills offered by simulation-based learning. They were willing to perform both positively and actively. In addition, the instructors' perception of the importance of

realism and fidelity in simulations did not appear in the nursing students' estimations of their instructors' perceptions. These results could contribute to reducing the cognitive gap between these two groups and are expected to provide basic data for the development and operation of simulation-based learning curriculums in the future.

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