

## **Practice of Concept Mapping in Brainstorming and Debriefing Sessions in Relation to Gender among Nursing Students**

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### **Abstract**

**Background:** Concept mapping practice in Problem Based Learning (PBL) is beneficial in improving PBL tutorial sessions practices and gender could contribute to the practice of concept mapping in brainstorming and debriefing sessions. **Aim of the study:** To assess the practice of concept mapping in brainstorming and debriefing sessions in relation to gender among nursing students. **Research design:** A correlational descriptive design was used in this study. **Setting:** The study was conducted at the Faculty of Nursing in Suez Canal University. **Subjects:** Ninety-two first-year nursing students participated in the study. **Tool of data collection:** Data were collected using concept mapping practice in PBL scale. **Results:** The total practice of concept mapping in brainstorming and debriefing sessions were  $12.25 \pm 2.73$ , and  $12.14 \pm 3.07$ , respectively. Female students scored the highest mean of valid selection of concepts with a significant difference in the brainstorming session and with no significant difference in the debriefing session. In addition, there was a significant difference between males and females regarding the total practice of concept mapping in a brainstorming session whereas there was no significant difference between both in the debriefing session. **Conclusion:** Concept mapping practice in PBL sessions needs to be improved. Female students are significantly better than males in their total practice of concept mapping in the brainstorming session. In addition, there is a highly significant positive correlation between students' practice of concept mapping in brainstorming and debriefing sessions. **Recommendations:** Conducting training program to improve concept mapping practice in PBL sessions is needed, putting into consideration the individual differences among students that contribute to their concept mapping practice in PBL sessions and hence their PBL practice in general. A further study on factors contributing to concept mapping practice in PBL sessions is considered.

**Keywords:** Brainstorming Session, Concept Mapping, Debriefing Session, Nursing Students.

### **1. Introduction**

Concept mapping practice in Problem Based Learning (PBL) is beneficial in

improving PBL tutorial sessions practices. It is one of the strategies that enhance knowledge acquisition, information processing, construction, understanding,

knowledge application, and problem resolving **(Khrais & Saleh, 2017)**.

Concept mapping is a proven technique in PBL implementation. It can be implemented in drawing a systematic inventory of the problem analysis, as students visualize their prior knowledge in the form of a concept map, which helps them to separate what is already known from what they need to be research to better understand the problem and its underlying mechanisms **(Johnstone & Otis, 2006; Zwaal & Otting, 2012)**.

Concept mapping is a graphical method for presenting a set of concepts placed in a thematic framework **(Novak & Gowin, 1984)**. It is a structured process, focused on a topic or construct of interest, involving input from multiple participants, that produces an interpretable pictorial view of their ideas and concepts and how these are interrelated **(Trochim, 1989)**.

PBL is an instructional student-centered approach that uses carefully constructed clinical problems as a context for students to define their learning needs, conduct self-directed learning, integrate theory, and practice, and apply knowledge and skills to develop a solution to a problem **(Adiga & Adiga, 2015)**.

PBL has two sessions namely, brainstorming, and debriefing sessions. The brainstorming session starts with definitions

of terms and concepts which helps the group to start with a clear understanding of the terminology and concepts common to the problem. Then, the students identify the problem or put a specific definition of the problem. After that, an analysis of the problem is done to update the current knowledge of the group and activate prior knowledge. The students interpret important points contained in the classification and it helps to identify the interrelationships between the concepts and problems. The group builds a coherent description of the operations of logic and reasoning in the group. Learning issues and needs are developed at this phase **(Ajmal, Jumani, & Malik, 2016)**.

Also, the brainstorming session lasts from one to two hours. It aims to stimulate students to tackle a realistic patient problem, challenge them to use their previous knowledge and experience, practice an analytical approach to problems, practice information gathering to clarify the problems, encourage students to identify what further information is needed, practice an analytical subdivision of the questions and synthesis of the answers, learn how to acquire in-depth knowledge and develop the skills of self-directed learning with collaboration **(Abdalla & Gaffar, 2011)**.

The debriefing session includes the discussion of the newly acquired knowledge. In this session, the participation of all members of the group is required to respond to the learning needs generated previously. Students can ask questions and clarify the details of the new knowledge and test the depth of understanding and insight into these learning needs. Besides, the debriefing session is scheduled after a few days to allow time for personal study, and it lasts for one to two hours. It aims to promote active thinking which produces more effective information storage in the long-term memory, corrects misconceptions, and provides early feedback on the learning. Additionally, the student learns how to inform others, how to listen to his/ her peers, how to participate in the discussion, how to collaborate with others, and apply new learning to the problem (Abdalla & Gaffar, 2011; Ajmal et al., 2016).

According to **Rendas, Fonseca, and Pinto (2006)**, PBL and concept mapping are verified to be complementary to each other because the method of information gathering, hypothesis generation, and identification of learning issues allow for the student exposure to a wide range of learning needs that can be visualized in the concept maps, which after discussion, could be considered as cognitive

frameworks of the meaningful learning occurring in each problem and for the whole course.

Because of the complementarity nature of concept mapping with PBL, concept mapping can be used in brainstorming and debriefing sessions of PBL. In a brainstorming session, the students can collaboratively construct a concept map related to each problem. This process can help students to identify the gaps, discover preconceptions in their knowledge related to the topic, and steer the group to generate relevant learning objectives. In a debriefing session, students can draw concept maps after the self-study and the structured learning activities of the week. This can help students determine the change in their understanding during the study week (**Bridges, Corbet, & Chan, 2015**).

#### **1.1. Significance of the study:**

The practice of concept mapping in the brainstorming, and debriefing sessions of PBL can support the PBL process and practice (**Bridges et al., 2015**). Hence the improvements in nursing students' practice in concept mapping could be reflected in the improvement of their practice in brainstorming, and debriefing sessions.

In addition, students' gender is considered one of the factors affecting the

concept mapping ability of students (Anohina-Naumeca, 2019). So, studying nursing students' concept mapping practice in relation to their gender could provide beneficial information to nursing educators for taking the needed measures to improve the PBL process.

### **The aim of the study:**

This study aimed to assess the practice of concept mapping in brainstorming and debriefing sessions in relation to gender among nursing students.

### **Objectives:**

1. Identify nursing students' practice of concept mapping in brainstorming and debriefing sessions.
2. Identify nursing students' practice of concept mapping in brainstorming and debriefing sessions in relation to gender.
3. Find out the relationship between nursing students' practice of concept mapping in brainstorming and debriefing sessions.

## **2. Subject and Methods**

**Study design:** The study had a correlational descriptive design.

### **The sample of the study:**

Ninety-two first-year nursing students participated in the study. Thirty-eight of the participants were males and fifty-four were females.

**Study setting:** The study was conducted at the Faculty of Nursing in Suez Canal University.

### **Tool of data collection:**

#### **Concept mapping practice in PBL scale:**

It was used to evaluate nursing students' practice of concept mapping in brainstorming and debriefing sessions. Each concept map was scored based on five skills: valid selection of concepts; the hierarchical arrangement of concepts; integration between concepts; relationship to the context of the problem; and degree of students' creativity (*Table 1*). Each skill in this tool was evaluated based on a five-point Likert scale from poor (1) to excellent (5). The validity and reliability of this tool were tested by **Kassab and Hussain (2010)**.

### **Fieldwork:**

Data were collected from the first-year nursing students with the 2<sup>nd</sup> PBL problem at the 2<sup>nd</sup> term of the academic year 2017/2018. The students were divided into eight PBL groups. Each PBL group was asked to draw one concept map for the brainstorming session and another for the debriefing session. Each concept map was evaluated by four raters.

### **Pilot study:**

A pilot study was carried out on 15 students to check the suitability of tools and duration to fulfilling and make needed modifications to this study. The sample of the pilot study wasn't included in the study.

### **Ethical considerations:**

The procedures and purpose of the study were fully explained to the students followed by the signing of informed consent. The confidentiality of the participants was protected by the anonymity of the questionnaires. The study protocol was approved by the Research Ethics Committee at the Faculty of Nursing in Suez Canal University.

### **Statistical design:**

The Statistical Package for Social Sciences (SPSS) version 20.0 was used for data analysis. Mean and standard deviation was used for descriptive data analysis whereas the Pearson correlation test and Independent Sample t-test were used for inferential analysis. P-value < 0.05 set for statistical significance.

## **3. Results**

**Table (2)** shows the practice of concept mapping in the PBL sessions among nursing

students. It was found that the mean score of total practice of concept mapping in the brainstorming session was  $12.25 \pm 2.73$ , and  $12.14 \pm 3.07$  in the debriefing session.

**Table (3)** shows the practice of concept mapping in the brainstorming session in relation to gender among nursing students. It was found that the females scored a significantly higher mean in the total practice of concept mapping in a brainstorming session ( $13.06 \pm 1.74$ ) compared to males ( $11.11 \pm 3.42$ ). Also, the females scored significant higher means in the skills of valid selection of concepts, integration between concepts, the relationship of the map to the context of the problem, and degree of creativity ( $3.36 \pm 0.49$ ,  $2.50 \pm 0.23$ ,  $2.89 \pm 0.83$ ,  $2.74 \pm 1.00$ , respectively) and compared to males ( $2.91 \pm 0.63$ ,  $1.95 \pm 0.78$ ,  $2.46 \pm 1.00$ , and  $2.28 \pm 1.06$ , respectively). However, there was no significant difference between males ( $1.51 \pm 0.61$ ) and females ( $1.57 \pm 0.50$ ) regarding the hierarchical arrangement of concepts.

**Table (4)** shows the practice of concept mapping in the debriefing session in relation to gender among nursing students. It was found that there was no significant difference between males ( $11.63 \pm 3.30$ ) and females ( $12.50 \pm 2.87$ ) regarding the total practice of concept mapping in a debriefing session.

Also, there were no significant differences between males ( $2.82 \pm 0.88$ ,  $1.90 \pm 0.79$ ,  $2.19 \pm 0.82$ , and  $2.47 \pm 0.44$ , respectively) and females ( $3.14 \pm 0.85$ ,  $1.97 \pm 0.72$ ,  $2.18 \pm 0.59$ , and  $2.50 \pm 0.55$ , respectively) regarding the skills of valid selection of concepts, the hierarchical arrangement of concepts, integration between concepts, and the relationship of the map to the context of the problem. However, there was a significant difference between males ( $2.25 \pm 0.96$ ) and females ( $2.71 \pm 0.70$ ) regarding the degree of creativity.

**Table (5)** shows the correlation between the practice of concept mapping in brainstorming and debriefing sessions. It was found that there was a highly significant positive correlation between students' practice of concept mapping in a brainstorming session and their practice of concept mapping in a debriefing session.

#### **4. Discussion**

Concept mapping is a recognized approach to the improvement of the PBL system as both of them complement each other (**Addae, Sahu, & Sa, 2017; Johnstone & Otis, 2006; Joshi & Vyas, 2018**). They are useful methods to promote active learning (**Addae et al., 2017; Joshi & Vyas, 2018**).

Concerning the practice of concept mapping in the PBL sessions among nursing students, the mean score of total practice of concept mapping in the brainstorming session was  $12.25 \pm 2.73$ , and  $12.14 \pm 3.07$  in the debriefing session. These results reflect the poor experience of first-year nursing students in practice concept mapping in PBL sessions. Hence, this experience might need training and repeated practice to be improved. In this regard, **Kassab and Hussain (2010)** reported that the mean score of concept mapping practice in the debriefing sessions of second-year students who practiced concept mapping in PBL sessions repeatedly was  $17.87 \pm 2.60$ .

Regarding the practice of concept mapping in the brainstorming session between males and females, it was found that the females scored a significantly higher mean in the total practice of concept mapping in a brainstorming session compared to males. This result could be due to that females have higher achievement scores than males. In this regard, **Banks (2012)** reported that female students tend to demonstrate higher educational achievement than male students.

In the current study, the females scored significantly higher means in the skills of valid selection of concepts, integration between concepts, the relationship of the map

to the context of the problem, and degree of creativity in the brainstorming session compared to males. These results could be attributed to individual differences among male and female students in addition to their previous knowledge. In this regard, **Anohina-Naumeca (2019)** indicated that the concept mapping ability may be influenced by many factors including students' cognitive style, learning style, and gender. Besides, the amount and quality of previous knowledge, and the familiarity with a knowledge domain related to the PBL problem topic. Hence, these factors should be considered in students' training and practicing of concept mapping in brainstorming and debriefing sessions. Furthermore, the PBL scenario could help identify concepts as a starting point in concept mapping practice (**Anohina-Naumeca, 2019**).

The current study found no significant difference between males and females regarding the hierarchical arrangement of concepts. This result could be due to the that the skill of hierarchical arrangement of concepts needs training to be practiced and the studied students didn't receive any training on using concept mapping in PBL sessions. In this regard, **Herring (2011)** pointed out the role of concept mapping training in practicing its skills.

Concerning the practice of concept mapping in the debriefing session between males and females, it was found that there was no significant difference between males and females regarding the total practice of concept mapping in a debriefing session. This result is in disagreement with **Kassab, Abu-Hijleh, Al-Shboul, and Hamdy (2005)** who indicated that male and female students perform in different ways in PBL sessions. Hence, it is expected to find a significant difference in practice concept mapping in debriefing sessions between male and female students.

In the current study, there were no significant differences between males and females regarding the skills of valid selection of concepts, the hierarchical arrangement of concepts, integration between concepts, and the relationship of the map to the context of the problem in the debriefing session. These results could be due to the poor preparation of students in the self-study period. In this regard, **Kassab (2016)** indicated that the practice of concept mapping in debriefing sessions is depending to a great extent on the amount of students' effort in self-study and the structured learning activities of the week. Also, students' understanding of the nature of concepts aids in understanding and then

practicing concept mapping (**Mintzes, Wandersee, & Novak, 2005**).

There was a significant difference between males and females regarding the degree of their creativity in concept mapping practice in the debriefing session. This result could be due to the female students tend to possess creative skills more than male students. In this regard, **Ülger and Morsünbül (2016)** reported that female students at the university level have significantly higher creative thinking than males.

Regarding the correlation between nursing students' practice of concept mapping in brainstorming and debriefing sessions, the current study results revealed a highly significant positive correlation between both. This result could be due to that the skills of concept mapping practice in PBL sessions are integrated and complement each other. The valid selections of concepts in brainstorming sessions may be a result of students' understanding of PBL problems doing good analysis for them. Hence, they will be able to select valid concepts (**Kang & Kim, 2009**). Also, the hierarchical arrangement of concepts and the integration between them in the brainstorming session could reflect students' progress over time in their ability to compare the previously selected concepts in a

hierarchical structure and increase the ability to integrate their previous knowledge with the information presented by the clinical case scenario to identify their learning issues (**Kassab, 2016**). Also, the relationship of the map to the context of the problem reflects students' better understanding of the PBL problem and the organizing of its information. In addition, the valid selection of concepts in the debriefing session is developed based on students' self-study as a trial to satisfy their learning needs extracted during the brainstorming sessions. That is energized when students share and discuss their knowledge and improved the hierarchical arrangement of concepts in the debriefing session (**Ajmal et al., 2016**).

## **5. Conclusion:**

Concept mapping practice in PBL sessions needs to be improved. Female nursing students are significantly better than males in their total practice of concept mapping in the brainstorming session. In addition, there is a highly significant positive correlation between students' practice of concept mapping in brainstorming and debriefing sessions.

## **6. Recommendations:**

- Improving concept mapping practice in PBL sessions through providing first-



year nursing students with a training program on using concept mapping in brainstorming and debriefing sessions is needed.

- Considering the individual differences among students that contribute to their concept mapping practice in PBL

sessions and hence their practice in PBL sessions in general.

**7. Conflict of Interest:**

None.

**8. Funding:**

None.

**Table 1: Criteria of concept maps evaluation in PBL.**

<b>Skills</b>	<b>Illustration</b>
<b>Valid selection of concepts</b>	The degree to which meaningful and valid concepts have been selected from the PBL problem.
<b>The hierarchical arrangement of concepts</b>	The degree of the arrangement of concepts with more general concepts at the top and more specific below or extending outward.
<b>Integration between concepts</b>	The degree to which the map shows meaningful interconnections between the different concepts in the map.
<b>Relationship to the context of the PBL problem</b>	The degree to which the concepts are directly related and linked to the context of the problem. The context of the map is the clinical or community problem that the students study during the PBL week.
<b>Degree of student creativity</b>	The degree to which the student demonstrates unusual elements that aid communication or stimulate interest without being distracting.

*Kassab, S. E., & Hussain, S. (2010). Concept mapping assessment in a problem-based medical curriculum. Med Teach, 32(1), 926 - 931. doi: 10.3109/0142159X.2010.497824*

**Table 2: Practice of concept mapping in the PBL sessions among nursing students (N=92).**

Variables	Min-Max	Mean ± SD
Valid selection of concepts.	1-5	3.18 ± 0.59
The hierarchical arrangement of concepts.	1-5	1.55 ± 0.55
Integration between concepts.	1-5	2.27 ± 0.59
Relationship to the context of the problem.	1-5	2.71 ± 0.93
Degree of students' creativity.	1-5	2.55 ± 1.05
<b>The total practice of concept mapping in a brainstorming session.</b>	5-25	12.25 ± 2.73
Valid selection of concepts.	1-5	3.01 ± 0.87
The hierarchical arrangement of concepts.	1-5	1.94 ± 0.74
Integration between concepts.	1-5	2.18 ± 0.69
Relationship to the context of the problem.	1-5	2.48 ± 0.50
Degree of students' creativity.	1-5	2.52 ± 0.84
<b>The total practice of concept mapping in a debriefing session.</b>	5-25	12.14 ± 3.07

**Table 3: Practice of concept mapping in the brainstorming session in relation to gender among nursing students (N=92).**

Skills of practice concept mapping in the brainstorming session	Min-Max	Mean ± SD		P-Value
		Male (N=38)	Female (N=54)	
Valid selection of concepts.	1-5	2.91 ± 0.63	3.36 ± 0.49	<b>0.000*</b>
The hierarchical arrangement of concepts.	1-5	1.51 ± 0.61	1.57 ± 0.50	0.562
Integration between concepts.	1-5	1.95 ± 0.78	2.50 ± 0.23	<b>0.000*</b>
Relationship to the context of the problem.	1-5	2.46 ± 1.00	2.89 ± 0.83	<b>0.028*</b>
Degree of students' creativity.	1-5	2.28 ± 1.06	2.74 ± 1.00	<b>0.037*</b>
<b>The total practice of concept mapping in a brainstorming session.</b>	5-25	11.11 ± 3.42	13.06 ± 1.74	<b>0.001*</b>

\*: Statistically significant at  $p < 0.05$

**Table 4: Practice of concept mapping in the debriefing session in relation to gender among nursing students (N=92).**

Skills of students' practice of concept mapping in a debriefing session	Min-Max	Mean ± SD		P-Value
		Male (N=38)	Female (N=54)	
Valid selection of concepts.	1-5	2.82 ± 0.88	3.14 ± 0.85	0.081
The hierarchical arrangement of concepts.	1-5	1.90 ± 0.79	1.97 ± 0.72	0.676
Integration between concepts.	1-5	2.19 ± 0.82	2.18 ± 0.59	0.919
Relationship to the context of the problem.	1-5	2.47 ± 0.44	2.50 ± 0.55	0.760
Degree of students' creativity.	1-5	2.25 ± 0.96	2.71 ± 0.70	<b>0.009*</b>
<b>The total practice of concept mapping in a debriefing session.</b>	5-25	11.63 ± 3.30	12.50 ± 2.87	0.183

\*: Statistically significant at  $p < 0.05$

**Table 5: Correlation between the practice of concept mapping in brainstorming and debriefing sessions (N=92).**

The total practice of concept mapping in a brainstorming session.	The total practice of concept mapping in a debriefing session.	
	Pearson Correlation (r)	P-Value
	0.488	<b>0.000**</b>

\*: Statistically significant at  $p < 0.05$

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