Concept mapping as an educational strategy to Promote meaningful learning

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ABSTRACT

Background: *A major metacognitive learning strategy that appears to improve students learning experience is concept mapping.*

Purpose: *To determine the effects of teaching by concept mapping method on meaningful learning of a group of bachelor degree program nursing students.*

Methods: *Students studied in fourth year of Nursing, Bachelor's Program, in two nursing faculties located in Tehran were selected by simple sampling method and randomly assigned into intervention and control groups. The selected materials were taught by concept mapping strategy for the intervention group while in the control group traditional lecturing method was used. A teacher-made, criterion referenced test was used as instrument to evaluate meaningful learning of participants in two groups.*

Results: *Based on intended criteria 230 fourth year students wereincluded.25 students were excluded due to lack of one or more including criteria. The remaining students were divided randomly into two intervention (106 students) and control (99 students) groups. The study was conducted during a 5-week period. The results showed that there was a significant statistical difference between the mean scores of retention test of learning in the case (72.40 %) and control (53.30 %) groups (P<0.005).*

T-test also revealed that there was a significant statistical difference between the mean scores of cumulative post-test for the case group (73.29 %) and the mean scores of cumulative posttest for the control group (68.69 %).

Conclusion: *Based on our findings it can be concluded that teaching by concept mapping strategy has significant effects on meaningful learning and retention of the students.*

By addressing these issues it is suggested that more nurse educators would attempt to use the concept mapping strategy in the promotion of meaningful learning.

Key words: CONCEPT MAPPING, TEACHING/LEARNING PROCESS, MEANINGFUL LEARNING, METACOGNITION.

Introduction

During the last quarter of 20th century number of nurses was doubled for each100, 000 of population across the world (1). With advance of medical technologies harder medical conditions has come under control. Advances in public health have made the dream of living longer come true. All these have added to the need for quality nursing care. In an era which is usually described as information era, delivering quality care requires nurses who learned their lessons well. This gives improvement of teaching and learning activities a high priority.

Educational researchers and theoreticians believed that applying teaching/learning solution causes significant improvement in learning. Focusing on met cognitive skills such as reasoning, critical thinking and problem solving is a must for nursing education. Obtaining such outcomes requires a paradigm shift in nursing education.(3) The aim is forwarding from behavioural educative materials to educative materials.

Loving & Wilson (5) wrote that nursing educators use a comparative model for teaching in class. This program deeply concentrates on covering and the behavioural aims of teaching. Distinguished property of this philosophy is the existence of hierarchy between educators and students (4). Educators teach and the learners learn or at least pretend they have learned what the educators taught them. Replacement philosophy delivered responsibility of the structures of teaching to the educators. This structure leads to a better learning

and teaches the learners how to learn. Applying this philosophy facilitates critical thinking in learning that is one major aim of education. Reaching this aim needs re-designing of the education, applying new teaching methods (5).

To keep pace with more complex knowledge and advancement of technology, the significant learning improvement solutions should also be created. Nurse teachers must apply those techniques that help the students to learn the concepts significantly and use them in clinical situations.(6).

Concept/cognitive maps are powerful instruments that support significant learning and help long time retention of the information in students' memories. Concept map is a two-dimensional and schematic instrument that represents a set of hidden meanings in theorem frame and the relation thereof. Concept drawing consists of knots and lines. Every knot consists of concept and connecting lines show the relation and theorems between two groups. Concept map includes a design that principal and comprehensive concepts are placed at the top (or center) and partial and small concepts in lower levels (or surroundings) and connects them to each other by lines and symbols (7-14).

Given the importance of nursing education, the necessity of a research for examining concept maps as a new teaching method that leads to significant learning and better retention of the information is inevitable.

Materials and Methods

Students were chosen among those in fourth year of Nursing, Bachelor's Program, by simple sampling method. The students randomly assigned into intervention and control groups. The two groups were at 2 different faculties of Nursing and Midwifery in Tehran. After taking permission from faculties and students, researchers, attended in the classes and taught them nursing care in chronic diseases taken from cardiovascular course, medical and surgical unit in nursing. Traditional teaching method (lecture together with audiovisual instruments) was used for control group and concept mapping method for intervention group. The same instructor taught both groups. A pre-test was taken at the beginning of every class and a post-test at the end, after giving course materials. In intervention group, after taking pre-test, concept-mapping course was shown by overhead and then the class managed through drawing map step by step. At the end of each session, for adding up the contents of teaching materials, concept maps were studied and criticized, and then post test was taken for two groups. Four weeks later than the last session post-test (retention test) was taken. In control group, the course was taught though lecture with the aid of overhead for showing pictures and outlines.

Obtained data were analyzed using Chi-square, Fisher, t pairs, independent t tests by SPSS (Ver. 11) software.

Results

Based on intended criteria 230 fourth year students were included.25 students were excluded due to lack of one or more including criteria. Finally the remained students were divided randomly into two intervention (106 students) and control (99 students) groups. The study was conducted during 5 weeks (one session each week). Most of the students (83.90%) were between 20-23 years old. 91.22% of them were female and 82.93% were single. The number of passed units were between 80-95 at the beginning of the study.

The mean scores of pre-test, between intervention and control groups, were significantly different. Accordingly, the mean of pre-test scores in intervention group was lower than the mean of pre-test scores in control group (P<0.005).

TABLE 1- Frequency distribution of pre-test scores in case and control groups.

The Scores	Case Group		Control Group		Result of Change Test (One Field)
	Number	Percent	Number	Percent	
20-40	1	0.9	0	0	
40-60	89	84.0	75	75.80	T=3.163
60-80	16	15.1	24	54.2	Df=203
Total	106	100	99	100	P<0.005
Mean	53.47		55.88		Significant
Standard deviation	5.706		5.203		

The mean scores of post-test was higher significantly in intervention than in control group (P<0.005)

Table 3 indicated that there are significant differences between retention test mean scores in the intervention group in comparison with the same scores in controls (P<0.005).

TABLE 2- Frequency distribution of post-test scores in case and control groups.

The Scores	Case Group		Control Group		Result of Test (One Field)
	Number	Percent	Number	Percent	
40-60	1	0.9	21	21.2	
60-80	86	81.1	70	70.7	T=4.326
80-100	19	17.9	8	8.1	Df=203
Total	106	100	99	100	P<0.005
Mean	73.29		68.69		Significant
Standard Deviation	6.036		8.827		

TABLE 3- Frequency distribution of retention tests scores in case and control groups.

The Scores	Case Group		Control Group		Result of Test (One Field)
	Number	Percent	Number	Percent	
20-40	4	3.8	9	9.1	
40-60	21	19.8	58	58.6	T=4.326
60-80	45	42.5	32	32.3	Df=203
80-100	36	34.0	0	0	P<0.005
Total	106	100	99	100	Significant
Mean	721.40		53.30		
Standard Deviation	16.333		10562		

Discussion

Results of this research showed that teaching based on concept mapping is effective on learning method and information retention.

Based on the results of this study concept mapping methods as a main route of teaching or as a complementary strategy for traditional teaching method may improve the students' knowledge retention capability.

In the study by Goastlu BS 124 students from 7th year of one of the nursing schools in New York selected and studied in two groups to compare concept mapping with traditional method. 20 teacher-made questions were used for post test evaluation as well as a complementary questionnaire for additional data collection. The results of the study showed that concept drawing added 5.98 to the scores of intervention group(P<0.01). The results also showed that using concept-drawing techniques against traditional teaching methods always results in higher understanding level and more educational improvement (15).

In another study with the aim of determination of the effects of teaching with the concept drawing method on understanding and refine of learning contents, 126 students of 5th year in Taiwan were chosen. Comparing pre and post tests results showed that intervention group enjoyed better operation and refine more capability (P<0.01) (16).

Daily et al (1999) in a semi-experimental study for determination of the effects of concept mapping on education and critical thinking studied 6 groups of nursing students (a total of 54 students). They found significant statistical differences between first and last mean scores of concept drawing group of the students. This difference showed significant increasing in conceptual and critical thinking of participant students (14).

Based on the findings of this research it seems that concept mapping method increases meaningful learning and information retention. Use of this method can enhance students' learning experience which is a critical determinant of quality education.

Acknowledgments

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