Concept Mapping as a Teaching Strategy Utilized for Senior Nursing Students

Virmalene M. Pacis
Master of Arts in Nursing – Union Christian College
San Fernando City, La Union, Philippines

Dr. Rose Merlyn Jubilo
Research Director - Union Christian College
San Fernando City, La Union, Philippines

Jonas P. Cruz
Nurse Lecturer – Shaqra University
Riyadh, Saudi Arabia

Abstract

The study aimed to determine the level of effectiveness of concept mapping in teaching senior nursing students of Union Christian College. Pretest-posttest control-experimental group was used to conduct the study and double blind method was utilized to strengthen it. There were 36 respondents per group, majority were females, single, and young adults. The results showed that concept mapping method along with traditional lecture was moderately effective. Furthermore, there was a significant difference between the pretest and posttest scores in both methods. It was also found out that there was no significant difference between the pretest scores of the two groups. However, there was a significant difference between the posttest scores of the two groups with 95% confidence interval but there was no significant difference between them at alpha .01. It is then concluded that concept mapping method is partially effective. Also, it facilitates more meaningful learning experience for student nurses due to its nature.

Introduction

Teaching and learning are the two sides of a coin. The most accepted criterion for measuring good teaching is the amount of student learning that occurs. (Sajjad, 2009) Doyle (2004) cited that this same criterion was also put forth by Thomas Angelo, when he said “teaching in the absence of learning is just talking.” A teacher’s effectiveness is again about student learning.

According to Sajjad (2009), many researchers have focused on whether or not students are legitimate judges of teaching effectiveness. Though caveats abound, the general sense is that students are both rational and reliable sources of evidence (Arreola, 1995; Braskamp and Ory, 1994; Pratt, 1997). While in class, students are exposed to all sorts of instructional experiences (lectures, instructional materials and aids, readings, exams). They are, in effect, experimental consumers who are able to discern quality, relevance, usefulness, and instructor interaction with students (Montgomery, n.d.). As consumers, Cuseo (n.d.) claims that students can judge what is taught and how it is taught, yet Braskamp and Ory (1994) claim that students can only provide information with respect to teaching. However, Ory (2001) sums it up best stating: “unless they haven’t been to class, as consumers they have a legitimate voice”. Theall (n.d.) mentioned that the students can answer questions about the quality of lectures, the value of readings and assignments, and the clarity of the instructor's explanations. Students are certainly qualified to express their satisfaction or dissatisfaction with the experience. They have a right to express their opinions in any case, and no one else can report the extent to which the experience was useful, productive, informative, satisfying, or worthwhile.
Concept maps are diagrams that represent organized knowledge (Novak and Gowin, 1984). Thus, it explains the importance of prerequisite subjects in nursing that help build a strong foundation to be able to push through a higher level of learning.

According to Scott, Pelley, and Taylor (2006), educators in allied health professions are always looking for effective teaching methods to enhance student learning in the classroom. Their study advocates the promotion of critical thinking through integrative learning to allow students to transfer knowledge from the classroom environment to practical situations in the clinic. Concept mapping, according to them, is a teaching technique that is used in a variety of educational settings to promote integrative learning that is utilized to meet different student learning styles. Concept mapping can also be used for individual and group instructions. Subsequently, Scott et al. (2006) found that the application of concept mapping has practical implications for educators regarding students’ grasp of concepts which made it easier for the teacher to facilitate learning, hence concept mapping can be an effective teaching method in the classroom.

According to All and Havens (1997), nursing students face a great need to understand the larger questions and problems of their chosen field. Unless there is understanding, students may only commit unassimilated data to short-term memory and no meaningful learning will occur. Meaningful learning is most likely to occur when information is presented in a potentially meaningful way and the learner is encouraged to anchor new ideas with the establishment of links between old and new material. Moreover, if the new age of nursing students are tired of traditional methods of teaching that may affect their enthusiasm to learn, then concept mapping may be the ingredient for a higher level of learning the course. Concept mapping, as mentioned earlier, improves decision making which is a criterion in the higher order of thinking. Critical thinking, which is a skill nurses should master before entering into practice, is also amplified. Daley, Shaw, Balistrieri, Glasenapp, and Piacentine’s work, as cited by Green (2010), found concept maps to be a metacognitive learning strategy to improve student critical thinking. Luckowski’s study, as cited by Green (2010), utilized concept maps in critical care as a teaching strategy noting that critical thinking can be integrated into curriculums for all nursing levels.

Objective of the Study

The study aimed to determine the level of effectiveness of concept mapping in teaching Acute Biologic Crisis to senior students of Union Christian College. Specifically, it:

1. Determined the level of effectiveness of concept mapping on the respondents’ learning as reflected through an achievement test;
2. Determined difference between pre-test and post-test scores of the experimental group and the control group;
3. Determined the difference between experimental and control groups in terms of the mean scores in the pre-test and mean scores in the post-test?

Hypotheses

1. There is no significant difference between the pre-test and post-test scores of students in the traditional lecture and in concept mapping groups.
2. There is no significant difference between concept mapping and traditional lecture methods shown by the mean scores computed for the pre-test and the mean scores computed for the post-test.

Methodology

This research study used a pretest-posttest design, a true experimental design in which there is a degree of randomization, use of a control group, and therefore, greater internal validity. Random assignment
of the respondents to control group or experimental group was done through fishbowl technique. Further, the use of the pretest-posttest control group design for one term of the first semester of school year 2012-2013 enhanced the control of dependent variable measurements and eliminated threats to internal validity such as history, maturation, testing, instrumentation, regression, selection, and mortality. Data collector bias was minimized by ensuring that the researcher administered the pretest and posttest similarly through the use of a written script. The instructor utilized concept mapping and traditional lecture to the experimental and control group, respectively. Moreover, he has been utilizing concept mapping method for three years. Threats to external validity such as interaction of testing and treatment, interaction of selection and treatment, reactive arrangements, and multiple-treatment interference were not matters of concern because randomization was implemented. In addition, Double Blind method was utilized.

Population and Locale

The research study was conducted at the Nursing Department, Union Christian College. The respondents were almost half the census of fourth year students enrolled in NCM 106, where acute biologic crisis is a subtopic. The experimental group was taught using the concept mapping instructional design for a term during the first semester, school year 2012-2013. In contrast, the control group was taught using the traditional lecture by the same instructor with the same subject matter and allotted time. Fishbowl technique was used to randomly assign the control group and the experimental group. There were 36 respondents per group, majority were female, single, and young adults. Attrition was not a problem because there was a large sample size, and the mean score of the students in each group was the baseline for students’ learning. Testing biases were minimized because the pre-test and the post-test were administered 5 weeks apart. After the pre-test, answers were not rationalized to decrease retention of questions.

Data Gathering Tool

An achievement test was the major instrument to gather data. The tool was a 75-item choice examination allotted for one hour. The same examination was used for the pre-test and post-test. The validity and reliability of the tool were highly established because the contents were lifted from the test bank of the Philippine Board of Nursing. It was also counterchecked by several nurse educators to determine whether the test items were in accordance with the desired topic before administering it to the randomly selected group of senior students.

Treatment of Data

Objective 1 dealt with the level of effectiveness of concept mapping reflected through the gained marks accumulated from the achievement test. The scores were computed using a 50-50 ratio and tallied into 4 categories. The level of effectiveness of the teaching strategy was measured using a rubric adopted from Hartland Educational and Career Consultancy Incorporated. The said agency has been running for the past 7 years, and has helped several graduate nurses achieve their licenses to practice professionally. In addition, the review center has been using the rubric for 5 years to evaluate the performance of the examinees, hence the validity and reliability of the rubric are well established. Table 1 shows the ratings and the corresponding descriptive equivalents.
Table 1. Rubric for the Level of Effectiveness of Concept Mapping

<table>
<thead>
<tr>
<th>Rating</th>
<th>Descriptive Equivalent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% and above</td>
<td>Highly Effective</td>
<td>Students had exemplary performance. (Students got 45 points and above in a 75-item-test.)</td>
</tr>
<tr>
<td>75% to 79.99%</td>
<td>Effective</td>
<td>Students performed above average. (Students got 38 to 44 points in a 75-item-test.)</td>
</tr>
<tr>
<td>70% to 74.99%</td>
<td>Moderately Effective</td>
<td>Students performed fairly. (Students got 30 to 37 points in a 75-item-test.)</td>
</tr>
<tr>
<td>69.99% and below</td>
<td>Ineffective</td>
<td>Students performed poorly. (Students got less than 30 points in a 75-item-test.)</td>
</tr>
</tbody>
</table>

T test was used on problems 2 and 3 to determine if there is a significant difference between the mean scores in the pretest and posttest in concept mapping and in traditional lecture method and if there is a significant difference between the mean scores of the two groups in terms of pretest and posttest. Relative hereto, 5 % and 1% levels of probability with 95% and 99% reliability were utilized to determine the degree of significance in the findings.

Results and Discussions

Level of Effectiveness

The results shown in table 2 indicate that 91.7 % (Experimental group) and 86.1% (Control group) of the students earned a score of 37 and below in the pretest which means that the performance of the students was generally low. There were only 8.3% from the experimental group and 13.9% from the control group who passed the test. Hence, this implies that there was a need to intervene to promote learning. On the other hand, the posttest results in the group taught with concept mapping and with traditional lecture methods presented 63.9% and 44.4% respectively and earned a rating within the range of 70% to 74.99%.

In addition, there were only 2.8% of the respondents in the experimental group and 36.1% in the control group who got 69.99% and below, which indicated that their performance in the posttest improved. Also, there was an increase in the percentage of students who acquired 80% and above in both groups with 5.6% each. Since majority of the students increased their ratings fairly, the results implied that concept mapping and traditional lecture method were moderately effective.

Table 2. Summary of the Level of effectiveness of Concept Mapping and Traditional Lecture Methods

<table>
<thead>
<tr>
<th>Level of Effectiveness</th>
<th>Rating (%)</th>
<th>Concept Mapping (Experimental Group)</th>
<th>Traditional Lecture (Control Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Ineffective</td>
<td></td>
<td>69.99%</td>
<td>14</td>
</tr>
<tr>
<td>Moderately Effective</td>
<td></td>
<td>70 to 74.99</td>
<td>19</td>
</tr>
<tr>
<td>Effective</td>
<td></td>
<td>75 to 79.99</td>
<td>3</td>
</tr>
<tr>
<td>Highly Effective</td>
<td></td>
<td>80 and above</td>
<td>0</td>
</tr>
</tbody>
</table>

*f – Frequency; % - Percentage

However, posttest results in the experimental group showed that there were more students who increased their scores. It is inferred that concept mapping method was more effective than traditional lecture as a strategy utilized in teaching nursing concepts.
The result supports previous studies, such as that of Gaines (1996) as cited by Russel, Comello, and Wright (2007) conducted to examine the effects of concept mapping as instructional strategy utilized for nursing students in a pharmacology course. The results of the study showed that the method utilized for the said course was effective in the student’s learning process. According to Hinck, et al. (2006), concept maps based on studies helped college students to better learn the course and to improve scores. Concept mapping increases the ability of nursing students to understand massive amounts of content, measured by multiple choice exams (Hinck, et al., 2006). According to a study on the impact of traditional and non-traditional methods of teaching to students’ performance at nursing colleges in Jordan, results show that the lowest mean score came from the group where traditional lecture was the main approach. (Hasheesh, Mostafa, and Obeidat, 2011)

Table 3 presents the mean scores accumulated in the pretest and posttest by the experimental and control groups. The pre-test mean scores which were 30.97 and 30.44 compared to the post test mean scores with 35.67 and 33.06 reflected an increase in the performance of the students after exposure to an instructional strategy. According to Kuehn (n.d.), students are not expected to know the answers to all questions in the pretest, but they are expected to use previous knowledge to predict rational answers, and in the posttest with same material utilized, students are expected to answer more questions correctly based on an increase in knowledge and understanding. In addition, the computed mean scores obtained by the group taught with concept mapping strategy, both in the pretest and posttest, were slightly higher, with .54 and 2.61 difference respectively, than that of the group taught with traditional lecture.

Table 3. Summary of Mean scores in the Pretest and Posttest of the Experimental and Control Groups

<table>
<thead>
<tr>
<th>Teaching Method</th>
<th>Pretest Mean Score</th>
<th>Posttest Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept Mapping (Experimental Group)</td>
<td>30.97</td>
<td>35.67</td>
</tr>
<tr>
<td>Traditional Lecture (Control Group)</td>
<td>30.44</td>
<td>33.06</td>
</tr>
</tbody>
</table>

Significant Difference

Table 4 shows the t values computed to determine whether there was a significant difference between the scores in the pretest and posttest garnered by the control and the experimental groups. In the concept mapping group, the computed t value was 4.20 which implies that it was beyond the acceptance region, considering the level of significance at .05 and .01, thus the null hypothesis is rejected. Hence, there was a significant increase in the scores in the posttest compared to the pretest, after teaching acute biologic crisis using the concept mapping method. This implies that majority of the students in this group gained knowledge and understanding of the subject matter taught.

Though the t value computed for the concept mapping group was higher, the traditional lecture group earned a t value of 2.81 which also reflected the rejection of the null hypothesis. Therefore, the scores between the pretest and posttest in the control group also represented a significant increase which meant that knowledge had been imparted to the group.

Table 4. Significant Difference between the pretest and posttest scores in Concept Mapping and Traditional Lecture

<table>
<thead>
<tr>
<th>Teaching Method</th>
<th>Pretest Mean Score</th>
<th>Posttest Mean Score</th>
<th>t value</th>
<th>p value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept Map</td>
<td>30.97</td>
<td>35.67</td>
<td>4.20</td>
<td>2.03 (5%)</td>
<td>Reject Ho</td>
</tr>
<tr>
<td>Traditional Lecture</td>
<td>30.44</td>
<td>33.06</td>
<td>2.81</td>
<td>2.72 (1%)</td>
<td>Reject Ho</td>
</tr>
</tbody>
</table>

In the study by Goastlu (as cited by Parsa and Nikbakht, 2004), 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. The results of the study showed that concept drawing added a significant value to the scores of the intervention group. The results also showed that using concept-drawing techniques against traditional teaching methods always results in higher understanding level and more educational improvement. Based on the findings of the study of Parsa and Nikbakht, 2004, in Iran among nursing students, concept mapping as a teaching method increases meaningful learning and information retention. The use of this method can enhance students’ learning experience which is a critical determinant of quality education.

Table 5 showed the calculated t values that determined if there was significant difference in terms of the pretest mean scores in concept mapping and traditional lecture method and in terms of the posttest mean scores of the said teaching strategies. The computed t value between the mean scores of the pretest in both methods is .41 with the level of significance at .05 and .01 inferred that it was within the acceptance region so the null hypothesis is accepted. Thus, there is no significant difference between the scores accumulated by the control and the experimental groups in the pretest which means that the baseline scores of the two groups were almost equal. Furthermore, the computed t value between the mean scores of the posttest in the two teaching methods was 2.06, which reflected that there is a significant difference between the mean scores at alpha .05 but indicated no significant difference between the mean scores at alpha .01.

Hence, it can be inferred from the scores obtained by the samples from the two groups in the pretest although the experimental group earned a higher score, with .54 additional points to the mean score of the control group, the respondents from the control and experimental group shared the same level of knowledge and understanding prior to teaching acute biologic crisis. On the other hand, the posttest scores revealed that at 95% confidence, the scores in the group taught through concept mapping were significantly higher. Moreover the scores in the said group acquired a greater value, with 2.61 added points from the mean score of the group where lecture was used. The increased value showed that concept mapping was more effective than traditional lecture in teaching acute biologic crisis at alpha .05.

<table>
<thead>
<tr>
<th>Test Administered</th>
<th>Concept Mapping Mean Score</th>
<th>Traditional Lecture Mean Score</th>
<th>t value</th>
<th>p value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>30.97</td>
<td>30.44</td>
<td>0.41</td>
<td>1.99 (5%)</td>
<td>Accept Ho</td>
</tr>
<tr>
<td>Posttest</td>
<td>34.67</td>
<td>33.06</td>
<td>2.06</td>
<td>2.65 (1%)</td>
<td>Reject Ho at alpha .05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accept Ho at alpha .01</td>
</tr>
</tbody>
</table>

Parsa and Nikbakht (2004) stated that concept mapping method, as a main route of teaching or as a complementary strategy for traditional teaching method, may improve the students’ knowledge retention capability. Another study by Mohamed, as cited in the International Journal for the Scholarship of Teaching and Learning in 2008, with regards to the impact of three different learning models, student performances appeared to be higher for material taught under the active learning modules and worst, under traditional lecturing.

**Conclusion**

Based on the findings of the study, the following conclusions are derived:

1. Concept mapping, as a teaching strategy is partially effective. It can be used with other instructional designs such as traditional lecture to promote a better learning atmosphere.
2. Concept mapping method facilitates more meaningful learning experience for student nurses.
3. Concept mapping method is more effective than traditional lecture for it promotes meaningful learning rather than rote learning.

References