"INVESTIGATING THE IMPACT OF TWO TEACHING STRATEGIES ON PHYSIOLOGY OF PAIN IN TERMS OF KNOWLEDGE AND PERCEPTION REGARDING STRATEGIES AMONG BSC NURSING STUDENTS OF SELECTED NURSING COLLEGES IN KERALA"

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Abstract: Concept Mapping is a method that inspires learning and aids in critical thinking, encourages students to connect new knowledge gained to their prior learning and also opens the chance to acquire more knowledge and information about a wide range of concepts within a short duration.

The main objective of the study was to assess the effectiveness of two teaching strategies Concept Mapping over Lecture method on Physiology of Pain and to assess the perception of the students regarding teaching strategies. A quantitative research approach using an experimental study, pre-test post-test control group design was adopted for the study. The study was conducted in selected nursing colleges in Pathanamthitta and Trivandrum district of Kerala, India. Using multi-stage cluster sampling technique 237 1st year BSc nursing students were selected 124 sample in control group and 113 sample in experimental group. The tool used for the study were a structured questionnaire for personal data and Knowledge and a structured opinionnaire.

The findings of the study showed that the post-test scores of the samples in experimental group (76) 67.3 % had moderate knowledge, (37) 32.7 % had good knowledge was more than the post-test scores of the samples in control group (66) 53.2 % had moderate knowledge, (23) 18.6 % had good knowledge, thus concluding that concept mapping is a good method of teaching. The study results further show the opinion of the samples; data shows mean values of each aspect was higher for Concept Mapping compared to Lecture method of teaching, statistics shows that the p values were less than 0.01, concluding that the students considered concept mapping more effective than Lecture method of teaching. Data also shows that there was no association between pre-test knowledge score and selected demographic variables at 0.05 level of significance.

The study concludes that concept mapping is an effective teaching strategy for teaching nursing students. Concept mapping was more effective in increasing the Knowledge of students as compared to Lecture method. The opinion of the students regarding concept mapping was high as students felt concept mapping as a good method of teaching considering many aspects like collaboration with other, encourages deep thinking etc. Thus the study shows that among the two strategies concept mapping was more effective and the students also perceived Concept mapping as a better teaching strategy than Lecture method.

Index Terms - **Teaching strategies, Concept mapping, Lecture, Effectiveness, Knowledge, Perception.**

I. INTRODUCTION

Education is a continuous and lifelong process of gaining knowledge, skills, beliefs, and values. The history of education dates back when adults trained the young with the knowledge and skills necessary to survive in safety. Education in pre-literature societies was attained orally and through imitation. Storytelling was used to pass knowledge, skills and, values from one generation to the other. With the extension of culture, learning moved from informal to formal education.

In the 20th Century, newer teaching methods came into existence with the use of television, radio, internet, and modern devices. A teaching method consists of principles and methods practiced by teachers to facilitate students learning. These devices are based

partly on the subject matter to be taught and partly by the learner's nature of learning. Effectiveness in the learning process can be achieved by adopting appropriate strategies.

The most admired teaching method that is used by the majority of teachers is hands-on activities, these activities include movement, listening and talking it stimulates multiple areas of the brain.

To enhance meaningful learning metacognitive strategies are developed that will assist the nursing students to learn effectively. Nurse educators must create an environment that keeps students busy in the learning process and during this journey, both teachers and students use a wide range of visual tools in the new generation classroom.

One such method is Concept Mapping a teaching strategy that is used to represent the relationship between ideas, words or images similar to the way a sentence diagram represents the grammar of a sentence. Concept Maps create logical thinking and study skills among students by disclosing the link between concepts. It is a teaching-learning strategy that develops a relationship between knowledge and sensible learning.

The researcher's own experience and interest in the area and as very few studies have been conducted on this topic in nursing field, particularly in Kerala, has led to the need to evaluate the impact of two teaching strategies on physiology of pain in terms of knowledge and perception regarding strategies among BSc Nursing students of selected Nursing colleges in Kerala. Such a study will help in including new methods of teaching in the syllabus of nursing students that will help in better understanding of concepts, help in easy recall and skill development. It is also important to revise traditional methods of teaching and take advantage of new, active and student-centered educational methods.

II. OBJECTIVES OF THE STUDY

The objective of the study was to:

1. Assess the baseline knowledge of 1st year BSc Nursing students
2. Assess the effectiveness of two teaching strategies concept mapping over lecture method on physiology of pain among 1st year BSc nursing students in selected nursing colleges of Kerala
3. Assess the perception regarding strategies among 1st year BSc Nursing students
4. Find an association between pre-test knowledge score with selected demographic variables

III. REVIEW OF LITERATURE

In this study review of literature has been arranged under the following headings:

1. Literature review related to concept mapping as a teaching method
2. Literature review related to the lecture method of teaching
3. Literature review related to concept mapping and lecture method of teaching
4. Narrative reviews

IV. CONCEPTUAL FRAMEWORK

The conceptual framework for the present study is an integration of Ausubel's Assimilation/Subsumption theory and the Nursing process to make meaningful learning to occur.

Figure 1: Conceptual Framework of the study
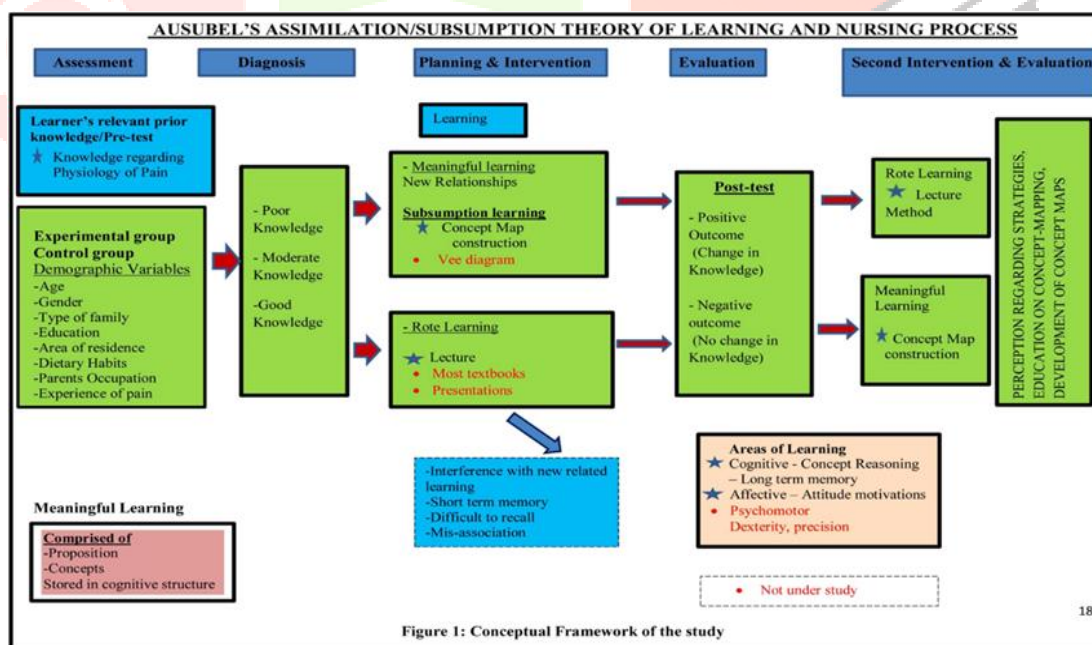
V. HYPOTHESIS

H1 – The distribution of 1st year BSc nursing students in both experimental and control group is not same based on pre-test Knowledge and background characteristics

H2 - The mean post–test knowledge score of 1st year BSc nursing students in experimental group on the topic physiology of pain will be significantly higher than the mean post-test knowledge score of 1st year BSc nursing students in control group as evident from structured knowledge questionnaire at 0.05 level of significance

H3 - The mean post–test knowledge score of 1st year BSc nursing students in experimental group on the topic physiology of pain will be significantly higher than the mean pre-test knowledge score of 1st year BSc nursing students in experimental group as evident from structured knowledge questionnaire at 0.05 level of significance

H4 - The mean post–test knowledge score of 1st year BSc nursing students in control group on the topic physiology of pain will be significantly higher than the mean pre- test knowledge score of 1st year BSc nursing students in control group as evident from structured knowledge questionnaire at 0.05 level of significance

H5 – The perception of 1st year BSc nursing students regarding concept mapping will be significantly higher than the perception regarding Lecture method as evident by structured opinionnaire.

H6 – There is a significant association between pre-test knowledge score and selected demographic variables at 0.05 level of significance

VI. ASSUMPTIONS OF THE STUDY
1. Students will have some knowledge about the central nervous system
2. Teaching methods influence the student's learning
3. Traditional method is a widely used teaching method in Colleges

VII. DELIMITATIONS OF THE STUDY
The study is delimited to: -
1. BSc Nursing students studying in selected Nursing colleges of Kerala
2. BSc Nursing students studying in 1st year of selected Nursing colleges
3. BSc Nursing students studying in private nursing colleges of Kerala
4. Two districts Pathanamthitta and Trivandrum
5. BSc Nursing students willing to participate in the study
6. Assessment of knowledge of 1st year BSc Nursing students only once before giving intervention in both groups
7. Assessment of knowledge of 1st year BSc Nursing students only once after giving intervention in both groups
8. Assessment of perception regarding strategies only once after using both methods
9. Selected methods of teaching i.e. concept-mapping and lecture method
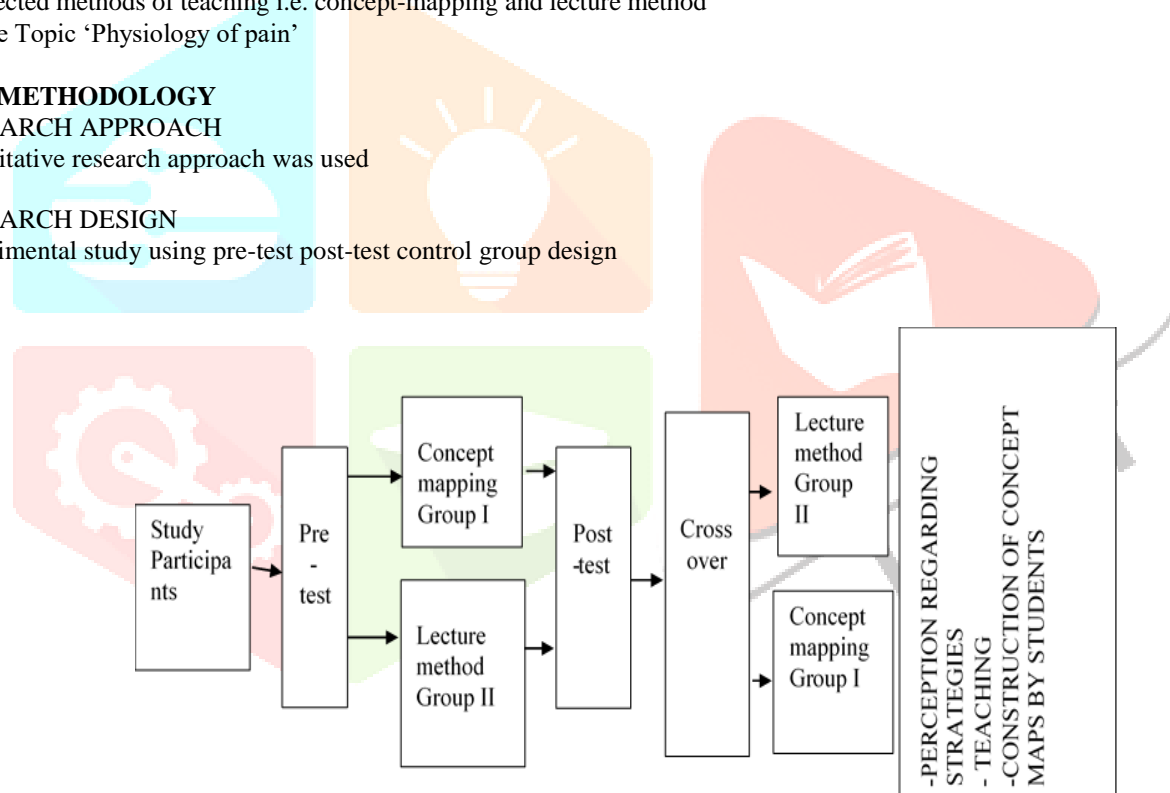10. The Topic 'Physiology of pain'

VIII. METHODOLOGY
RESEARCH APPROACH
Quantitative research approach was used

RESEARCH DESIGN
Experimental study using pre-test post-test control group design

Figure 2: Description of the study design

Table 1
Summary of the design adopted

Groups	Pre – test Day 1	Treatment Day 1	Post –test Day 7	Day 7	Day 7 - P_1 - Teaching regarding concept map construction - Construction of concept maps by students (not evaluated)
Group I	K_1	X	K_2	Y	
Group II	K_1	Y	K_2	X	

The interpretations of the symbols are as follows:

Group I – Assigned as experimental group

Group II – Assigned as control group

K1 – Pre-test knowledge on physiology of pain

X – Instructions using concept mapping on physiology of pain

Y – Teaching using the lecture method on physiology of pain

K2 – Post-test knowledge on physiology of pain

P1 – Perception regarding teaching strategies among both groups

VARIABLES OF THE STUDY

Independent Variable: - Two teaching strategies – Lecture method and concept map used to teach physiology of pain.

Dependent Variable: - Knowledge and perception regarding strategies.

RESEARCH SETTING

Selected private nursing colleges of Kerala.

POPULATION

All 1st year BSc Nursing students studying in nursing colleges of Kerala.

SAMPLE

1st year BSc nursing students of selected nursing colleges of Kerala

SAMPLE SIZE

The sample consisted of 237 1st year BSc nursing students from selected Nursing colleges of Kerala, 113 samples in experimental group and 124 in control group.

SAMPLING CRITERIA

Inclusion criteria

1. BSc Nursing students of Kerala
2. BSc Nursing students of private colleges of Kerala
3. BSc Nursing students from randomly selected Nursing Colleges of Kerala
4. BSc Nursing students in 1st year of course and who have not attempted the university exam even once.
5. BSc Nursing students present at the time of data collection
6. 1st year BSc nursing students who were willing to participate in the study

Exclusion criteria

1. Student who are repeaters in the same class

SAMPLING TECHNIQUE

Multi-stage cluster sampling technique, two clusters were selected from 14 districts i.e. Pathanamthitta and Thiruvanathapuram by lottery system. Further, using simple random sampling 3 nursing colleges were selected from Pathanamthitta district into the control group and 2 nursing colleges were selected from Thiruvananthapuram district into the experimental group, the number of nursing colleges was selected depending upon the required samples.

DATA COLLECTION TOOLS AND TECHNIQUES

Table 2
Summary of data collection tools and techniques

Sl. No	Tool	Purpose	Method
1	Structured questionnaire for personal data	To collect background information	Questionnaire
2	Structured knowledge questionnaire on physiology of pain	To assess the knowledge of the 1st year BSc nursing students on physiology of pain	Questionnaire
3	Structured opinionnaire	For assessing the opinion of students regarding two teaching strategies	Opinionnaire

IX. PROCEDURE FOR DATA COLLECTION

The data was collected between 1st July to 20th November 2019. Using a multi-stage cluster sampling technique, two clusters were selected from 14 districts i.e. Pathanamthitta and Thiruvanathapuram and further using simple random sampling technique from each cluster 3 nursing colleges were selected from Pathanamthitta district into a control group consisting of 124 samples and 2 nursing colleges were selected from Thiruvananthapuram district into experimental group consisting of 113 samples, the number of nursing colleges were selected depending upon the required samples. The process was carried under III phases.

X. DATA ANALYSIS AND INTERPRETATION

Both descriptive and inferential statistics has been used to analyze the data.

SUMMARY OF THE FINDINGS

1. Findings related to background characteristics, baseline knowledge and homogeneity of baseline characteristics of 1st year BSc nursing students in experimental and control group

• Majority of the students 124 (52.3 %) had 19 years of age, about 28 (11.9%) students had an age of 20 years, further 79 (33.3 %) had 18 years of age and 6 (2.5 %) had an age of 17 years.

• Maximum of the samples 230 (97 %) were females and only 7 (3 %) were males.

• Majority of the samples 205 (86.5 %) belonged to nuclear family and 32 (13.5 %) belonged to joint family.

• About 203 (85.7 %) had completed their 12th Board under HSC while about 11 (4.6 %) completed their 12th board under VHSC and about 23 (9.7 %) completed under CBSE board.

• Majority of the samples i.e. 220 (92.8 %) reported that they did not undergo additional training and only 17 (7.2 %) said that they had undergone additional training like engineering, BA English, Entrance coaching, BSc chemistry, Degree etc.

• Majority of the samples 152 (64.1 %) were settled in rural area and only 85 (35.9 %) belonged to urban area of residence.

• Majority of the samples 50 (21.1 %) had an income of ≤ 2020, 49 (20.7 %) had family income between 2021 - 6059, 39 (16.5 %) had family income between 6060 – 10,109, whereas 32 (13.5 %) had a family income between 10,110 – 15,159 and 28 (11.8 %), 23 (9.7 %) and 16 (6.8 %) had a family income between 15,160 – 20,209, 20,210-40,429 and ≥ 40,430 respectively.

• About 232 (97.9 %) samples were non vegetarians, about 2 (0.8 %) were pure vegetarian and 1 (0.4 %) were Eggetarian.

• Only 1 (0.4 %) of the father was a professional belonging to medical field, about 13 (5.5 %) fathers were professionals from non-medical field and around 74 (31.4 %) were working as clerks, shop keepers and farmers, 64 (27.1 %) were skilled workers, 22 (9.3 %) were semi-skilled workers and 18 (7.7 %) were unemployed.

• Majority of the mothers were unemployed 159 (67 %), and about 12 (5.1 %) of mothers were clerks, shop owners, farmer, skilled worker. 14 (5.9 %) samples were unskilled workers and 8 (3.4 %) were semi – skilled workers.

• About 161 (67.9 %) samples said that they have experienced pain in some part of their life while 76 (32.1 %) said they never experienced pain.

• 174 (73.4 %) had heard/read about pain through sources like books, chemist, others, newspaper, television, google, social media, peer group etc. and 63 (26.6 %) said they had never read about pain.

• The mean value obtained in different areas are definition and pain principles 6.6, pain tract and sources 4.1, pain modulation and mechanisms 4.9. The total mean of Knowledge regarding physiology of pain obtained was 15.5 against a total of 40. The mean, median, mode values in all areas independently were approximately similar showing a unimodal or symmetrical distribution. The maximum score was 30 and the minimum obtained score was six for knowledge regarding physiology of pain. The middle value in the first half of the rank-ordered data set i.e Q1 was 13 for Knowledge regarding physiology of pain, the median i.e Q2 was calculated as 16 and the middle value of the second half of the rank – ordered data set i.e Q3 was 18. The interquartile range obtained was Q3 – Q1 i.e 5.

• Majority of the samples 214 (90.3 %) had poor Knowledge, 22 (9.3 %) had moderate Knowledge and 1 (0.4 %) had good Knowledge regarding physiology of pain.

• Significance was present at 0.01 and 0.05 level for age in years and gender respectively and no significance for other factors like type of family, 12th board of education etc. Thus concluding presence of homogeneity of samples for type of family, 12th board of education and undergone any other course and heterogeneity of samples with regards to age in years and gender.

• Homogeneity was present among both groups on Area of residence, Family income, Mothers occupation, Experience of pain while the group showed heterogeneity for baseline characteristic like father's occupation.

• The pre-test Knowledge scores were homogenous among both group with similar means of 15.5 in experimental group and 15.6 in control group based on Knowledge regarding physiology of pain. Both experimental and control group did not differ initially in terms of their Knowledge before intervention.

2. Findings related to effectiveness of two teaching strategies concept mapping over lecture method on physiology of pain among 1st year BSc nursing students
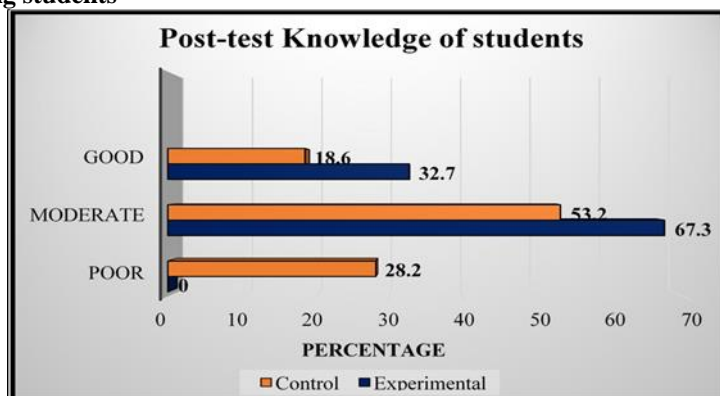
Figure 3: Bar diagram shows the distribution of post-test knowledge of samples

Figure 3 depicts the distribution of post-test Knowledge of samples in experimental and control group, data shows that gain of Knowledge was more in experimental group as compared to control group with 32.7 % of samples having good Knowledge in experimental group while control group good Knowledge was 18.6 %, 67.3 % had moderate Knowledge in experimental group and in control group it was 53.2 %, data further shows that after intervention only 28.2 % had poor Knowledge in control group with no samples in experimental group falling in this category. Thus showing effectiveness of concept mapping as a teaching strategy.

Table 3

Comparison of post-test Knowledge score of 1st year BSc nursing students in experimental and control group

N=237

Sl. No.	Knowledge	Experimental			Control			T	P
		Mean	SD	n	Mean	SD	n		
1.	Definition and Pain Principles	11.9	2.1	113	10.1	3.0	124	5.17*	p<0.01
2.	Pain Tracts and Sources	8.1	1.6	113	6.6	2.3	124	5.81*	p<0.01
3.	Pain modulation and mechanisms	7.9	1.6	113	6.3	1.8	124	6.9*	p<0.01
4.	Knowledge regarding Physiology of Pain	27.9	3.4	113	23.1	5.9	124	7.56*	p<0.01

*Significant at 0.01 level of significance

df (236)

Table 3 shows the mean post-test Knowledge score of the experimental group was 11.9, 8.1, 7.9 and 27.9 for definition and pain principles, pain tracts and sources, pain modulation and mechanisms and overall Knowledge of physiology of pain respectively while the mean post-test Knowledge score of control group was 10.1, 6.6. 6.3 and 23.1. This shows that Concept Mapping was more effective intervention than Lecture method of teaching.

• Pre-test Knowledge score 95 (84 %) samples had poor Knowledge, 17 (15 %) had moderate Knowledge and 1 (0.9 %) had good Knowledge. The scores after intervention showed an increase in Knowledge with about 37 (32.7 %) having good Knowledge, 76 (63.3 %) having moderate Knowledge and no samples having poor Knowledge in experimental group.

Table 4

Mean, mean deviation, standard error of mean from pre-test and post-test Knowledge scores and 't' value of experimental group

N=113

Knowledge Score	Mean	Mean Deviation	SD_D	SE	't' value
Pre-test	15.64	12.27	13.34	1.26	9.78*
Post-test	27.91				

*Significant at 0.05 level of significance

df (112) 't' = 1.98 at 0.05 level of significance

Table 4 shows Mean post-test Knowledge score of the experimental group was (27.91) and mean pre-test Knowledge score was (15.64) with the mean difference of 12.27, was found to be statistically significant as evident from 't' value of 9.78 for df 112 at 0.05 level of significance. The concept mapping was effective in increasing the Knowledge score of the students in the experimental group.
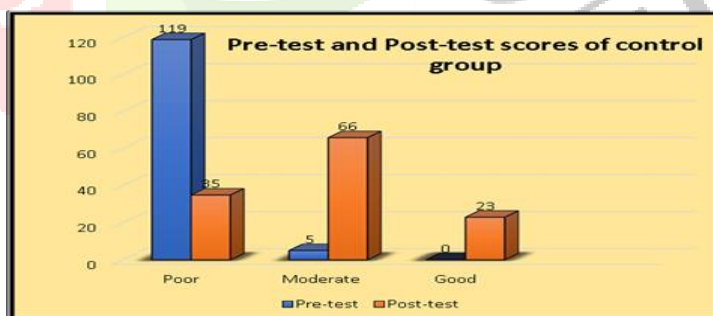

Figure 4: Bar diagram showing pre-test and post-test scores of control group

Figure 4 shows Control group pre-test scores 119 (96 %) had poor Knowledge, 5 (4 %) had moderate Knowledge and no samples had good Knowledge, while in post-test scores 35 (28.2 %) had poor Knowledge, 66 (53.2 %) had moderate Knowledge and 23 (18.6 %) had good Knowledge. Thus showing increase in Knowledge.

Table 5

Mean, mean deviation, standard error of mean from pre-test and post-test Knowledge scores and 't' value of control group

n=124

Knowledge Score	Mean	Mean Deviation	SD_D	SE	't' value
Pre-test	15.57	7.53	5.292	0.48	15.68*
Post-test	23.10				

*Significant at 0.05 level of significance

df (123) 't' = 1.98 at 0.05 level of significance

Table 5 shows Mean post-test Knowledge score of the control group was (23.10) and mean pre-test Knowledge score (15.57) with the mean difference of 7.53, was found to be statistically significant as evident from 't' value of 15.68 for df 123 at 0.05 level of significance.

3. Findings related to assessment of perception regarding strategies among 1st year BSc Nursing students

Table 6

Frequency and percentage distribution of opinion of 1st year BSc nursing students regarding Cognitive Domain based on two teaching strategies

N=237

Sl. No.	Cognitive Domain	Lecture method		Concept mapping	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Which method do you think gives better cover for objectives	11	4.6	226	95.4
2.	Which method facilitates your learning more	24	10.1	213	89.9
3.	Which method improves your imagination skills more	18	7.6	219	92.4
4.	In which method information is well organized	62	26.2	175	73.8
5.	In which method retention of knowledge is perceived to be increased	18	7.6	219	92.4
6.	Clarification of doubts is easier in which method of teaching	112	47.3	125	52.7
7.	Which method provides increased reflection about topic	24	10.1	213	89.9
8.	Which method helps visual learners grasp the study material	9	3.8	228	96.2

Table 6 shows Majority of samples (226) 95.4 % think that concept mapping gives better cover for objectives and (219) 92.4 % reported that concept map improves imagination skills and is helpful in retention of knowledge, about (228) 96.2 % stated that concept mapping helps in visual learning and (213) 89.9 % reported that concept mapping increases reflection about topic and facilitates learning more. About (175) 73.8 % believed that concept mapping helps in organizing information against (62) 26.2 % who believed that lecture method helps in organizing information well. About (125) 52.7 % stated that clarification of doubts is easier with the help of concept maps, whereas (112) 47.3 % stated clarification of doubts is easier with the help of lecture method.

Table 7

Frequency and percentage distribution of opinion of 1st year BSc nursing students regarding affective Domain based on two teaching strategies

N=237

Sl. No.	Affective Domain	Lecture method		Concept mapping	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Which method do you feel is more attractive	12	5.1	225	94.9
2.	Which method increased your motivation for learning	38	16.0	199	84.0
3.	Which method decreases monotonous situation of classroom	70	29.5	167	70.5
4.	Which method makes the class livelier	44	18.6	193	81.4
5.	Which method do you feel increases the reading comprehension	76	32.1	161	67.9

Table 7 shows (225) 94.9 % believed that concept mapping method was more attractive than lecture method. (199) 84 % and (193) 81.4 % stated that concept mapping increases motivation for learning and makes the class livelier. (167) 70.5 % reported that concept mapping decreases monotonous situation of classroom and (70) 29.5 % reported that lecture method decreases monotonous situation of classroom. (161) 67.9 % thought that concept mapping increased comprehension and (76) 32.1 % believed lecture method increased comprehension.

Table 8
Frequency and percentage distribution of opinion of 1st year BSc nursing students regarding Psychomotor Domain based on two teaching strategies

N=237

Sl. No.	Psychomotor Domain	Lecture method		Concept mapping	
		Frequency	Percentage	Frequency	Percentage
1.	Collaboration of students during the teaching process is higher in which method	60	25.6	117	74.7
2.	Which method persuades you for deep thought	34	14.3	203	85.7
3.	Which method is better overall	23	9.7	214	90.3

Table 8 shows that Majority of the samples (214) 90.3 % felt that concept mapping is a better method if considered overall. Majority of the sample (203) 85.7 % believed that concept mapping persuades them for deep thoughts and (117) 74.7 % stated that collaboration of students during the teaching process was higher in concept mapping than lecture method i.e. about (60) 25.6 %.

4. Findings related to association between pre-test knowledge score with selected demographic variables
• There was no significant association between pre-test knowledge score and selected demographic variables at 0.05 level of significance.

XI. DISCUSSION
In the present study the Impact of two teaching strategies on physiology of pain in terms of knowledge and perception regarding strategies was assessed. Very few studies have been conducted by researchers in this area. In this section, the major findings of the study have been discussed with reference to the results obtained by other researchers.

Effectiveness of two teaching strategies concept mapping over lecture method

The findings of the present study revealed that gain of Knowledge was more in experimental group as compared to control group with 32.7 % of samples having good Knowledge in experimental group while control group good Knowledge was 18.6 %, 67.3 % had moderate Knowledge in experimental group and in control group it was 53.2 %, data further shows that after intervention only 28.2 % had poor Knowledge in control group with no samples in experimental group falling in this category. Thus showing effectiveness of concept mapping as a teaching strategy. This has been supported by Ljoyah, G. T. W. et al. (2015) in which the researchers found that concept mapping strategy was more effective in enhancing achievement score of pupils as compared to the lecture method. Pupils taught using concept mapping recorded a mean achievement score of 63.0 %, as compared to those taught using the lecture method strategy with a mean achievement score of 49.9 %. Another study by

Perception regarding two teaching strategies concept mapping and lecture method

The findings of the study show that the mean values of each aspect was higher for concept mapping compared to Lecture method of teaching. The data further shows that the p values were less than 0.01, concluding that students had high opinion regarding concept mapping as a teaching method as compared to Lecture method. Concluding that the opinion of 1st year BSc nursing students regarding concept mapping was higher than the opinion regarding Lecture method. The findings of the study are consistent with the study conducted by Taie, E. S. (2014) that shows most of the samples perceived concept mapping positively as a learning tool.

XII. IMPLICATION
The findings of the study have implications for nursing education, nursing research, nursing administration and clinical practice.

Nursing Education
Curriculum planners can incorporate this approach in curriculum guidelines for attainment of good learning. The educational administrator can train teachers in using concept mapping in their class as it enhances students higher order thinking. Concept mapping should be included in the nursing education syllabus as a teaching method so that it can be widely practiced.

Nursing Research
Extensive research can be done in these areas to explore new avenues in this teaching strategy as well as other new techniques can also be studied.

Nursing Administration
Concept mapping can be used by administrators during in-service education for a better understanding of staff nurses. Concept mapping can be used for retention of information in clinical settings. Nursing administrators should implement use of concept mapping for incidental and planned teaching in the clinical settings.

Clinical Practice
Care for patients according to diagnosis can be summarized using concept mapping. Patients can also be explained regarding various care aspects using concept maps.

XIII. LIMITATIONS

The participants of the study included only 1st year BSc nursing students of private nursing colleges of Kerala.

XIV. CONCLUSION

On the basis of findings of the present study, the following conclusions can be drawn:

• Concept mapping is an effective teaching strategy for teaching nursing students

• Concept mapping was more effective in increasing the Knowledge of students as compared to Lecture method.

• The opinion of the students regarding concept mapping was high as students felt concept mapping a good method of teaching considering many aspects like collaboration with other, encourages deep thinking etc.

• Findings indicate that among the two strategies concept mapping was more effective and the students also perceived concept mapping better than Lecture method.

XV. ACKNOWLEDGEMENT

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