

A QUASI - EXPERIMENTAL STUDY TO EVALUATE THE EFFECTIVENESS OF MIND MAPPED CARE PLANS (MMCP) IN EVALUATING CRITICAL THINKING SKILL ON PATIENT CARE IN NURSING PRACTICE AND ATTITUDE AMONG NURSING STUDENTS AT SELECTED COLLEGE, COIMBATORENithiya¹, Deepa², Lingaraj Chitra³¹Staff Nurse in Sri Ramakrishna Multi Speciality Hospital, Coimbatore, Tamil Nadu, India²Professor Cum HOD, Department of Medical and Surgical Nursing P.P.G. College of Nursing (Affiliated to Tamil Nadu Dr. M.G.R. Medical University, Chennai), Coimbatore, Tamil Nadu, India.³Principal, P.P.G. College of Nursing (Affiliated to Tamilnadu Dr.M.G.R. Medical University, Chennai), Coimbatore, Tamilnadu, India.**Abstract:**

As nurses' roles change in response to the dynamics of managed care and an increase in use of biotechnology in health care, more is expected of them both in terms of psychomotor and cognitive skills. Critical thinking skill is currently a highly valued educational outcome throughout the educational spectrum, especially in relation to higher and professional education. Nursing education worldwide is also embracing the construct critical thinking skill as a desirable educational outcome and realizes the importance of eliciting the evidence of critical thinking in nurse's reasoning process. Mind mapping in nursing is a brilliant way for all nursing students to understand their lessons better and absorb difficult medical concepts easily. Therefore, mind maps are developed to provide a visual description of the thinking process.

Aim:

This present study was aimed to evaluate the effectiveness of Mind Map Care Plan as an innovative instructional approach to develop critical thinking skill and change the attitude of nursing students towards nursing care plan.

Methodology:

The study used a quasi- experimental study of before and after control group design. A total of 198 III - year and IV-year B.Sc. nursing degree students from PPG College of Nursing were included as experimental group (n=100) and control group (n=98) through purposive sampling technique. The orientation of this new approach was 4 weeks. On the first week, following the pre-assessment, the Experimental group was given an introductory lecture on how to prepare Mind Mapped Care Plan (MMCP) as an innovative instructional approach. Followed by, this new approach was reviewed for remaining 3 consecutive weeks where the participants were given a same case study scenario every week to prepare nursing care plans using mind map. Finally, both the groups were again assessed for the critical thinking skills at three points of time. Data collection tools included a (1) demographic variables, (2) check list on critical thinking skill based on nursing process, (3) 5- Point Likert scale on attitude of nursing students towards nursing care plan and (4) Teaching module on "Mind Mapped Care Plan".

Result & Conclusion: *According to the study, the demographic variable "extensive reading helps to improve critical thinking skill/prediction" ($2=100.309$, $p=0.0001$) had a statistically significant association with the post-test 2 level of critical thinking skill among nursing students in the experimental group at the $p<0.001$ level. The other clinical variables did not show a statistically significant association with the post-test 2 level of critical thinking skill among nursing students in the experimental group at the $p<0.05$ level. Findings: Among nursing students in the experimental group, the demographic variable interest in drawing ($\alpha 2=5.197$, $p=0.023$) demonstrated a statistically significant association with post-test 2 level of attitude towards care plan at the $p<0.05$ level. The researcher comes to the conclusion that, since mind mapping is a useful teaching tool for helping students apply new information and skills to clients with complex health-care needs, MMCP should be promoted in nursing curricula to help students develop their critical thinking abilities.*

Keywords: *Critical thinking, Mind Mapped care plans, innovative instructional approach, attitude and strategy*

1.Introduction

Florence Nightingale, in discussing the nature of nursing in 1859, observed that “Nursing has been limited to signify little more than the administration of medicines and the application of poultices.” As nursing research continues to work in establishing the profession as independent in its own right, the value of nursing goals is understood and the difference between nursing and other professions is being delineated. Nursing is now recognized as both a science and an art concerned with the physical, psychological, sociological, cultural, and spiritual concerns of the individual. The science of nursing is based on a broad theoretical framework; its art depends on the caring skills and abilities of the individual nurse. (British red cross society May 2023)

Critical thinking is vital in examining simple and complex situations in nurses’ day-to-day responsibilities. In order to state clearly and precisely what the information reveals, it is imperative to ascertain whether the information or assessment that has been obtained has been accurately captured. Critical thinking is gaining much popularity in nursing. Critical thinking has come to the forefront in nursing. (National League of Nursing USA 2019)

Critical thinking and the nursing process are not distinct from one another. Using critical thinking in the nursing process can help students' cognitive growth. a nursing care plan that gives pupils an educational opportunity to hone their critical thinking and decision-making abilities. Integrating advanced critical thinking abilities into the nursing process in the clinical context is a significant duty of nurse educators. (WHO 2013)

The nursing process are fundamental to thinking through and meeting patient needs and preventing patient problems. care plans pervasively used to teach students to use and record the components of the nursing process as they begin to plan and direct patient care. This structure, while practical in theory, becomes problematic when one looks at how nurses in practice truly think. As nurses care for patients, they create in their mind's eye a whole patient picture that is comprised of a myriad of interconnections between data sets associated with identified patient problems. Each nurse has her or his own unique way of making these interconnections. This will help you keep in mind that the client is the focus of your plan, not the medical diagnosis or condition. Many different pieces of information about the client can be connected directly to the client. (American Nurses Association 2021)

2. Need for the Study

- The goal of nursing education is to prepare students for safe clinical nursing practice. Nurses use the nursing process to systematically collect and scientifically analyse the client’s unique data to identify nursing problems or diagnoses, plan and implement nursing interventions, and evaluate the client’s responses to those nursing interventions. Nurse educators have traditionally taught students the nursing process through the use of a nursing care plan that uses a linear columnar format. This style of care planning may not foster critical thinking as many students draw information directly from a care plan book without relating it to the client’s specific needs. Also, these care plans are often completed retrospectively. Some argue that care plans are obsolete in nursing practice and that thorough, accurate documentation reflects the nursing process better than a document that requires continuous manual updating that lends little to effective nursing practice. (Nurseslab.com 2023)
- Mind Map with the nursing care plan as a way to teach the nursing students to view each plan as a whole picture and to understand the relationships between the factors that affect the client. He also identified three central issues that inhibit critical thinking when using a linear format nursing care plan; 1. Linear nature, 2. Copying from care plan books, 3. Inhibits holistic view of the client. (Pubmed.com 2020)
- Clinical nursing education is at the heart of the profession and the provision of quality nursing care must be upheld. The facilitator is responsible for creating an environment that is conducive to the development of critical thinking, while learners take the responsibility for constructing their own knowledge and skills through active interaction to promote critical thinking skills. (WHO 2017)
- The concept of critical thinking is important and faculty which have the main role in developing critical thinking should provide relevant training for the nurse educators, create a conducive learning environment and expand the curriculum, so that it stimulates critical thinking in students. Nurse educators' ongoing battle to enhance critical thinking highlights the need for creative educational strategies that support the use of critical thinking skills. (National Institutes of Health 2020)

3.Problem Statement

“A quasi-experimental study to evaluate the effectiveness of mind mapped care plans (MMCP) in evaluating critical thinking skill on patient care in nursing practice and attitude among nursing students in selected college, Coimbatore”.

Objectives

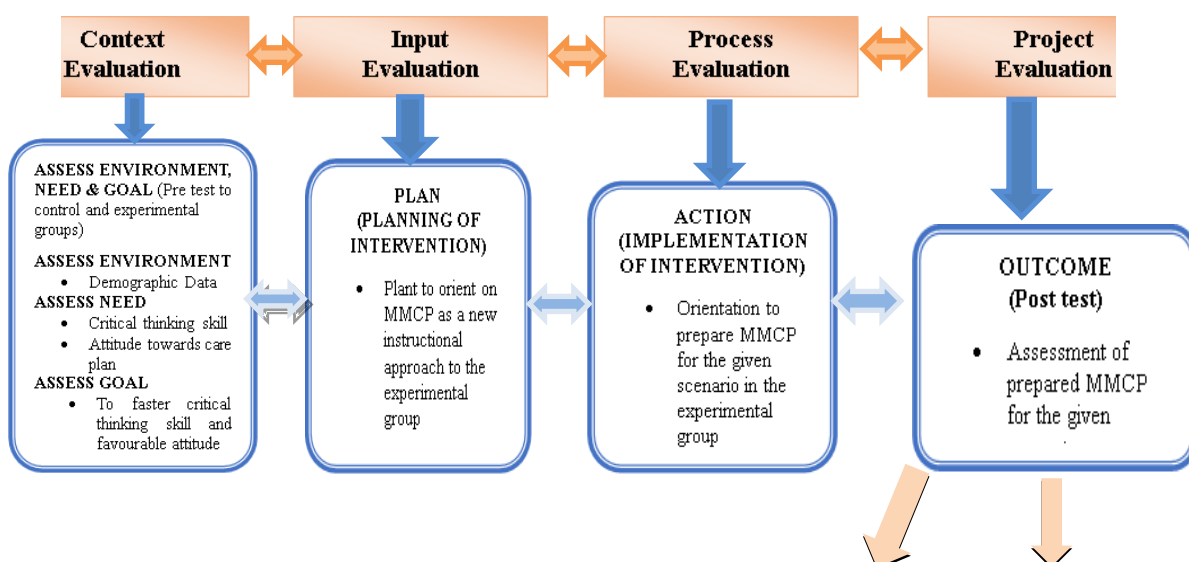
- To assess the critical thinking skill and attitude of nursing students towards care plan before and after introducing Mind Mapped Care Plans (MMCP) approach in both the control and experimental groups.
- To determine the effectiveness of Mind Mapped Care Plans (MMCP) on attitude of nursing students towards care plan.
- To find out the relationship between critical thinking skill of nursing students and their attitude towards care plan.
- To find out the association between attitude of nursing students and their selected demographic variables in both the control and experimental groups.

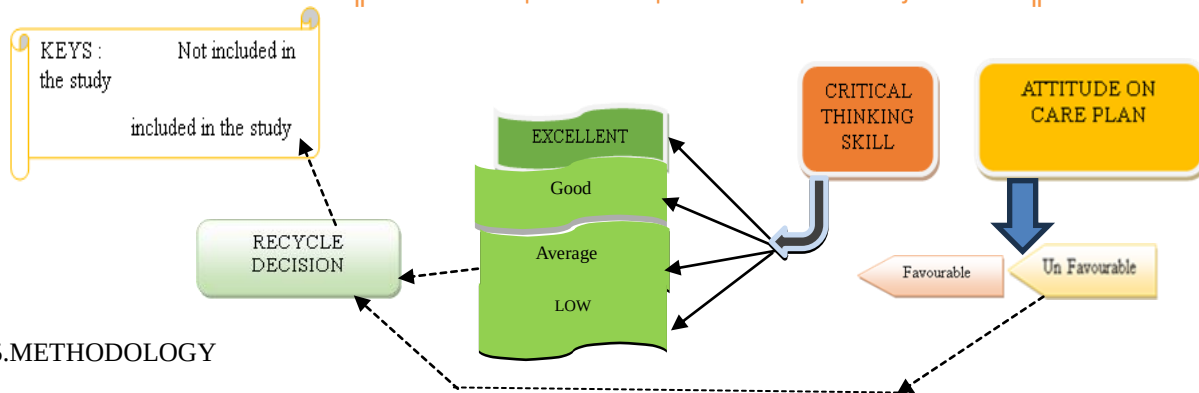
Hypotheses

- H1 - There is a significant difference between the pre-test and post-test scores on critical thinking skill and attitude of nursing students in the experimental group
- H2 - There is a significant relationship between critical thinking skill of nursing students and their attitude towards care plan in both control and the experimental group.
- H3 - There is a significant association between critical thinking skill and selected demographic variables of nursing students in both control and the experimental group.
- H4 - There is a significant association between attitude and selected demographic variables of nursing students in both control and the experimental group.

4.Conceptual Structure

Conceptualization is a process of forming ideas which utilize and forms a conceptual frame work for the study. It is the abstract, logical structure which enables the researcher to link the findings to the nursing body of knowledge. General system theory adopted in this study, Conceptual Framework on Daniel L. Stufflebeam (1971) CIPP (Context, Input, Process and Product) model.





5.METHODOLOGY

Research approach: Quantitative evaluative approach

Research design: Quasi- experimental, one group pretest- posttest with control group design.

] Setting: Students of PPG college, Coimbatore.

Population: Target Population B.Sc. Nursing students.

Accessible Population III - year and IV-year B.Sc. Nursing students in selected college, Coimbatore.

Sampling & sample size:

- Non-probability, purposive sampling technique used for this study.
- Sample size is 198 (100 in experiment group and 98 in control group)

Variables:

- Independent variable is Mind Mapped Care Plan.
- dependent variable is critical thinking skill and attitude.

Criteria for sample collection

Inclusion criteria: College students was

- Only III -year and IV- year B.Sc. Degree nursing students.
- Both gender.
- Nursing students who are willing to participate in the study.
- Students who are available at the time of data collection.
- All categories of students in critical thinking and attitude.

Exclusion criteria:

- Students who are studying in Post – basic B.Sc. Nursing.

Instruments and tools for data collection

Section A : Socio demographic and institution profile

A questionnaire was designed to collect the Socio demographic data and institutional profile related to Age, Gender, Selection of profession, aim of selecting professional and Area of preference after course completion. Institutional profile of selected nursing institutions includes Institution conducting the course, obtained clinical exposure, Locality of the institution, Duration of institution started, and Type of institution.

Section B : Modified California Critical Thinking Skills Test (CCTST)

Observation of student nurse's critical thinking skill level on nursing process by the researcher. It comprised 30 items which were designed according to nursing process steps under the six major components in critical thinking skill, through which the researcher observed the nursing student's practice regarding steps of nursing process. The instrument is scaled as "satisfactory or unsatisfactory". The investigator would rate the major components of critical thinking skill based on the steps of nursing process by placing a '✓' mark against the respective column of each item, as per respondent's response. These items were allotted to each component of critical thinking skill as follows: Analysis, Interpretation, inference making, explanation, evaluation and self-regulation

Section - C: Modified -5- Point Likert scale on attitude towards care plan

This instrument also was constructed by an investigator to gather data on the attitude of nursing students towards nursing care plan before and after the intervention. It is a self-administered questionnaire of Modified 5- point Likert scale. The questionnaire consisted of 30 statements equally distributed positively (15) and negatively (15) worded statements with five different response options ranging from strongly agree to strongly disagree. In this questionnaire 1, 2, 4, 5, 9, 10, 14, 15, 19, 21, 22, 23, 27, 28 and 29 were positively worded statements and 3, 6, 7, 8, 11, 12, 13, 16, 17, 18, 20, 24, 25, 26 and 30 were negatively worded statements. The subjects were instructed to put a '✓' mark against column provided. It has 30 statements, which were arranged under four major aspects of professional behaviours. Cognitive, Affective, Technical and Interpersonal Competencies

Section D: Teaching Module Part IV -Teaching Module

It is a structured teaching module on the topic "Mind Mapped Care Plans" developed based on the literature review and experts' opinion. It is a new innovative educational approach in nursing education. This was oriented to III-year B.Sc. degree nursing students for the period of 3 hrs and covered the following areas. Introduction, Review of nursing process, Definition of Mind Map, Benefits, Laws - how to prepare Mind Map, Advantage of Mind Mapped care plan, Sample Mind Mapped care plan Mind Map and critical thinking skill in nursing and Exercises to practice the steps involved in the teaching module.

Validity

Validity refers to whether an instrument accurately measures what it is supposed to measure. The tool was validated by experts of Medical Surgical Nursing and Nursing Education. The experts were requested to give their opinion and suggestions regarding relevance, appropriateness, accuracy and degree of agreement in each item of the tool.

Reliability

Reliability of the Modified California Critical Thinking Skills Test (CCTST) scale used in this study ($r = 0.926$) and found to be reliable. Reliability of the 5- Point Likert attitude scale used in this study ($\alpha = > 0.83$). and thus, good reliability is indicated.

Ethical consideration

Ethical clearance approval for the present study was obtained from Institutional Ethical committee of PPG group of institutions, Coimbatore. The ethical committee has given a written consent to proceed the study. Each participant was explained about the study and written consent was obtained.

TECHNIQUES OF DATA ANALYSIS & INTERPRETATION

DATA ANALYSIS & INTERPRETATION

The data were analysed in terms of objectives of this study using descriptive and inferential statistics. The plan for data analysis is as follows:

- Organization of data in master sheet / computer
- Demographic variables analysed in terms of frequency and percentage.
- Pre-test and post-test critical thinking skill and attitude analysed by mean and Standard Deviation • The paired „t“ test was used to find the difference in mean scores before and after Mind Mapped Care Plan both within the control and experimental group

Data obtained from the B.Sc. Nursing students from III year and IV year, were organized, analysed and presented under the following sections

- Section I: Description of the demographic variables of nursing students.
- Section II: Assessment of level of critical thinking skill and attitude of nursing students towards care plan before and after introducing Mind Mapped Care Plans (MMCP) approach in both the experimental and control group
- Section III: Effectiveness of Mind Mapped Care Plans (MMCP) on critical thinking skill and attitude of nursing students towards care plan in the experimental group and comparison in control group
- Section IV: Relationship between critical thinking skill and attitude of nursing students towards care plan in the experimental group and control group.
- Section V: Association of post-test level of critical thinking skill and attitude towards care plan among nursing students with selected demographic variables.

Section I: Description of the demographic variables of nursing students.

n = 198

S.NO	Demographic Variables	Experimental Group n = 100		Control Group n = 98	
		f	%	F	%
1	Age in years				
	19 – 20	55	54.5	0	0
	21 – 22	44	44.5	88	89.8
	Above 22	1	1.0	10	10.2
2	Gender				
	Male	17	20.0	33	33.0

	Female	83	80.0	65	67.0
3	Year of study				
	III – year	100	100.0	0	0
	IV – year	0	0.0	98	100.0
4	Religion				
	Hindu	57	57.0	58	59.2
	Christian	40	40.0	38	38.8
	Islam	3	3.0	2	2.0
	Others	-	-	-	-

5	Type of personality				
	Introvert	59	59.0	34	34.7
	Extrovert	41	41.0	64	65.3
6	Are you interested in drawing				
	Yes	58	58.0	63	64.3
	No	42	42.0	35	35.7
7	Are you underwent any surgeries due to accident				
	Yes	2	2.0	0	0
	No	98	98.0	98	100.0
8	Residence				
	Home with parents	9	9.0	9	9.2
	On campus hostel	88	88.0	84	85.7
	Off campus hostel with rented home	3	3.0	5	5.1
9	Do you have any additional degree YES/NO, if yes				
	One	6	6.0	1	1.0
	More than one	1	1.0	0	0
	No	93	93.0	97	99.0

10	Reason for select this profession				
	Parent's choice	1	1.0	0	0
	Own choice	46	46.0	32	32.7
	Friends influence	52	52.0	60	61.2
	Media influence	1	1.0	6	6.1
11	Aim of selecting this profession				
	To serve humanity	14	14.0	21	21.4
	Earn money	14	14.0	28	28.6
	Job opportunity	57	57.0	44	44.9
	Settle in abroad	15	15.0	5	5.1

12	Area of preference after completion of course				
	Academic (teaching)	5	5.0	12	12.2
	Clinical (bedside)	94	94.0	86	87.8
	Community	1	1.0	0	0
13	Number of awards and prizes in last year				
	1	33	33.0	35	35.7
	2	10	10.0	15	15.3
	More than 3	5	5.0	10	10.2
	No	52	52.0	38	38.8
14	Are you interested in computer- based skill				
	Yes	70	70.0	76	77.6
	No	30	30.0	22	22.4
15	Last year performance in Medical Surgical Nursing is PASS /FAIL, if pass				
	Distinction > 75 -100	10	10.0	18	18.4
	Good > 65- 70	53	53.0	52	53.1
	Average > 50 – 65	36	36.0	25	25.5
	Poor > 50	1	1.0	3	3.1
16	Extensive reading helps to improve critical thinking skill / prediction				
	Agree	76	76.0	72	73.5
	Neutral	23	23.0	24	24.5
	Not agree	1	1.0	2	2.0
17	Courses offered				
	with B.Sc. (N)	83	83.0	56	57.1
	with M.Sc. (N)	16	16.0	7	7.1
	with Doctorate in nursing	1	1.0	35	35.7
18	Clinical exposure obtained				
	Parent hospital alone	7	7.0	8	8.2

	Affiliated hospital alone	23	23.0	16	16.3
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	Both	70	70.0	74	75.5
19	Locality of the institution				
	Urban	73	73.0	62	63.3
	Sub-urban	23	23.0	28	28.6
	Rural	4	4.0	8	8.2
20	Duration of institution started				
	1 – 5 years	9	9.0	8	8.2
	6 –10 years	4	4.0	0	0
	>11 years	87	87.0	90	91.8

***p<0.001, **p<0.01, *p<0.05, S – Significant

N.S – Not Significant, p>0.05

Table 4.1. shows Frequency and percentage distribution of demographic variables of nursing students in that most of the nursing students, 55(55%) in the experimental group were aged between 19 – 20 years & 88(89.8%) in the control group were aged between 21 – 22 years, 80(80%) in the experimental group and 67(67%) in the control group were female, 100(100%) in the experimental group were III year students & 98(100%) in the control group were IV year students, 57(57%) in the experimental group and 58(59.2%) in the control group were Hindus, 40(40%) in the experimental group and 38 (38.8%) in the control group were Christians,3(3%) in the experimental group and 2 (2%) in the control group were Islam, 58(58%) in the experimental group were introvert person and 64(65.3%) in the control group were extrovert person, 58(58%) in the experimental group and 63(64.3%) in the control group had interest in drawing, 98(98%) in the experimental group and 98(100%) in the control group had not underwent any surgeries due to accident, 88(88%) in the experimental group and 84(85.7%) in the control group were residing in campus hostel, 9(9%) in the experimental group and 9 (9.2%) in the control group were residing in home with parents, 93(93%) in the experimental group and 97(99%) in the control group does not have any additional degree, 46(46%) in the experimental group and 32 (32.7%) in the control group were influenced by own choice of selecting this profession,52(52%) in the experimental group and 60(61.2%) in the control group were influenced by friends in selecting this profession, 57(57%) in the experimental group and 44(44.9%) in the control group had the aim of job opportunity for selecting this profession, 94(94%) in the experimental group and 86(87.8%) in the control group. Area preferred clinical (bed side) after completion of course, 52(52%) in the experimental group and 38(38.8%) in the control group does not have any award and prizes in last year, 70(70%) in the experimental group and 76(77.6%) in the control group, 53(53%) in the experimental group and 52(53.1%) in the control group had good performance in Medical Surgical nursing last year, 76(76%) in the experimental group and 72(73.5%) in the control group had agreed that extensive reading helps to improve critical thinking skill / prediction, 70 (70%) in the experimental group and 76(76%) in the control group interested in computer based

skills, 83(83%) in the experimental group and 56(57.1%) in the control group were offered with B.Sc.(N), 70(70%) in the experimental group and 74(75.5%) in the control group obtained clinical exposure both from parent hospital and affiliated hospital, 73(73%) in the experimental group and 62(63.3%) in the control group had their institution located in urban area and 87(87%) in the experimental group and 90(91.8%) in the control group were in the institution which had started >11 years before.

Section II:2.1 Frequency and percentage distribution of pretest and post-tests level of critical thinking skill towards care plan among nursing students in the experimental and control group.

S.NO	Assessment	Level of Critical Thinking Skill	Pre test		Post test I After 7 days		Post test II After 14 days		n = 198
			f	%	F	%	F	%	
1	Experimental group	Low (≤ 12)	44	44.0	0	0	0	0	
		Moderate (13 – 18)	17	17.0	5	5.0	1	1.0	
		Good (19 – 23)	23	23.0	23	23.0	1	1.0	
		Excellent (≥ 24)	16	16.0	72	72.0	98	98.0	
2	Control group	Low (≤ 12)	43	.9	16	16.3	16	16.3	
		Moderate (13 – 18)	15	15.3	31	31.6	31	31.6	
		Good (19 – 23)	16	16.3	25	25.5	25	25.5	
		Excellent (≥ 24)	24	24.5	26	26.5	26	26.5	

***p<0.001, S – Significant

N.S – Not Significant, p>0.05

The table 2.1 shows that in the pretest of experimental group among nursing students, 44(44%) had weak critical thinking skill, 23(23%) possessed strong critical thinking skill, 17(17%) had moderate critical thinking skill and 16(16%) had superior critical thinking skill whereas in the pretest of control group, 43(43.9%) had weak critical thinking skill, 24(24.5) had superior critical thinking skill, 16(16.3%) had strong critical thinking skill and 15(15.3%) had moderate critical thinking skill. The computed chi-square test value of 2.973 was not statistically significant at p<0.05 level .

After the intervention, in the post-test after 7 days, The calculated chi-square test value of 56.439 was statistically significant at p<0.001 level .In the post-test II after 14 days, 98(98%) had superior critical thinking skill The calculated chi-square test value of 108.076 was statistically significant at p<0.001 level which infers that after the intervention MMCP in the experimental group the nursing students had acquired more critical thinking skill than the nursing students in the control group who had undergone normal daily routines.

2.2 Frequency and percentage distribution of pretest and post-tests level of attitude towards care plan among nursing students in the experimental and control group.

n = 198

S.NO	Assessment	Level of Attitude	Pre test		Post test I After 7 days		Post test II After 14 days	
			f	%	f	%	F	%
1	Experimental Group	Unfavorable attitude ($\leq 50\%$)	36	36.0	17	17.0	9	9.0
		Favorable attitude (51 – 100%)	64	65.0	83	83.0	91	91.0
2	Control Group	Unfavorable attitude ($\leq 50\%$)	40	40.8	39	39.8	36	36.7
		Favorable attitude (51 – 100%)	58	59.2	49	49.2	62	63.3

***p<0.001, S – Significant

NS – Not significant p<0.05,

The table 2.2 shows that in the pretest of experimental group among nursing students, 64(64%) had favorable attitude and 36(36%) had unfavorable attitude whereas in pretest of control group, 58(59.2%) had favorable attitude and 40(40.8%) had unfavorable attitude towards care plan. The computed chi-square test value of 0.485 was not statistically significant at p<0.05 level which indicates that there was no significant difference in the pretest level of attitude towards care plan among the nursing students between the two groups.

After the intervention, in the post-test after 7 days, 83(83%) had favourable attitude and the calculated chi-square test value of 12.680 was statistically significant at p<0.001 level. In the post-test II after 14 days, 91(91%) had unfavourable attitude and 9(9%) had unfavourable attitude towards care plan and in the control group, 62(63.3%) had favourable attitude and 36(36.7%) had unfavourable attitude towards care plan. The calculated chi-square test value of 21.679 was statistically significant at p<0.001 level which infers that after the intervention MMCP in the experimental group the nursing students had gained more favourable attitude than the nursing students in the control group who had undergone normal daily routines.

Section III: Table 3.1 Effectiveness of Mind Mapped Care Plan (MMCP) on Critical Thinking Skill towards care plan among the nursing students in the experimental group using Repeated Measures ANOVA.

n = 198

Critical Thinking Skill		Mean	S.D	Mean Difference Score		Repeated Measures ANOVA ‘F’ test value & p-value
Pretest		14.20	8.58	14.23		F=180.768 p=0.0001, S***
Post Test 1		25.43	3.77			
Post Test 2		28.43	2.45			
Pairwise Comparisons						
(I) CTS	(J) CTS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pretest	Post Test 1	-11.230*	.940	.000	-13.520	-8.940
	***p<0.001, *p<0.05, S – Significant Post Test 2	-14.230*	.890	.000	-16.398	-12.062
Post Test 1	Post Test 2	-3.000*	.436	.000	-4.063	-1.937

Table 3.1 shows that the pretest mean score of critical thinking skill among the nursing students was 14.20±8.58, post-test I mean score was 25.43±3.77 and post-testII mean score was 28.43±2.45. The calculated Repeated Measures ANOVA value of F= 180.768 was statistically significant at p<0.001 level which was evident from the mean difference score of 14.23.

The Bonferroni Pairwise comparison shows that there was difference between pretest and post-test (11.230), pretest and post-test II (14.230) and post-test I and post-test II (3.000) statistically significant at p<0.05 level. The above findings clearly infer that MMCP was found to be effective in improving the critical thinking skill among the nursing students in the experimental group. It was found to be effective in improving the attitude towards care plan among the nursing students in the experimental group.

Table 3.2: Comparison of pretest and post-tests level of Critical Thinking Skill towards care plan among the nursing students in the control group using Repeated Measures ANOVA.

n = 98

Critical Thinking Skill		Mean	S.D	Mean Difference Score		Repeated Measures ANOVA ‘F’ test value & p-value	
Pretest		14.55	9.76	4.49		F=23.114 p=0.0001, S***	
Post Test I		19.04	6.57				
Post Test II		19.04	6.57				
Pairwise Comparisons							
(I) CTS	(J) CTS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference		
					Lower Bound	Upper Bound	
Pretest	Post Test I	-4.490*	.934	.000	-6.765	-2.215	
	Post Test II	-4.490*	.934	.000	-6.765	-2.215	
Post Test I	Post Test II	0.000	0.000	-	0.000	0.000	

***p<0.001, *p<0.05, S – Significant

The table 3.2 shows that the pretest mean score of critical thinking skill among the nursing students in the control group was 14.55±9.76, post-testI mean score was 19.04±6.57 and post-testII mean score was 19.04±6.57. The calculated Repeated Measures ANOVA value of F = 23.114 was statistically significant at p<0.001 level which infers that there was mild improvement in the level of critical thinking skill from pretest to post-testII among the nursing students which was evident from the mean difference score of 4.49. The Bonferroni Pairwise comparison shows that there was difference between pretest and post-testI (4.490), pretest and post-testII (4.490) statistically significant at p<0.05 level. But significant difference was not observed between post-testI and post-testII level of critical thinking skill among the nursing students.

Table 3.3: Effectiveness of Mind Mapped Care Plan (MMCP) on attitude towards care plan among the nursing students in the experimental group using Repeated Measures ANOVA.

n= 100

Attitude	Mean	S.D	Mean Difference Score	Repeated Measures ANOVA ‘F’ test value & p-value		
Pretest	91.0	22.0	45.15	F=270.264 p=0.0001, S***		
Post Test I	119.96	16.72				
Post Test II	136.15	14.57				
Pairwise Comparisons						
(I) CTS	(J) CTS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pretest	Post Test I	-28.960*	1.946	.000	-33.698	-24.222
	Post Test II	-45.150*	2.375	.000	-50.934	-39.366
Post Test I	Post Test II	-16.190*	1.480	.000	-19.794	-12.586

***p<0.001, *p<0.05, S – Significant

The table 3.3 shows that the pretest mean score of attitude among the nursing students was 91.0±22.0, post-testI mean score was 119.96±16.72 and post-testII mean score was 136.15±14.57. The calculated Repeated Measures ANOVA value of F = 270.264 was statistically significant at p<0.001 level which infers that there was significant improvement in the level of attitude towards care plan from pretest to post-testII among the nursing students which was evident from the mean difference score of 45.15. The Bonferroni Pairwise comparison shows that there was difference between pretest and post-testI (28.960), pretest and post-test 2 (45.150) and post-testI and post-testII (16.190) statistically significant at p<0.05 level.

Table 3.4: Comparison of pretest and post-tests level of attitude towards care plan among the nursing students in the control group using Repeated Measures ANOVA.

n = 198

Attitude		Mean	S.D	Mean Difference Score		Repeated Measures ANOVA ‘F’ test value & p-value
Pretest		90.09	22.87	0.42		F=4 .597 p=0.028, S*
Post Test I		90.22	22.87			
Post Test II		90.51	22.66			
Pairwise Comparisons						
(I) CTS	(J) CTS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Pretest	Post Test I	-0.133	0.057	.069	-0.272	0.007
	Post Test II	--0.418*	.172	0.050	-0.836	-0.000
Post Test I	Post Test II	-0.286	.164	0.255	-0.686	0.114

***p<0.001,

*p<0.05, S – Significant

The table 3.4 shows that the pretest mean score of attitude among the nursing students in the control group was 90.09±22.87, post-test I mean score was 90.22±22.87 and post-test II mean score was 90.51±22.66. The calculated Repeated Measures ANOVA value of F=4.597 was statistically significant at p<0.001 level which infers that there was mild improvement in the level of attitude towards care plan from pretest to post-test II among the nursing students which was evident from the mean difference score of 0.49. The Bonferroni Pairwise comparison shows that there was difference between pretest and post-test 2 (0.418) statistically significant at p<0.05 level. But significant difference was not observed between pretest and post-test& post-test I and Post test II level of attitude among the nursing students.

Table 3.5: Comparison of pretest and post-tests level of critical thinking skill towards care plan among the nursing students between the experimental and control group using One ANOVA

n = 198

Critical Thinking Skill	Experimental Group n = 100		Control Group n = 98		Mean Difference Score	One Way ANOVA 'F' test value & p-value
	Mean	S.D	Mean	S.D		
Pretest	14.20	8.58	14.55	9.76	0.35	F=0.072 p=0.788, NS
Post Test I	25.43	3.77	19.04	6.57	6.39	F=70.586 p=0.0001, S***
Post Test II	28.43	2.45	19.04	6.57	9.39	F=178.453 p=0.0001, S***

***p<0.001, S – Significant

N.S – Not Significant, p>0.05

The table 3.5 denotes that the computed One-Way ANOVA value of F = 0.072 in the pretest was not statistically significant at p<0.05 level which indicates that there was no significant difference in the pretest level of critical thinking skill among the nursing students between the groups. In the post-test I One-Way ANOVA value of F= 70.586 was statistically significant at p<0.001 level of critical thinking skill among the nursing students between the groups which was evident from the mean difference score of 6.39 between the groups. In the post-test II One-Way ANOVA value of F=178.453 was statistically significant at p<0.001 level of critical thinking skill among the nursing students between the groups which was evident from the mean difference score of 9.39 between the groups.

Table 3.6: Comparison of pretest and post-tests level of attitude towards care plan among the nursing students between the experimental and control group using One ANOVA.

n = 198

Attitude	Experimental Group n = 100		Control Group n = 98		Mean Difference Score	One Way ANOVA 'F' test value & p-value
	Mean	S.D	Mean	S.D		
Pretest	91.0	22.0	90.09	22.87	0.91	F=0.081 p=0.776, NS
Post Test I	119.96	16.72	90.22	22.87	29.74	F=109.357 p=0.0001, S***

Post Test II	136.15	14.57	90.51	22.66	45.64	F=285.165 p=0.0001, S***
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***p<0.001, S – Significant

N.S – Not Significant, p>0.05

The table 3.6 illustrates that the computed One-Way ANOVA value of $F = 0.081$ in the pretest was not statistically significant at $p < 0.05$ level which indicates that there was no significant difference in the pretest level of attitude towards care plan among the nursing students between the groups. In post-test I One-Way ANOVA value of $F = 109.357$ was statistically significant at $p < 0.001$ level which was evident from the mean difference score of 29.74 between the groups. In post-test II One-Way ANOVA value of $F = 285.165$ was statistically significant at $p < 0.001$ level which was evident from the mean difference score of 45.64 between the groups.

Section IV: Relationship between Critical Thinking Skill and attitude of nursing students towards care plan in the experimental group and control group.

Table 4.1: Correlation between pretest and post-tests scores of critical thinking skill and attitude towards care plan among the nursing students in the experimental group.

n = 100

Variables	Critical Thinking Skill		Attitude		Karl Pearson's Correlation 'r' & p-value
	Mean	S.D	Mean	S.D	
Pretest	14.20	8.58	91.0	22.0	R =0.060 p=0.553, NS
Post Test I	25.43	3.77	119.96	16.72	r =0.447 p=0.0001, S***
Post Test II	28.43	2.45	136.15	14.57	r =0.402 p=0.0001, S***

***p<0.001, S – Significant

N.S – Not Significant, p>0.05

The table 4.1 denotes that the pretest correlation value of $r = 0.060$ shows poor positive correlation statistically not significant at $p < 0.05$ level. The calculated Karl Pearson's value in post-testI (0.447) and post-test 2 (0.402) shows a positive correlation between critical thinking skill and attitude towards care plan among the nursing students statistically significant at $p < 0.001$ level which indicates that after the intervention when the critical thinking skill in post-testI and post-testII increases then ultimately it increases the attitude in post-testI and post-testII.

Table 4.2: Correlation between pretest and post-tests scores of critical thinking skill and attitude towards care plan among the nursing students in the control group.

n = 98

Variables	Critical Thinking Skill		Attitude		Karl Pearson's Correlation 'r' & p-value
	Mean	S.D	Mean	S.D	
Pretest	14.55	9.76	90.09	22.87	r=0.111 p=0.275, NS
Post Test I	19.04	6.57	90.22	22.87	r=0.045 p=0.662, NS
Post Test II	19.04	6.57	90.51	22.66	r=0.036 p=0.726, NS

N.S – Not Significant, $p > 0.05$

The table 4.2 denotes that the pretest, post-testI and post-testII correlation value of $r=0.060$, $r=0.045$ and $r=0.036$ shows poor positive correlation statistically not significant at $p < 0.05$ level.

Section V: Association of post-test level of critical thinking skill and attitude towards care plan among nursing students with selected demographic variables.

Table 5.1: Association of post-testII level of critical thinking skill among nursing students with their selected demographic variables in the experimental group.

n = 100

Demographic Variables	Moderate		Good		Excellent		Chi-Square Value
	f	%	F	%	F	%	
Age in years							$\chi^2=2.597$ d.f=4 P=0.627 NS
19 – 20	0	0	0	0	55	55.0	
21 – 22	1	1.0	1	1.0	42	42.0	
Above 22	0	0	0	0	1	1.0	
Gender							$\chi^2=0.510$ d.f=2
Male	0	0	0	0	20	20.0	

Female	1	1.0	1	1.0	78	78.0	P=0.775 NS
Year of study							$\chi^2=0.021$
III – year	1	1.0	1	1.0	97	97.0	d.f=2
IV – year	0	0	0	0	1	1.0	P=0.990 NS
Religion							$\chi^2=3.061$
Hindu	0	0	0	0	57	57.0	d.f=4
Christian	1	1.0	1	1.0	38	38.0	P=0.548 NS
Islam	0	0	0	0	3	3.0	
Others	-	-	-	-			
Type of personality							$\chi^2=2.135$
Introvert	1	1.0	0	0	58	58.0	d.f=2
Extrovert	0	0	1	1.0	40	40.0	P=0.344 NS
Interested in drawing?							$\chi^2=1.478$
							d.f=2
							P=0.478
							NS
Are you under went any surgeries due to accident							$\chi^2=0.042$
Yes	0	0	0	0	2	2.0	d.f=2
No	1	1.0	1	1.0	96	96.0	P=0.979 NS
Residence							$\chi^2=0.278$
Home with parents	0	0	0	0	9	9.0	d.f=4
On campus hostel	1	1.0	1	1.0	86	86.0	P=0.991 NS
Off campus hostel with rented home	0	0	0	0	3	3.0	
Do you have any additional degree YES/NO, if yes							$\chi^2=0.154$
One	1	1.0	1	1.0	91	91.0	d.f=4

More than one	0	0	0	0	6	6.0	P=0.997 NS
No	0	0	0	0	1	1.0	
Reason for select this profession							$\chi^2=2.098$ d.f=6 P=0.910 NS
Parent's choice	0	0	0	0	1	1.0	
Own choice	0	0	1	1.0	45	45.0	
Friends influence	1	1.0	0	0	51	51.0	
Media influence	0	0	0	0	1	1.0	
Aim of selecting this profession							$\chi^2=6.466$ d.f=6 P=0.373 NS
To serve humanity	0	0	0	0	14	14.0	
Earn money	0	0	0	0	14	14.0	
Job opportunity	1	1.0	0	0	56	56.0	
Settle in abroad	0	0	1	1.0	14	14.0	
Area of preference after completion of course							$\chi^2=0.130$ d.f=4 P=0.998 NS
Academic (teaching)	0	0	0	0	5	5.0	
Clinical (bedside)	1	1.0	1	1.0	92	92.0	
Community	0	0	0	0	1	1.0	
Number of awards and prizes in last year							$\chi^2=1.884$ d.f=6 P=0.930 NS
1	0	0	0	0	50	50.0	
2	0	0	0	0	33	33.0	
More than 3	0	0	0	0	10	10.0	
No	1	1.0	1	1.0	5	5.0	
Are you interested in computer-based skill							$\chi^2=0.875$ d.f=6 P=0.990 NS
Yes	1	1.0	1	1.0	68	68.0	
No	0	0	0	0	27	27.0	

Last year performance in Medical Surgical Nursing is PASS /FAIL, if pass							$\chi^2=1.810$ d.f=6 P=0.936 NS
Distinction > 75 -100	0	0	0	0	10	10.0	
Good > 65- 70	1	1.0	1	1.0	51	51.0	
Average > 50 – 65	0	0	0	0	36	36.0	
Poor > 50	0	0	0	0	1	1.0	
Extensive reading helps to improve critical thinking skill / prediction							$\chi^2=100.309$ d.f=4 P=0.0001 S***
Agree	0	0	1	1.0	75	75.0	
Neutral	0	0	0	0	23	23.0	
Not agree	1	1.0	0	0	0	0	
Courses offered							$\chi^2=0.418$ d.f=4 P=0.981 NS
with B.Sc. (N)	1	1.0	1	1.0	81	81.0	
with M.Sc. (N)	0	0	0	0	16	16.0	
with Doctorate in nursing	0	0	0	0	1	1.0	
Clinical exposure obtained							$\chi^2=6.832$ d.f=4 P=0.145 NS
Parent hospital alone	0	0	0	0	7	7.0	
Affiliated hospital alone	1	1.0	1	1.0	21	21.0	
Both	0	0	0	0	70	70.0	
Locality of the institution							$\chi^2=3.735$ d.f=4 P=0.443
Rural	0	0	0	0	4	4.0	
Duration of institution started							$\chi^2=0.305$ d.f=4 P=0.989 NS
1 – 5 years	0	0	0	0	9	9.0	
6 –10 years	0	0	0	0	4	4.0	
>11 years	1	1.0	1	1.0	85	85.0	

***p<0.001, S – Significant

N.S – Not Significant, p>0.05

The table 5.1 shows that the demographic variable extensive reading helps to improve critical thinking skill / prediction ($\chi^2=100.309$, $p=0.0001$) had shown statistically significant association with post-test II level of critical thinking skill among nursing students in the experimental group at $p<0.001$ level and the other clinical variables had not shown statistically significant association with post-test II level of critical thinking skill among nursing students in the experimental group at $p<0.05$ level.

Table 5.2: Association of post-test II level of attitude towards care plan among nursing students with their selected demographic variables in the experimental group

n = 98

Demographic Variables	Un favorable		Favorable		Chi-Square Value
	F	%	F	%	
Age in years					$\chi^2=0.100$
19 – 20	5	5.0	50	50.0	d.f=2
21 – 22	4	4.0	40	40.0	P=0.951
Above 22	0	0	1	1.0	N.S
Gender					$\chi^2=1.099$
Male	3	3.0	17	17.0	d.f=1
Female	6	6.0	74	74.0	P=0.295
					N.S
Year of study					$\chi^2=0.100$
III – year	9	9.0	90	90.0	d.f=1
IV – year	0	0	1	1.0	P=0.752
					N.S
Religion					$\chi^2=3.112$
Hindu	6	6.0	51	51.0	d.f=2
Christian	2	2.0	38	38.0	P=0.211
Islam	1	1.0	2	2.0	N.S
Others	-	-	-	-	
Type of personality					$\chi^2=0.240$
Introvert	6	6.0	53	53.0	d.f=1

Extrovert	3	3.0	38	38.0	P=0.624 N.S
Interested in drawing?					$\chi^2=5.197$ d.f=1 P=0.023S*
Yes	2	2.0	56	56.0	
No	7	7.0	35	35.0	
Are you underwent any surgeries due to accident					$\chi^2=0.202$ d.f=1 P=0.653 N.S
Yes	0	0	2	2.0	
No	9	9.0	89	89.0	
Residence					$\chi^2=4.602$ d.f=2 P=0.100 N.S
Home with parents	2	2.0	7	7.0	
On campus hostel	6	6.0	82	82.0	
Off campus hostel with rented home	1	1.0	2	2.0	
Do you have any additional degree YES/NO, if yes					$\chi^2=0.744$ d.f=2 P=0.689 N.S
One	9	9.0	84	84.0	
More than one	0	0	6	6.0	
No	0	0	1	1.0	
Reason for select this profession					$\chi^2=1.779$ d.f=3 P=0.620 N.S
Parent's choice	0	0	1	1.0	
Own choice	6	6.0	40	40.0	
Friends influence	3	3.0	49	49.0	
Media influence	9	0	1	1.0	
Aim of selecting this profession					$\chi^2=2.124$ d.f=3 P=0.547
To serve humanity	2	2.0	12	12.0	
Earn money	0	0	14	14.0	
Job opportunity	6	6.0	51	51.0	

Settle in abroad	1	1.0	14	14.0	N.S
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Area of preference after completion of course					$\chi^2=0.631$ d.f=2 P=0.729 N.S
Academic (teaching)	0	0	5	5.0	
Clinical (bedside)	9	9.0	85	85.0	
Community	0	0	1	1.0	
Number of awards and prizes in last year					$\chi^2=1.900$ d.f=3 P=0.593 N.S
1	5	5.0	47	47.0	
2	4	4.0	29	29.0	
More than 3	0	0	10	10.0	
No	0	0	5	5.0	
Are you interested in computer- based skill					$\chi^2=0.466$ d.f=3 P=0.926 N.S
Yes	7	7.0	63	63.0	
No	2	2.0	25	25.0	
Last year performance in Medical Surgical Nursing is PASS /FAIL, if pass					$\chi^2=2.275$ d.f=3 P=0.517 N.S
Distinction > 75 -100	0	0	10	10.0	
Good > 65- 70	4	4.0	49	49.0	
Average > 50 – 65	5	5.0	31	31.0	
Poor > 50	0	0	1	1.0	
Extensive reading helps to improve critical thinking skill / prediction					$\chi^2=0.106$ d.f=3 P=0.949
Agree	7	7.0	69	69.0	
Neutral	2	2.0	21	21.0	

Not agree	0	0	1	1.0	N.S
Courses offered					$\chi^2=2.274$ d.f=2 P=0.321
with B.Sc. (N)	6	6.0	77	77.0	
with M.Sc. (N)	3	3.0	13	13.0	
with Doctorate in nursing	0	0	1	1.0	

Clinical exposure obtained					$\chi^2=0.257$
Parent hospital alone	1	1.0	6	6.0	d.f=2
Affiliated hospital alone	2	2.0	21	21.0	P=0.879
Both	6	6.0	64	64.0	N.S
Locality of the institution					$\chi^2=1.307$
Urban	6	6.0	67	67.0	d.f=2
Sub-urban	2	2.0	21	21.0	P=0.520
Rural	1	1.0	3	3.0	N.S
Duration of institution started					$\chi^2=1.396$
1 – 5 years	1	1.0	8	8.0	d.f=2
6 –10 years	1	1.0	3	3.0	P=0.498
>11 years	7	7.0	80	80.0	N.S

*p<0.05, S – Significant

N.S – Not Significant, p>0.05

The table 5.2 shows that the demographic variable interest in drawing ($\chi^2=5.197$, p=0.023) had shown statistically significant association with post - test II level of attitude towards care plan among nursing students in the experimental group at p<0.05 level and the other clinical variables had not shown statistically significant association with post–testII level of attitude towards care plan among nursing students in the experimental group at p<0.05 level.

Findings the association between attitude of nursing students and their demographic variables in both the control and interventional groups.

The study shows that the demographic variable extensive reading helps to improve critical thinking skill / prediction ($\chi^2=100.309$, $p=0.0001$) had shown statistically significant association with post-test II level of critical thinking skill among nursing students in the experimental group at $p<0.05$ level. The study revealed that the demographic variable interest in drawing ($\chi^2=5.197$, $p=0.023$) had shown statistically significant association with post-test II level of attitude towards care plan among nursing students in the experimental group at $p<0.05$ level and the other clinical variables had not shown statistically significant association with post-test II level of attitude towards care plan among nursing students in the experimental group at $p<0.05$ level.

The study revealed that the demographic variable interest in drawing ($\chi^2=5.197$, $p=0.023$) had shown statistically significant association with post-test II level of attitude towards care plan among nursing students in the experimental group at $p<0.05$ level and the other clinical variables had not shown statistically significant association with post-test II level of attitude towards care plan among nursing students in the experimental group at $p<0.05$ level.

Summary

Non randomized quasi experimental pretest t-post-test control group design was adopted in this study Modified Daniel.L Stufflebeam CIPP Model (1971) helping art of clinical nursing theory was used as a conceptual framework of the study. The study was conducted in III - year and IV - year BSc Nursing students of PPG College of Nursing, Coimbatore. Modified California Critical thinking scale test and Modified 5 - Point Likert attitude scale used to assess the effectiveness of mind mapped care plans (MMCP) in evaluating critical thinking skill on patient care in nursing practice and the attitude among nursing students. In this study 198 patients were selected experimental group consisted of 100 students and control group consisted of 98 students. pretest and post-test were assessed by using Modified California Critical thinking scale test (CCTST) and Modified 5 – Point Likert attitude scale for both experimental and control group.

RECOMMENDATION FOR FURTHER THE STUDY

- It is recommended that the MMCP can be encouraged to utilize in clinical settings as a teaching approach to enhance learners' critical thinking skills.
- It is also recommended to conduct further research studies to discover more effective strategies to

promote critical thinking skills for nursing students in the classroom as well as in their clinical practice.

- It is recommended that nursing faculty set critical thinking skills as a crucial outcome and competency in their educational programs.
- A similar study can be conducted in universities other than The Tamil Nadu Dr M.G.R Medical University in Tamil Nadu state as well as other states in India as well as globally.
- The study's findings have important ramifications for nursing practice, administration, education, and research. The results of this study offered empirical support for the claim that MMCP is a cutting-edge teaching strategy that helps nursing students improve their critical thinking abilities.

Conclusion

To meet the demands of the fast-paced, technologically-advanced nursing profession of today, nurses must possess critical thinking skills. The body of research consistently emphasizes that critical thinking skills are necessary for nurses to evaluate complicated data and make wise clinical decisions while organizing, supervising, and assessing their patients' care. Our ability to succeed professionally depends on teaching nursing students how to think critically while organizing patient care. There can be restrictions on how critical thinking abilities can be developed when using the nursing process as a regular activity in a traditional way.

There is currently insufficient data to draw firm conclusions about how nursing education affects the growth of critical thinking. Several analysts speculate that this might be the case because a lot of research lack an adequate active student-centered instructional method foundation. Therefore, creative strategy is more crucial than conventional approaches. The Mind-Mapped Care Plan is an alternate strategy for delivering comprehensive and patient-centered care, which is supported by the study findings. Mind mapping is an effective learning strategy to help students apply new knowledge and skills to clients with complex health-care needs, so the researcher concludes that MMCP should be encouraged in the nursing curriculum to develop the learners' critical thinking skills, which might impact nursing care to improve patient outcome. This study makes it very evident that one of the difficulties for nurse educators is coming up with creative ways to encourage students to adopt an active learning style.

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