

# Improving ‘Nursing Student Disposition Towards Critical Thinking And Academic Performance Through The Utilization Of Mind-Mapping

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## **Abstract:**

**Background:** one teaching and learning strategy that has recently emerged in higher education as a means to support student critical thinking is the nonlinear learning strategy of mind mapping (MM). **Aim:** to examine the effect of mind mapping utilization on nursing students' disposition towards critical thinking and academic performance. **Design:** A Quasi-experimental design was used. **Setting.** This study was conducted at the accredited nursing science department, Faculty of Medicine, A.B.U., Zaria, Nigeria. **Sample.** A purposive sample of sixty nursing students who enrolled in Management of Nursing Care Services course, who accepted to take part in the research and met the inclusion criteria was included in the study. The sample was divided equally into two groups, namely, experimental and control groups. **Tools.** Data collected by using a five instruments, namely, 1) The demographic profile fact sheet, 2) students' pre/posttest 'knowledge about mind mapping questionnaire, 3) mind mapping, assessment rubric, 4) Critical thinking disposition instrument, 5) nursing students' academic performance (pre/post/test). **Results:** a highly significant difference was found between experimental nursing students' overall knowledge mean score with respect to mind mapping before and post introductory session. Additionally, the experimental and control groups differed significantly in the post intervention with respect to the overall dimensions of disposition towards critical thinking mean scores and overall academic performance. **Conclusion:** improving disposition towards critical thinking through mind-mapping utilization would enhance their academic performance. **Recommendation:** Curriculum developers and textbook authors of nursing management and leadership may incorporate mind mapping techniques in their contents to encourage nursing students to utilize this strategy that enhances critical thinking .Furthermore , future research can additionally explore the long - term effect that mind mapping may have on critical thinking

**Keywords:** Nursing Student, Disposition, Critical Thinking, Academic Performance, Mind-Mapping

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## **I. Introduction**

The students' postulates an imperative part in delivering best quality graduates who will get to be extraordinary leaders and labor in the nation (Alos, Caranto, & David, 2015). Particularly in health science courses, there has been a viewpoint change from passive role learning and the memorization of the fundamental knowledge' content to the high-level integration of information using active learning which incorporates analysis and synthesis in order to improve critical thinking skills (Chaplin, 2007). One way to deal with this issue is the utilization of mind maps (Nebojsa et al., 2011). The Mind Map can be connected to any component of life in which the advancement of learning and clarity of thinking can enhance the performance of the human being (Clauss et al., 2013).

In higher education, the Mind Map (MM) perceived as a potential teaching and Learning strategy that effectively engages the mapper (learner) in synthesizing and integrating Information in a meaningful non-linear manner (D'Antoni et al., 2010). Mind Map as a learning strategy that used to organize thoughts; it can be the declaration of outspread thought and a graphical strategy that gives the way to open the capability of the human thinking (Clauss et al., 2013).

A Mind mapping is viewed as 'visual, non-linear representation of what's going on in the individual mind. The diagram used to represent the words, ideas, tasks, and their relationships 'or other items connected to and arranged around a central key word or idea (Biktimirov & Nilson 2006; King, 2007a; Deshatty & Mokashi, 2013). It is thus an effective tool to aid in studying and organizing information (Buzan, 2006; Davies, 2011).

A Mind mapping gives the individual a chance to see, in one picture, the thoughts, digressions and ideas the individual brain connects to a particular concept". Also, it can as an effective visual design to empower students to obviously observe the relationship amongst thoughts, and thusly encourages them to amass certain thoughts together. Consequently, this strategy empowers active learning and helps students to utilize their

learning styles to move beyond the passive role of just listening and taking notes (**King, 2007a; Padang & Gurning, 2014**).

Empowering students to think critically is a main role of higher education (**Anajafi, et al, 2009**). Critical thinking (CT) has been identified as a vital outcome of nursing education (**American Association of Colleges of Nursing, 2008**). Creating an environment that builds up a students' critical thinking ability is one of educators, primary roles (**Pudelko, 2012**) because of, Critical thinking (CT) facilitates the dynamics of academics and universities and helps them survive, develop and promotes scientific societies (**Anajafi, et al, 2009**).

Practically, to promote critical thinking skills in students, educational organization must proceed to investigate and evaluate the viability of various teaching and learning strategies (**Zipp & Maher, 2013**). One teaching and learning strategy that has recently emerged in higher education as a means to support student critical thinking is the nonlinear learning strategy of mind mapping (MM) which considered one of the most powerful tools for developing metacognition ( the thinking process) for the thinking maps (**Hyerle, 2010; Pudelko, 2012**).

One of the goals of critical thinking is the learners' familiarity with their own thinking process (metacognition). One outcome, educators Lately, given more regard for, especially, in higher education is the improvement of critical thinking skills in their students (**Garrison, Anderson, & Archer, 2010; Brookfield, 2012**).

Critical thinking consists of two aspects: a set of operational cognitive skills and disposition. Skills emphasize the cognitive strategies and the attitude focuses on the critical parts of thinking as well as the internal, sustainable motivations in problem solving (**Facione, 2010**). Dispositions toward thinking critically have been depicted as the unswerving internal inclination to problem solving and decision making achieved by thinking. Critical thinking disposition is defined as a personal disposition or habit that results in the making of self-controlled decisions in response to problems and choices encountered in personal or professional situations (**Facione & Facione, 2007; Zhang, 2008**).

The dispositions of the individuals towards the critical thinking approach may vary in terms of some factors such as dealing with the quantity instead of quality in the curricula applied in educational institutions, insisting on memorization teaching styles, socioeconomic level of society, being intertwined with each field media on every field and factors such as prejudice are effective on critical thinking dispositions (**Sarigoz, 2012**).

Student's academic performance has been a vital issue for higher education institutions and examination concerning the likelihood of student achievement is additionally essential from various perspectives for colleges, their educators and policy makers (**Garkaz, Banimahd & Esmaceli, 2011**). Academic performance can be seen as ability to study and remember facts and to be able to express such knowledge gained either verbally or in writing. It is a key criterion to judge ones total potentialities and capabilities which are frequently measured by examination results and used to pass judgement on the quality of education by academic institutions (**Alos, Caranto, & David, 2015**).

Academic performance and academic achievement, each of these two terms was used interchangeably for the purpose of the present study. Academic performance can be measured in several ways including; performance in individual courses; grouped courses; yearly grade point average (GPA) and program GPA (**Donaldson, McCallum & Lafferty, 2010**). Students' poor performances cut across different fields of education, including nursing education. The poor academic performances can lead to inadequate knowledge needed to enhance professional skills required for nursing procedures. A poorly trained nurse becomes a threat to the lives of the patients, and further compounds the already poor state of the health care in Nigeria (**Dimkpa, Inegbu & Buloubomere, 2013**).

Students' poor academic performance may result from numerous factors including incongruence of the teaching strategy to the students' learning styles, lack of motivation, self-efficacy doubts as well as inefficient studying techniques. Furthermore, the type of assessment utilized may also have an impact on the students' performance (**Gqweta, 2012**).

### **Significance of the Study**

Twenty first century, in the era of knowledge explosion, nursing sciences' educators are encountering noteworthy significant challenges, one of these challenges is the lack of enough consideration regarding the students' educational progress which, assume an important role in scholastic achievement which can lead to their scholarly failure (**Hashemabadi, Garavand, Ghasr, & Hosseini, 2013**). Thus , the question proceeds as

which inventive learning methodologies would be most effective for the enhancing nursing students 'critical thinking in order to improve the intellectual skills which may improve students' academic performance .

In this manner, In Nigeria, nursing educational system has developed from a non-regulated profession in which students rely on upon their faculty for knowledge without exhibiting the necessary thinking skills required to practice safely in a health profession that is closely overseen by strict accreditation guidelines. Consequently, the nursing programs ought to be changed, in which the educational modules is saturated rather than encouraging students to expand critical thinking skills needed to analyze and interpret patient problems (Foluso &Thompson, 2014).

Subsequently, the implementation of a learning strategy that advances students' engagement in the learning process could energize students' critical thinking abilities and the transfer of those abilities necessary for academic achievement. Accordingly, it is assumed that the findings of this study will add to further understanding the role of mind mapping in upgrading academic achievement. If the utilization of mind maps demonstrates its viability in enhancing academic achievement, scholarly staff will have additional instructional media that can be used to support students' learning with understanding. What's more, this will help educators in their scan for a compelling and effective academic methodology or model for enhancing learning process.

### **Study Aim**

The present study aims to examine the effect of mind mapping utilization on nursing students' disposition towards critical thinking and academic performance.

### **Research Questions**

In order to provide guidance to the aim of the study, three research questions were specified as follows:

1. To what extent is there a difference in the experimental group ' Pre-and Post 'Knowledge test scores about Mind Mapping?
2. To what extent does the utilization of Mind Maps improve the experimental group' disposition towards critical thinking when compared to the control group?
3. To what extent does the utilization of Mind Maps improve the experimental group academic performance when compared to the control group?

### **Hypotheses**

Based on the above research questions the following hypotheses were formulated:

1. The first hypothesis (H1) proposed that there will be a significant difference between the experimental group' pre-and post 'knowledge test scores about Mind Mapping.
2. The second hypothesis (H2) postulate that the difference between Pre-and Post-disposition towards critical thinking scores will be higher in the experimental group' as compared to the control group.
3. The third hypothesis (H3) hypothesized that the difference between Pre-and Post-academic performance scores will be higher in the experimental group' as compared to the control group.

### **Setting**

The accredited Nursing Science Department, Faculty of Medicine, Ahmadu Bello Ahmadu Bello University, which considered the largest University in Nigeria and second largest University in Africa and located in the Zaria city. Founded in October 4, 1962 and was named the University of Northern Nigeria. It was named the University on behalf of Mr. Alhaji Ahmed Bello's First Prime Minister of Northern Nigeria. The University has a long history as it was one of only two Universities in Nigeria (the other is the University of Ibadan) while Nigeria declared independence in 1960.

### **Sample**

The study used a purposive sample of (No.60) undergraduate nursing students who enrolled in Management of Nursing Care Services course (NURS, 402) in the fourth academic year, who accepted to take part in the research and met the inclusion criteria was included in the study. The sample was divided equally into two groups randomly: half of them were assigned to a mind map (experimental group) and the other half to a self-selected study (control group). The inclusion criteria of both two groups were as follows; both two groups willing to participate in the study, male and female nursing students, enrolled in fourth year, none of the students reported previous experience in mind mapping, Meanwhile, the exclusion criteria of both two groups, comprised

of being declined to take part in the study and withdrawal from the educational intervention from both experimental and control groups.

### **Research Design**

A quasi-experimental, repeated measures design which incorporate 2 (experimental –control) × 2 (pretest–posttest) designs was selected to test the participants at 2 pre-specified time points (initial, and immediately after the educational intervention).

### **Data Collection Tools**

To fulfill the aim of this study, the following tools were used

**1-The Demographic Profile Fact Sheet:** it was developed by the researcher to identify demographic information in the form of closed ended questions (ex. Age, gender, ect ....)

**2-Students' Pre/Posttest 'Knowledge about the Mind Mapping Questionnaire:** This Pre/posttest was developed by the researcher after reviewing the relevant literature. It was used to assess the study groups' knowledge about mind mapping. It included twenty questions which divided into five sub dimensions as follows: 1) why students should revise (4 questions), 2) what are mind maps? (4 questions), 3) Key features of mind maps, (5 questions), 4) Why use mind maps (4 questions), and 5) How to create a mind map (3 questions). As for the scoring system, Point (1) was assigned for correct answer to each question and point zero for each incorrect answer. The total test score was calculated from forty marks and the score of each student obtained from the total correct answers.

**3- Mind Mapping Assessment Rubric:** This tool developed by the researcher after reviewing the relevant literatures (West et al., 2002; O'Connor, 2011; Keleú, 2012) to identify the major observable performance indicators which were met in the constructed four mind maps by the experimental group. These performance indicators were covering the following: 1.) broadness of knowledge, 2) organization of ideas, 3) depth of ideas, 4) design (layout and size), 5) correctness, 6) creativity ,7) use of format, 8) use of color, 9) neatness of the constructed mind mapping and 10) use of images/symbols. As for the scoring system, point (3) was assigned to a good performance category, point (2) was assigned to the fair performance category, and point (1) was assigned to the poor performance category. For calculating the total assessment of the experimental group 'constructed maps were as follows:

(30) Participant X (4) (Mind Map) Assessment = (120) Assessment.

**4- Yoon's Critical Thinking Disposition Instrument.** The structured self-assessment questionnaire of (YCTD) which consists of (27) items developed by Yoon, (2004), it was used to collect primary data before and after the intervention. The self-assessment questionnaire was divided into seven subscales include objectivity (3 items), prudence (4 items), systematicity, (3 items), intellectual eagerness/ curiosity (5, items), intellectual fairness, (4, items), healthy skepticism (4 items), and CT self-confidence (4 Items). As for the scoring system, a five- point likert scale was used in the questionnaire. The available response of the respondent was strongly agree, agree, natural, disagree, and strongly disagree. These were given a score from 1 to 5 respectively.

**5- Nursing Students' Academic Performance (Pre/Post/test) instrument:** This Pre/posttest was developed by the researcher on four units which taught by the researcher from Management of Nursing Care Services course (NURS, 402). It was consisted of (22) multiple -choice test items and it was divided into four-sub measurements as follows: 1) Conflict management (5 questions), 2) Change management (7 questions), 3) Team building (5 questions), 4) Ethics in organization and leadership (5 questions). .As for the scoring system, Point (1) was assigned for correct answer to each question and point zero for each incorrect answer. The total test score was calculated from forty marks and the score of each student obtained from the total correct answers.

### **Validity Test**

The developed self-administered questionnaires and pre-post tests were submitted to three experts in the field of nursing education for ensuring relevancy, clarity, and readability, ease of understanding, question sequence, and completion time. Then, questionnaires were edited according to experts' suggestions.

### **Pilot Study**

Once the permission was granted by the pertinent authorities, ten percent of the sample equal (6) from the experimental and control groups who met the incorporation criteria was incorporated into the pilot study, keeping in mind the end goal to guarantee the feasibility, clarity, applicability, length of the scale and the time required for filling in the instruments. Data obtained from the pilot study was analyzed and accordingly the necessary modifications to the study instruments were done; those who took part in the pilot study was incorporated into the aggregate of the study sample.

### **Reliability**

For the study purpose, the reliability test was done to determine how strongly the attributes were related to each other and to estimate the reliability based on the average correlation between items within each factor. The reliability coefficients were generally higher for all questionnaires, and suitable for scientific purposes. The Cronbach alpha for each questionnaire was as follows: students' pre/posttest 'knowledge about mind mapping questionnaire (0.82), Yoon's critical thinking disposition instrument, (0.79), students' pre/posttest 'knowledge about mind mapping questionnaire (0.77), the mind mapping assessment rubric (0.75) respectively.

### **Ethical Considerations**

Once the permission was granted by the head of the department to conduct the intervention study, each participant was informed about the nature and purpose of the study, and took full right to refuse participation or withdraw at any time. Participants were informed about the importance of their honesty in the feedback given, it was further explained that the success of the research study depends on them. Also, the component of the tools was clarified to the participants. They were reassured that the collected data would be used for the scientific research only and would be treated with confidentiality.

### **Data Collection Procedure**

First of all, before conducting the study, the researcher reviewed the available literature and the different studies related to the study using books, articles, magazines, and the internet to develop the study tools for data collection and the introductory session about mind mapping prior to the implementation of the educational program. Also, the objectives and the content outlines of each unit that have been taught by the researcher were revised to make test questions. The course under the study was divided into ten units were taught by three academic staff and the researcher was one of the academic staff who taught this course. Before enrolling in the study, participants were identified according to the inclusion and exclusion criteria for the students who enrolled in a nursing management services course with the code (NURS, 402) in the second semester of the scholarly year 2016.

One week before the begun of the intervention so as to ensure that the two groups were practically identical preceding the intervention. In the primary session of the educational intervention prior to the distribution of the baseline questionnaires, the researcher cleared up the motivation behind conducting this study and gave guidelines for finishing the questionnaire package for both the experimental and control group. Additionally, the Students were informed that their choice to take part would not have any impact on their course grade. Then, the students completed the pre-intervention questionnaire package which incorporating study participants' demographic data sheet, 'the self-administered questionnaires to measure their entering behavior and ascertain the homogeneity of the group before the implementing the intervention. After that students were taught the four units of three hours for every unit every week. The teaching was done for 5 weeks, after which the academic performance (Pretest) on the units which taught by the researcher administered to the students in all the groups to know whether the two groups differ in their initial level of achievement.

With a particular true objective to improve nursing student disposition towards critical thinking and academic performance, the experimental group was given a presentation of the most proficient method to

develop mind maps for three hours to familiarize them about mind mapping. The subjects in the mind map group were administered a pre-and posttest to find out their insight with respect to mind mapping. After that Mind mapping activity was done on those four units, Subjects in the mind map group were asked for to construct their mind maps outside of class time using their textbook, handouts and class note, though those in the control group was asked to study based upon their preferences. The experimental group students then presented the mind maps they had prepared.

Concerning the appraisal of the four developed mind map was conducted after the experimental group had been doing it. Four appraisal for every participant' four developed mind map was done was done by utilizing Mind Mapping Assessment Rubric. With respect to the scoring system, the aggregate evaluation of the developed mind maps was as follows: (30) Participant X (4) (Mind Map) Assessment = (120) Assessment).

After one month, nursing students' academic performance (Posttest) on the units which taught by the researcher in the management of nursing care services course (**NURS, 402**) and critical thinking disposition instrumentation was administered to compare between control and experimental groups after the intervention. The pre-test and post-test questions were compared with the content, but their sequence and numbering were randomized. All the collected data were analyzed and interpreted so as to answer the research questions. The study conducted in the academic year 2015- 2016 in semester II

### **Statistical Analysis of the Study**

To answer the questions of the study, the researcher used descriptive statistics (i.e. Means and standard deviations) followed by the independent t- test to detect any significant differences in the mean scores of the two groups on academic performance.

## **I. RESULTS**

When looking at the participants' demographic in both experimental and control groups, the descriptive results reflect that, A total of (N = 60) subjects were volunteered to participate in the study. All they were fourth-year nursing students. Of the (60) total participants, (30) were assigned to the experimental Group and 30 participants were assigned to the control group. (30 %) of the experimental group' participants' age, ranged between (26 to30) followed by 26.7% their age ranged between (36 to 40) years old. Meanwhile, (36.7 %) control group' ages were ranged between (31 to 35) years old followed by (26.7%) their age ranged between (36 to 40) years old. Also, the results show that (66.7%) of experimental sample and (53.3%) of the control group were male. All the participants in both experimental and control groups (100%) freshmen in this course, 50% Of the experimental (73. 3%) of the control group were single.

As noted in table (1) that there was a highly significant difference between the experimental group overall mean knowledge score regarding mind mapping before and after the introductory session ( $t= 5.21$ , sig =0. 0000). With respect to, mind mapping knowledge sub-measurements test, the results of the t-tests indicated that, there was a highly significant difference between nursing students' mean knowledge score regarding why students should revise (4 questions), what are mind maps? (4 questions), key features of mind maps (5 questions), ( $t=4. 04$ , Sig=0. 000), ( $t=2. 93$  Sig =0. 005), ( $t=3. 12$ , Sig=0. 003), ( $t=3. 98$ , Sig=0. 000) respectively. Meanwhile, no significant difference was found between nursing students' mean knowledge score regarding how to create a mind map (3 questions) ( $t=1. 69$ , Sig=0. 096).

With respect to the distribution of the overall mind map levels as constructed by the experimental group, figure (1) revealed that, (50%) of the studied group had gotten good performance category, followed by (36.7 %) had gotten fair performance category and the rest (13.3 %) had gotten poor performance category. Also, the same figure shows that (36.7 %) of the experimental group had gotten good performance category regarding broadness of knowledge and use of images and symbols ,followed by (30%), of the studied group had gotten good performance category with respect to the utilization of colour and correctness of constructed mind map by the experimental group. Moreover, (63.3%) of the experimental group had gotten the fair performance category in regards to the organization of the ideas, followed by (60 %) of them also had gotten the fair performance category regarding mind mapping format and correctness of the constructed mind map.

Additionally, (36.7%) of the experimental group had gotten poor performance category regarding using creativity, skill when constructing the mind mapping.

With respect to the comparison between the four mind maps as constructed by the experimental group, **Figure (2)**, the results revealed that there a significant difference between the constructed mind maps ( $F=5.045$ ,  $P=0.003^{**}$ ), where the constructed mind map of ethics in organization and leadership had gotten the highest mean score(19.34), followed by team building (19.2), then change management (17.93) and lastly conflict management(16.33).

As for comparing the disposition towards critical thinking mean scores of the experimental and control groups before and the post intervention **Table (2)**. The results revealed that the experimental and control groups differed significantly in the post intervention regarding overall dimensions of disposition towards critical thinking mean scores ( $t=2.155$ ,  $sig=0.035^*$ ) where, the experimental group had gotten the highest mean score (82.06,  $\pm 9.87$ ). Also, the results revealed a significant difference between the pre- and post- intervention means scores of the experimental group overall dimensions of disposition towards critical thinking ( $t = 2.678$ ,  $sig=0.01^*$ )

In addition, the results demonstrated that, there was a statistically insignificant difference between experimental and control groups in the post intervention regarding objectivity ( $t = 1.152$ ,  $Sig=0.254$ ), systematicity ( $t = 1.152$ ,  $Sig=0.068$ ) intellectual eagerness/ curiosity ( $t = 1.495$ ,  $Sig=0.140$ ), intellectual fairness ( $t = 0.665$ ,  $Sig=0.509$ ) healthy skepticism ( $t = 1.078$ ,  $Sig=0.286$ ) and self-confidence ( $t = 0.501$ ,  $Sig=0.618$ ) respectively.

**Table (3):** Summarizes the comparison between the Post-test mean scores of experimental and control groups in relation to overall academic performance to examine whether mind mapping strategy contributes to nursing students' learning achievement. The results exhibited that, there was a highly statistically significant difference between experimental and control groups in relation to overall academic performance posttest ( $t = 3.034$   $Sig = 0.004^{**}$ ). Where, the educational intervention was effective in the experimental group, when compared with control groups where, the experimental group had gotten the most noteworthy mean score (9.73,  $\pm 3.85$ ).

Concerning, overall academic performance 'Pre-and Post-test mean scores of the experimental group, the results revealed a significant difference ( $t= -3.653$ ,  $Sig=0.001$ ) between the experimental pre-test means (6.10  $\pm 3.84$ ) and post -test means (9.73  $\pm 3.85$ ). In addition, the results revealed a significant difference ( $t= -3.653$ ,  $Sig=0.001$ ) between the experimental pre-test means (6.10  $\pm 3.84$ ) and control groups pre-test means (6.23  $\pm 3.52$ ) regarding overall academic performance.

Regarding conflict management 'Pre -test mean scores of experimental and control groups, the results demonstrated that, there was a statistically significant difference between the two groups ( $t = -2.526$ ,  $Sig =$

0.014\*) Where, the control group had gotten the highest mean score (1.433  $\pm 0.93$ ). With respect to conflict management post-test means scores of experimental and control groups, the results demonstrated that, there was statistically significant difference between the two groups ( $t = 2.60$ ,  $Sig = 0.012^*$ ) where, the experimental group had gotten the highest mean score mean (2.06  $\pm 1.08$ ) .

With respect to Change management, Pre -test means of scores of experimental and control groups. The results demonstrated that, there was a highly statistically significant difference between the two groups ( $t = -2.694$ ,  $Sig = 0.009^{**}$ ) Where, the control group had gotten the highest mean score (1.50,  $\pm 1.16$ ). Concerning change management 'post-test means scores of experimental and control groups, the results demonstrated that, there was an insignificant difference between the two groups ( $t = 1.283$ ,  $Sig=0.205$ ).

Concerning team building' Pre -test means of scores of experimental and control groups. The results demonstrated that, there was a highly statistically significant difference between the two groups ( $t = -2.856$ ,  $Sig = 0.006^{**}$ ) Where, the experimental group had gotten the highest mean score (1.46,  $\pm 1.136$ ). As regards, team building 'post-test scores of experimental and control groups. The results demonstrated that, there was a statistically significant difference between the both groups ( $t = 2.180$ ,  $Sig = 0.033^*$ ) where, the experimental group had gotten the highest mean score mean (2.33  $\pm 1.21$ ).

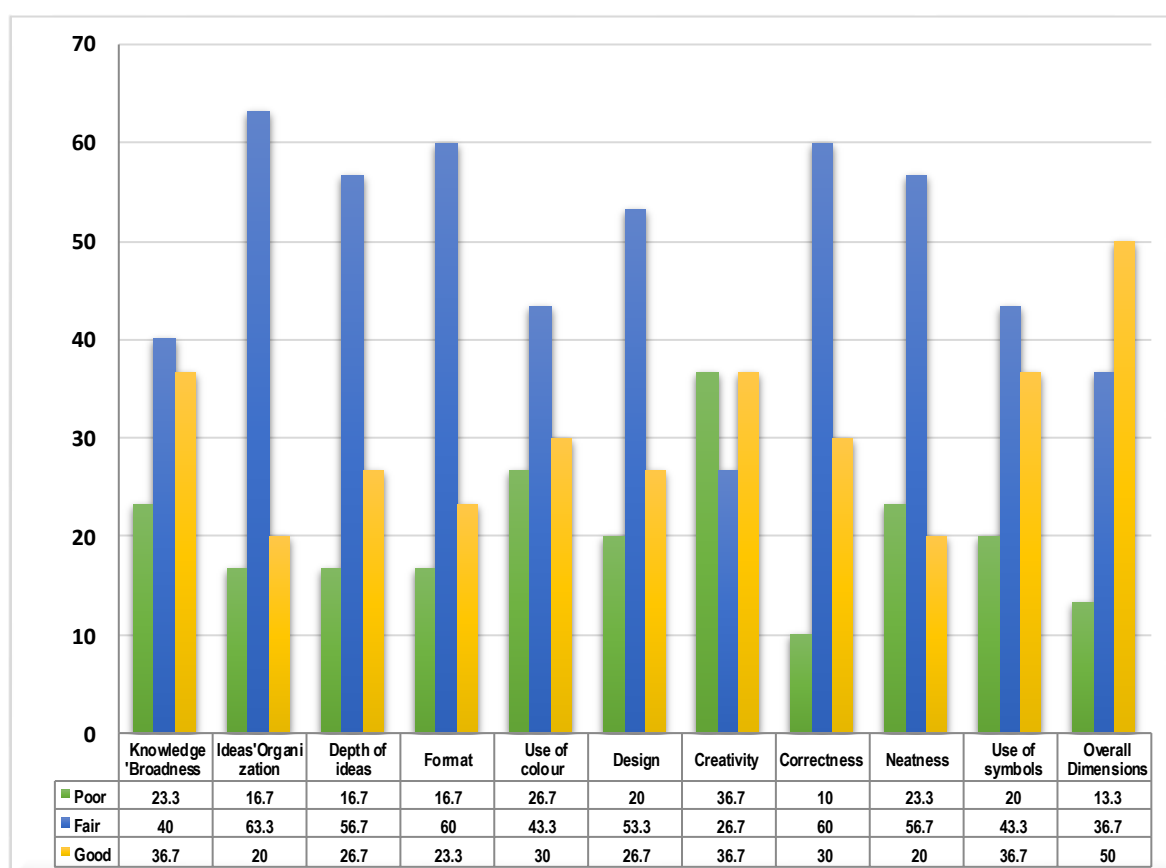
Lastly, with respect to, ethics in organization and leadership' pre -test scores of experimental and control groups. The results demonstrated that, there was a statistically significant difference between the both groups ( $t = -2.505$ ,  $Sig = 0.015^*$ ) Where, the control group had gotten the highest mean score (1.60  $\pm 1.162$ ).

**Table (1):** Experimental Nursing Students' Mean Knowledge Score Regarding Mind Mapping Before and Post Introductory Session (No.30)

Mind Mapping Sub-Measurements Test	Experimental Students' Knowledge					
	Pre- the Introductory Session		Post - the Introductory Session		t	Sig
	Mean	±SD	Mean	±SD		
Why students should revise (4 Questions)	0.76	±0.89	1.76	±1.006	4.06	0.000**
What are mind maps? (4 Questions)	0.90	±0.80	2.13	±2.16	2.93	0.005**
Key features of mind maps (5 Questions)	1.26	±1.17	2.23	±1.22	3.12	0.003**
Why use mind maps (4 Questions)	0.90	±0.99	2.06	±1.257	3.98	0.000**
How to create a mind map (3 Questions)	0.86	±0.81	1.23	±0.85	1.69	0.096
Overall Mind Mapping Dimensions (20 Questions)	4.70	±3.58	9.43	±3.45	5.21	0.0000**

(\*) Statistically Significant at  $p < 0.05$

**Figure (1).** Percentage Distribution Of Overall Mind Map Appraisal Levels As Constructed By The Experimental Group (120 Appraisal)



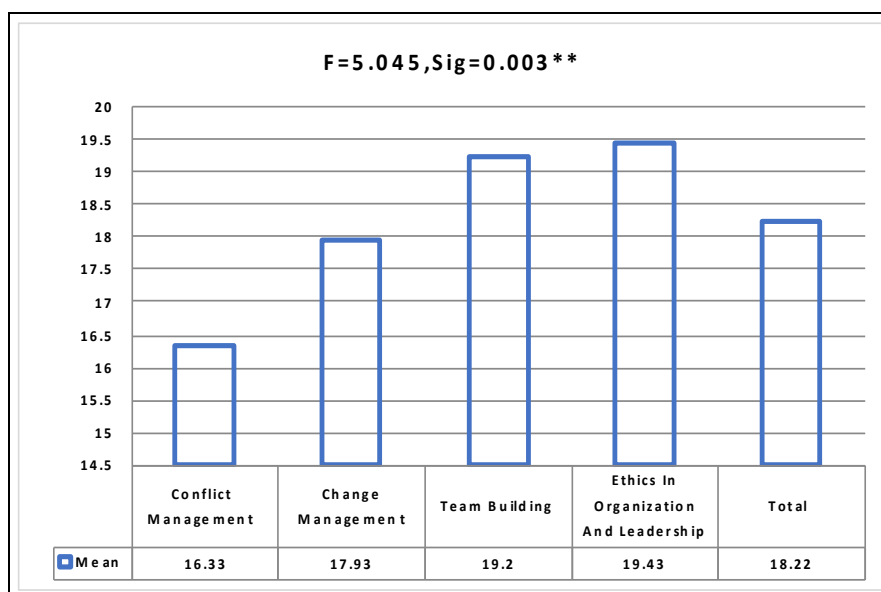


**Table (2):** Comparison among Experimental and Control Groups means scores In Relation To disposition towards Critical Thinking mean Scores of Undergraduate Nursing Students before and Post the Educational Intervention

Dimensions	Intervention	Nursing Students Disposition Toward Critical Thinking				Experimental VS Control Groups	
		Experimental Group (N=30)		Control Group (N=30)		t	Sig
		Mean	±S	Mean	±SD		
Self-Confidence	Pre-Intervention	11.20	±2.44	10.63	±2.78	0.838	0.405
	Post- Intervention	11.83	±2.22	11.53	±2.40	0.501	0.618
	t-Test for Equality of Pre & Post Means scores	t= -1.04 ,Sig =0.29		t= -1.340, Sig =0.185			
Intellectual Eagerness/ Curiosity	Pre-Intervention	14.56	±3.34	13.30	±3.07	1.526	0.133
	Post- Intervention	16.73	±6.58	14.66	±3.73	1.495	0.140
	t-Test for Equality of Pre & Post Means scores	t= -1.606 ,Sig =0.114		t= -1.547 ,Sig =0.127			
Intellectual Fairness	Pre-Intervention	10.76	±2.23	10.16	±2.27	1.029	0.308
	Post- Intervention	11.90	±2.92	11.40	±2.89	0.665	0.509
	t-Test for Equality Of Pre & Post Means scores	t= -1.684 ,Sig =0.098		t= -1.834 ,Sig =0.072			
Objectivity	Pre-Intervention	8.03	±2.59	9.00	±2.21	1.553	0.370
	Post- Intervention	9.30	±2.60	8.50	±2.77	1.152	0.254
	t-Test for Equality Of Pre & Post Means scores	t= -1.889 ,Sig =0.064		t=0.771 ,Sig =0.44			
Prudence	Pre-Intervention	10.46	±2.27	10.80	±2.48	0.543	0.589
	Post- Intervention	12.60	±1.99	10.93	±2.24	3.046	0.003**
	t-Test for Equality Of Pre & Post Means scores	t=-3.871 ,Sig=0.000**		t= 1.00 ,Sig =0.317			
Healthy Skepticism	Pre-Intervention	10.04	±2.82	9.23	±2.16	1.246	0.218
	Post- Intervention	10.53	±2.81	9.75	±2.79	1.078	0.286
	t-Test for Equality Of Pre & Post Means scores	t= -0.673 ,Sig =0.504		t= -.806 ,Sig =0.423			
Systematicity	Pre-Intervention	8.53	±1.85	8.10	±1.86	0.903	0.370
	Post- Intervention	9.16	±1.93	8.26	±1.81	1.152	0.068
	t-Test for Equality Of Pre & Post Means scores	t= -1.296, Sig=0.002*		t= -0.351 ,Sig =0.727			
Overall Dimensions	Pre-Intervention	74.41	±12.16	71.70	±8.61	0.996	0.323
	Post- Intervention	82.06	±9.87	75.05	±14.84	2.155	0.035*
	t-Test for Equality Of Pre & Post Means scores	t=2.678,Sig=0.01*		t= -1.070 ,Sig=0.289			

(\*) Statistically Significant At  $P < 0.05$

**Figure (2):** Comparison Among The Four Mind Maps As Constructed By The Experimental Group (No.30)



(\*) Statistically Significant At  $P < 0.05$

**Table (3):** Comparison among Experimental and Control Groups in Relation To nursing students' Academic Performance mean Scores before and Post the Educational Intervention

Dimensions	Intervention	Academic performance Pre-Post Test				Experimental VS Control Groups	
		Experimental Group (N=30)		Control Group (N=30)		t	Sig
		Mean	±S	Mean	±SD		
Conflict management	Pre-Intervention	1.366	±1.06	1.433	± 0.93	2.526	0.014*
	Post- Intervention	2.06	±1.08	1.36	± 0.99	2.605	0.012*
	t-Test for Equality Of Pre & Post Means scores	t=2.526,Sig=0.014*		t=.267,Sig=0.791			
Change management	Pre-Intervention	1.23	± 0.97	1.50	±1.16	2.694	0.009**
	Post- Intervention	2.06	±1.38	1.66	±0.99	1.283	0.205
	t-Test for Equality Of Pre & Post Means scores	t =2.694,Sig=0.009		t=0.595,Sig=0.554			
Team building	Pre-Intervention	1.46	±1.13	0.633	±0.66	2.856	0.006**
	Post- Intervention	2.33	±1.21	1.66	±1.154	2.180	0.033*
	t-Test for Equality Of Pre & Post Means scores	t= 2.856,Sig=0.006		t=0.223,Sig=0.824			
Ethics in organization and leadership	Pre-Intervention	0.73	±0.63	1.60	±1.16	2.505	0.015*
	Post- Intervention	1.16	± 0.69	1.00	±0.64	0.961	0.341
	t-Test for Equality Of Pre & Post Means scores	t=2.505,Sig=0.015*		t=2.164,Sig=0.035*			
Overall Questions	Pre-Intervention	6.100	±3.84	6.23	±3.52	3.653	0.001**
	Post- Intervention	9.73	±3.85	7.0333	±2.97	3.034	0.004**
	t-Test for Equality Of Pre & Post Means scores	t= 3.653,Sig=0.001		t= 0.950,Sig=0.346			

(\*) *Statistically Significant At P<0.05*

## II. Discussion

Twenty first century, the era of information age requires individuals who does not memorize the necessary information, but rather to mentally choose, organize and use the information as they need (Kirmizi, Saygi, & Yurdakal, 2015). Considering the fact that, nursing education in Nigeria keeps on struggle with the quickly changing health care system sophisticated technologies and society's orientation to health. Thus, the fundamental target of innovative educational systems ought to enhance critical thinking skills through the utilization of Mind mapping which is the powerful graphic technique that allow for greater creativity when recording ideas and information with visual representations (Khandaghi & Pakmehr, 2011; Kim, et, al, 2013). Thus, the study sought to examine if the educational intervention made a statistically significant difference in nursing student disposition towards critical thinking and academic performance through the utilization of mind-mapping.

As respects, the first hypothesis (HI) which proposed that there will be a significant difference between the experimental group' pre-and post 'knowledge test scores about Mind Mapping. The hypothesis was proved by the conclusive finding which showed that there was a highly significant difference between experimental nursing students' overall knowledge mean score was found regarding mind mapping before and post introductory session. This finding is in concurrence with Long & Carlson (2011) who reported that prior to conducting the study, in order to guarantee that the students were utilizing the thinking maps in the right way, all of the students were told on the steps of mind mapping construction to give students complete ownership of their map and permitted them to practice this new skill. Likewise, this finding is in agreement with Vijayakumari, & Kavithamole, (2014) who reported that prior to conducting the study, keeping in mind the end goal to acquaint the experimental group about mind mapping, an introductory lesson was given to them.

All students also were educated the right configuration for utilizing thinking maps, explaining each map and its intended purpose using the direct instruction method. Additionally, from the researcher perspective, that to ensure the proposed educational intervention practicality, an introduction to the program ought to be done keeping in mind the ultimate objective, to ensure the congruity of the students until the end of the program. In light of the fact that through this presentation the student will decide if they will proceed or drawback and is this program will profit them or not. Additionally, to do marketing for the intervention later on. So, the success of attracting the participants to continue in the program relies on how proficient the researcher in introducing attractive and not alienating presentation about the educational intervention.

The mind map is a graphical procedure to enhance creative thinking and learning, fulfillment, utilizes colors, images, codes, and dimensions to increase and upgrade key thoughts. This method expands the

perception of the visualization of relationships and links between concepts, which aids in information acquisition, data retention, and overall comprehension (**Spencer, Anderson & Ellis, 2013**).

It is evident from the dearth of literature on mind mapping that, utilizing mind maps as a dynamic learning methodology is an imaginative strategy to encourage student active learning. Students can illustrate a vision, display their relevant learning and innovativeness, and make associations about a central theme during this activity. As well as, mind mapping can be utilized for note taking, finishing homework assignments, preparing for exams, analyzing, and reflecting about nursing practice. Mind maps can be executed in nursing curricula as an alternative learning experience (**Rosciano, 2015**).

The construction of mind maps takes after particular rules. The map has a natural appearance, like a tree with a trunk. The map is start with an image at the center of the page representing the core idea. Branches are drawn, beginning at the top right of the page and following a clockwise direction. The branches contain keywords that are subheadings of the main topic. Each branch line should contain only one keyword. The utilization of images labeled to the branches is energized. The utilization of color, particularly to grouping and encoding is additionally suggested (**Santiago, 2011**).

With respect to the distribution of the overall mind map appraisal levels as constructed by the experimental group, the results revealed that, half of the studied group had gotten good performance category, followed by over one third of the experimental group had gotten fair performance category and the rest had gotten poor performance category. In the same line, **Wickramasinghe et al. (2007)**, found that the mean score of subjects in their mind map group was (31.3%). Also, the results of the present study, support of the results of those of **Long, & Carlson, (2011)** who reported that students were evaluated regarding their ability to complete thinking maps on their own. Observations were coded as either positive or negative. And on the final thinking maps assessment, all of the focal students performed well in regard to conveying correct information.

As indicated in the literature that it is widely accepted that education is more than just teaching and learning knowledge, but it involves learner's critical thinking skills, which is fundamental to daily life. Thus, the ability to critically think has been included as a learning outcome in curriculum and accreditation standards (**Giddens,et, el,2008; Vanicheva, Kah, &Ponidelko,2015**).

With respect to the second hypothesis (H2) which postulate that the difference between pre-and post-disposition towards critical thinking scores will be higher in the experimental group' as compared to those in the control group. The hypothesis was proved by the study results where the definitive finding demonstrated that the experimental and control groups differed significantly in the post intervention regarding overall dimensions of disposition towards critical thinking mean scores where, the experimental group had gotten the highest mean score. Likewise, the results revealed a significant difference between the pre- and post- intervention means scores of the experimental group total dimensions of disposition towards critical thinking. In contradicting to this finding, **D'Antoni et al. (2010)** were investigating if a relationship exists between mind mapping and critical thinking, they found no significant differences in either critical thinking or content knowledge scores on the pre- and post-quizzes between the two types of note taking groups. Meanwhile, On Mind mapping application, **Thangarajathi (2008)**, in a study found that mind mapping method is effective and it develops creativity among students.

Recently, **Gojkov, Stojanovi □, & Raji □ (2015)** conducted a research to examine the relation between the level of development of students' critical thinking and their ability to apply it. The findings showed despite the fact that the students, estimated their levels of critical thinking rather high, this was not shown in the situations obliging them to apply it. Hence, lack of critical thinking highlights the requirement for critical thinking, teaching, as one of the most significant teaching aim. Also, if students are offered control over their map developments, the maps positively affect student achievement because they "embody metacognitive models with certain structures" (**Abi-El-Mona & Adb-El-Khalick, 2008**).

To examine whether, mind mapping strategy contributes to nursing students' academic performance. The third hypothesis (H3) hypothesized that the difference between Pre-and Post-academic performance scores will be higher in the experimental group' as compared to the control group. The hypothesis was proved by the study results where the definitive finding demonstrated that, there was a highly statistically significant difference between experimental and control groups in relation to overall posttest academic performance mean scores. Where, the educational intervention was effective in the experimental group, when compared with control groups. Along with this result, **Buzan & Buzan (2003)** reported that use of a mind mapping technique improved students 'achievement. Also, in the same line, **Batdi, (2015)** reported that based on the findings of the meta-

analysis studies, it was found that mind mapping techniques were generally effective in terms of students' academic achievements, retention and attitude.

Besides, the finding of the research is in accordance with Liu, **Zhao, Zhao, Yuwei & Bo (2014)** who reported that mind mapping more useful to enhance to students 'academic achievement rather than affective achievement. This might be because of; mind map is a sort of visualized tool and it helps a lot in terms of information retention which is helpful to learning. In addition, the findings of the research are in accordance with the literature of **Nesbit & Adesope, (2006)** who indicating that mind maps help students learn information by forcing them to organize it and add images and color to it. These maps have been shown to lower extrinsic cognitive load because students are creating a two-dimensional space to tie in ideas and concepts that relate together).

### **III. Conclusion**

Based on the research findings and discussion, it can be generally depicted that the mind map as learning strategy which used for the studying, result in a significant improvement in the self-reported critical thinking disposition among the participants in the experimental group as compared to those in the control group. Likewise, this study affirmed that the mind mapping strategy improved the experimental group ' academic performance, because it provided them with a strategy to organize their thoughts.

### **IV. Recommendations**

Mind mapping research is in its infancy in nursing management and leadership field. Thus, there are many areas in need of investigation and these include

- Curriculum developers and textbook authors of nursing management and leadership may incorporate mind mapping techniques in their contents to encourage nursing students to utilize this strategy that enhances critical thinking.
- Academic staff training programs should include paper and digital mind mapping as a teaching strategy.
- The learning environment plays a major role in academic performance. Therefore, the academic management and staff should do their best to create a supportive learning environment that encourages active learning, and critical thinking skills.
- Future research can additionally explore the long -term impact that mind mapping may have on critical thinking skills, and whether this is influenced by the nursing student background and learning styles.
- Although the present study suggests that the strategy of mind mapping is beneficial to nursing students, there are areas that need to be studied further. One area for doing more research is to conduct such studies , on the other innovative learning strategies and make a comparison among these strategies in relation to nursing students' outcomes.
- Furthermore, students need to be given opportunities for consistent, repeated practice of these skills over an extended period of time. As well, support from the administrative staff along with the implementation of teacher training in critical thinking instructional strategies.

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