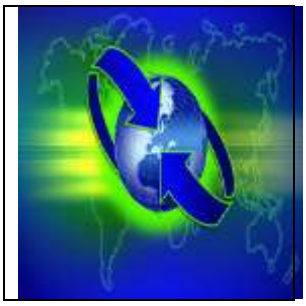

Concept Mapping Strategy and Students' Wound Care Competencies in College of Nursing Sciences in Cross River State, Nigeria

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Abstract

The aim of this study is to determine the effects of concept mapping strategy on students' wound care competencies in Colleges of Nursing Sciences in Cross River State, Nigeria. A quasi-experimental research design was adopted for the study. The population of the study comprised of all the year 1, 2 and 3 student nurses (Nursing department) in Colleges of Nursing Sciences in the study area. All the 215-year 2 nursing students were selected for the study through census. Lesson Plans on Wound Care for Student Nurses (LPWCSN), a 30 item Wound Care Achievement Test (WCAT) developed by the researchers were used as instruments for data collection. The data collection instruments were scrutinized and validated by two experts in department of nursing Science, University of Calabar. The reliability of the instrument was established using Kuder-Richardson 21 (KR-21) formula which yielded a reliability coefficient of .68. using SPSS 25 and Means and Standard Deviation were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to analyze the collected and prepared data for all the hypotheses. The results of the study revealed that concept mapping strategy had significant effects on students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation). It was recommended, among others, that nursing education programs should formally incorporate concept mapping strategies into the curriculum, particularly in clinical skill courses such as wound care, to enhance students' critical thinking and procedural competence (Word count: 252).

Keywords: Concept Mapping Strategy, Students' Wound Care Competencies, College of Nursing Sciences

Introduction

The acquisition of wound care competencies is a critical aspect of nursing education, as it directly impacts the quality of patient care and clinical outcomes. In colleges of nursing sciences, the use of effective teaching strategies is essential to bridge the gap between theoretical knowledge and practical application. Traditional lecture methods alone are often insufficient to equip nursing students with the hands-on skills, critical thinking, and clinical judgment required

for effective wound management. Therefore, there is a growing need to adopt innovative, student-centered teaching strategies. Concept mapping is one of the teaching strategies that actively engage students and foster deeper learning. Implementing this strategy not only enhances clinical competence but also boosts students' confidence and readiness for real-world healthcare settings.

Wound care is an essential component of clinical nursing practice, particularly in fields such as medical-surgical nursing, community health, and emergency care. Developing students' wound care competencies has proven crucial in enhancing their overall nursing performance. Competency in wound assessment, dressing techniques, infection control, and wound healing processes not only ensures patient safety but also strengthens clinical decision-making, confidence, and professional identity among student nurses. Wound care requires the integration of theoretical knowledge and clinical judgment. Students who are well-trained in wound care are more capable of assessing wound types accurately, identifying signs of infection, and choosing appropriate interventions. This skill set cultivates clinical reasoning, which is vital in making timely and effective decisions in real-world scenarios (Al-Ghareeb et al., 2022). Moreover, having hands-on experience and competency in wound care fosters a sense of confidence and readiness to face complex clinical challenges, ultimately translating to improved overall nursing practice.

Wound management is closely linked to infection prevention, which is a fundamental element of patient safety. Nursing students with adequate wound care skills are better equipped to apply standard precautions, utilize sterile techniques, and recognize early signs of complications such as sepsis. This competency reduces the risk of hospital-acquired infections and promotes better patient outcomes, which contributes to the reputation and effectiveness of nursing education institutions (Mbombo & Bimerew, 2021). Effective wound care involves communication with patients about wound management, pain control, hygiene, and prevention of recurrence. Students

who are trained in wound care demonstrate stronger therapeutic communication and interpersonal skills, which are key components of holistic nursing care.

According to Oyetunde and Oladepo (2023), students who actively engage in wound care procedures develop better empathy and rapport with patients, enhancing patient satisfaction and trust. Mgbekem (2018) underscores the importance of active listening in enhancing students' understanding and application of nursing concepts. This highlights a foundational aspect of effective teaching strategies, where listening skills contribute significantly to promoting critical thinking and deeper comprehension among nursing students. Active listening, when embedded within interactive strategies like concept mapping and simulation-based learning, enhances students' ability to process information, ask relevant questions, and apply concepts effectively in clinical contexts.

Competency in wound care is a critical component of competency-based nursing education, which emphasizes clinical proficiency and practical readiness. In line with this goal, Colleges of Nursing Sciences, particularly in Cross River State, Nigeria, are increasingly recognizing the need to strengthen wound care education. Osuchukwu et al. (2021) emphasized the importance of supportive-educative nursing interventions in enhancing mothers' knowledge of umbilical cord care, indicating a broader need for educational innovations in nursing practice. Structured wound care training - delivered through simulation labs, clinical placements, and supervised practice—significantly enhances skill acquisition and aligns with intended curriculum outcomes (Chikere & Iwuagwu, 2023). This ensures that students graduate not only with theoretical knowledge but also with practical expertise essential for quality patient care.

The acquisition of wound care competencies also bridges the gap between classroom learning and clinical application. Many nursing students struggle to transfer theoretical knowledge to real-life scenarios. However, when engaged in structured wound care training, including virtual simulations and scenario-based assessments, students demonstrate improved application of pathophysiological knowledge, pharmacology, and nursing procedures (Ahmed et al., 2022).

Ultimately, this integration of theory and practice not only enhances students' competence in wound care but also improves their overall performance across multiple nursing domains.

Hence, the development of wound care competencies in nursing students plays a significant role in improving their overall performance in nursing practice. It enhances clinical reasoning, promotes patient safety, strengthens communication, and ensures that students are prepared for the complex realities of healthcare delivery. Colleges of Nursing Sciences must therefore prioritize wound care training in their curricula to prepare competent, confident, and patient-centered future nurses.

In the contemporary teaching of nursing sciences, the demand for critical thinking, clinical reasoning, and competence-based education has amplified the significance of active learning strategies. Among these, concept mapping has emerged as a particularly effective teaching tool, especially in enhancing nursing students' wound care competencies. Concept mapping, a graphical tool used for organizing and representing knowledge, enables students to interrelate concepts and build a deeper understanding of wound care, which is essential in modern nursing education (Kaddoura et al., 2022). Wound care requires not only technical skills but also sound clinical judgment and decision-making. Concept mapping supports the development of clinical reasoning skills by encouraging students to analyze and synthesize information related to wound assessment, dressing selection, infection control, and patient-centered interventions (Chen & Chang, 2023). By visually linking symptoms, underlying conditions, and treatment strategies, nursing students can better understand the complex relationships involved in wound management.

Implementation of concept mapping strategy in the experimental group

In this study, the concept mapping strategy was introduced to the experimental group as an alternative approach to traditional teaching, particularly for the delivery of wound care content. The aim was to make learning more interactive, student-centered, and meaningful—especially within our Nigerian nursing education context, where students often rely heavily on rote

memorization. The intervention was carried out in four major phases, carefully planned to enhance students' understanding, retention, and clinical application of knowledge.

Phase one: Orientation and training

Before the actual teaching began, students in the experimental group were taken through a one-hour orientation session. This session was designed to familiarize them with what concept mapping is all about—how it works, why it's useful, and how it can improve their understanding of nursing topics. They were shown how to structure a concept map using linking phrases, hierarchies, and cross-connections. To make it relatable, we used familiar topics from general nursing. Depending on the resources available, some students used digital tools like CmapTools, while others simply used pen and paper to draw their maps. The key here was ensuring that everyone could participate meaningfully, regardless of the technology available.

Phase two: Teaching wound care with concept maps

For a period of about two to four weeks, we delivered wound care lessons using concept mapping during classroom lectures and clinical demonstrations. Each major topic—such as types of wounds, wound assessment, infection control, dressing techniques, and documentation—was broken down into smaller, manageable concepts.

Each class typically followed a stepwise approach:

i. Identifying the central idea: Every session started by placing a central concept (for example, "wound healing process") at the center or top of the map.

ii. Small group brainstorming: Students were divided into small groups (three to five members) to brainstorm sub-concepts like stages of healing, factors that influence healing, signs of infection, and types of dressings.

iii. Building the map: With the concepts gathered, students arranged them in a logical flow and connected them using linking phrases such as "leads to," "is affected by," or "helps prevent."

iv. Incorporating clinical guidelines: Real-life clinical standards and nursing protocols were embedded into the maps. For instance, aseptic technique was linked directly to infection prevention, making it clear how theory ties into practice.

v. Instructor Review: Each group's map was reviewed by the instructor, who provided corrections and guidance where needed. This feedback helped clarify any misunderstandings and strengthened the students' clinical reasoning.

Phase three: Clinical practice using concept maps

Beyond the classroom, students were encouraged to use concept maps during clinical sessions. Whether during lab practice or on ward rounds, they created quick maps tailored to individual patient cases. These mini-maps helped them plan care, justify their decisions, and reflect on what they had done. It also opened up room for peer learning, as students compared maps and discussed different ways to approach wound care scenarios. This phase really brought the maps to life, as students could see how what they had learned applied directly to real patients.

Phase four: Reflection and assessment

At the end of each topic or module, students were asked to revise and reflect on their maps. This was a personal moment for them to look back on what they had learned and identify areas they needed to strengthen. In some cases, these revised maps were used as part of continuous assessment, where students were scored based on how accurate, clear, and applicable their maps were. This encouraged them to put in genuine effort and take ownership of their learning.

Expected outcomes of the intervention

The introduction of concept mapping was not just about trying something new—it was about addressing real learning challenges that nursing students in Nigeria face. Our goals were:

a) To help students better connect theory with real-world clinical practice.

b) To promote deeper thinking and sound decision-making in patient care.

c) To foster teamwork, peer interaction, and active learning.

d) To improve the retention and practical application of wound care protocols.

The concept mapping strategy gave nursing students a new way to learn—one that was engaging, reflective, and more aligned with the demands of clinical practice. It helped students move beyond surface learning, allowing them to visualize the bigger picture and apply their knowledge more confidently. Compared to the conventional method, this approach proved more effective in preparing students for the realities of nursing care.

Modern nursing education is shifting from rote memorization to competency-based learning**,** and concept mapping supports this transformation. Research has shown that concept maps help nursing students retain theoretical knowledge and apply it in clinical settings more effectively than traditional lecture-based methods (Park & Kim, 2022). When applied to wound care education, this strategy allows learners to integrate anatomy, pathophysiology, pharmacology, and procedural knowledge into a coherent framework. Concept mapping also fosters active learning and student engagement**,** which are core principles in modern educational theory. Through collaborative map construction, nursing students engage in peer discussions, share perspectives, and critically evaluate wound care processes. This not only builds communication and teamwork skills but also leads to a more comprehensive understanding of wound healing dynamics (Ahn & Kang, 2023).

Concept mapping is one of the teaching strategies that actively engage students and foster deeper learning (Kaddoura et al., 2022). It is a graphical tool used to organize and represent knowledge, allowing students to visually connect ideas, identify relationships, and build a more meaningful understanding of clinical concepts. In wound care, concept mapping helps students link a patient's condition with relevant assessments, nursing interventions, expected outcomes, and follow-up care—making it an essential tool in modern nursing education. Incorporating concept mapping into simulation-based learning can significantly improve how nursing students understand and apply their knowledge. When used before and after wound care simulations, concept maps enable students to reflect on their current understanding, uncover knowledge gaps, and reinforce critical thinking. This reflective practice transforms learning from passive

memorization to an active, hands-on process, effectively bridging the gap between classroom theory and real-world clinical skills (Tiwari et al., 2023).

With the rise of digital and hybrid learning models, concept mapping also supports self-directed learning. Through the use of digital tools and applications, students can create, edit, and revisit their maps anytime, allowing for personalized learning pathways and continuous improvement. This autonomy not only builds confidence but also strengthens competence in wound care practice, encouraging habits that support lifelong learning (Abdullah et al., 2022). So, concept mapping does more than help students grasp content—it promotes deep understanding, enhances clinical judgment, and prepares them to navigate the complexities of today's healthcare environment. As nursing education embraces more student-centered and innovative approaches, concept mapping stands out as a valuable strategy for developing reflective, skilled, and confident wound care professionals.

Previous researches have been carried out by different scholars in different dimensions, for instance, Saradindu and Ramakanta (2016), investigated the effectiveness of concept mapping strategy on cognitive processes in science at secondary school level. For this study, a pre-test post-test experimental and control group design was used, with 100 samples, grouped as experimental group (50) and control group (50) on the basis of matching by intelligence test. The investigators conducted this experiment over twelve weeks by using both traditional and concept mapping strategy. The self-developed achievement test covering class IX text book of West Bengal Board of Secondary Education, India was used as tool.

The study found that the students exposed to the concept mapping strategy significantly achieved better than those exposed to the traditional teaching method at their applying, analyzing, evaluating and creating level of cognitive processes. In addition, the students exposed to the concept mapping strategy significantly higher gain scores than those exposed to the traditional teaching method in respect to their gain scores at every level of cognitive processes. The concept mapping strategy is capable of improving student's mastery of content at the higher order levels

of cognition. It is therefore recommended that concept mapping should be used in science teaching for the development of student's higher order thinking level.

Similarly, Sor, Jamabo and Igwe (2018), investigated the effects of cooperative and concept mapping instructional strategies on student's achievement in chemistry. It adopted an experimental design. Through random sampling, sample sizes of 280 SS2 chemistry students were selected from six secondary schools in six Local Government Areas of Rivers State. The students were placed into two experimental groups and a control group. Experimental group I was taught with cooperative teaching method, experimental group 2 was admonished with concept mapping technique and the control group was treated with lecture method. The research instrument was a teacher made Hydrocarbon Chemistry Achievement Test (HCCAT). The instrument was pilot tested and analyzed using Pearson Product Moment Correlation with a reliability coefficient of 0.85 .

Two research questions and two hypotheses guided the study. Mean, percentage and standard deviation were used in analyzing the research questions, while analysis of variance (ANOVA) was used to test the hypotheses at 0.05 level of significance. Results obtained show that there is a significant difference in academic achievement of students taught with cooperative and concept mapping strategies in respect to gender, location and retention. The male students had better performance in their respective categories. Based on this results, it was concluded that Concept Mapping Instructional Strategy (CMIS) is an effective instructional method for teaching. Hence, the study recommended the use of both strategies in teaching chemistry in secondary schools.

Awodun (2017) carried out an investigation on the effects of concept mapping teaching strategy on students' academic performance and retention in senior secondary school Physics in Ekiti state, Nigeria. The design for this study was Pretest-Posttest Quasi-Experimental. The population for the study was all the senior secondary class two (SS2) Physics students in Ikere Local Government Area of Ekiti State, Nigeria. The sample comprised thirty-five (35) students from each of the two public secondary schools randomly selected in Ikere Local Government Area to

make a total of seventy (70) SS2 students. One of the schools was selected for the experimental group while the other assigned for the control group. The experimental group was taught using Concept-mapping teaching strategy while the control group was taught using conventional method. Three null hypotheses were formulated and tested at 0.05 level of significance to guide the study.

The instrument for data collection was thirty (30) item standardized objective questions tagged: Physics Achievement Test (PAT). The data collected were analysed using t-test statistical analysis. The findings showed that: in the pre-test, the obtained mean scores are not significantly different from another which showed that the two groups selected are homogeneous. The obtained post-test mean scores of experimental group was significantly higher than the post-test mean score of the control group. Also, the obtained retentive-test mean score of experimental group was significantly higher than the retentive-test mean scores of the control group. The findings revealed that, students in concept mapping teaching strategy group performed significantly better than their counterpart of conventional method.

Achor, Imoko, and Uloko (2021) conducted a quasi-experimental study among Senior Secondary School students in Benue State, Nigeria. The study compared the achievement of students taught chemistry using concept mapping with those taught using traditional lecture methods. The results revealed that the concept mapping group significantly outperformed their counterparts ($p < 0.05$), attributing the improvement to the ability of concept mapping to enhance visualization and retention of abstract concepts. Ibrahim and Mohammed (2022) examined the effect of concept mapping on students' performance in biology in Kano State. Using a sample of 120 SS2 students, the study employed a pre-test and post-test control group design. Findings indicated a statistically significant difference in the mean achievement scores of students exposed to concept mapping ($M = 78.4$) versus those taught conventionally ($M = 61.2$), with a p-value less than 0.05. The authors concluded that concept mapping fosters meaningful learning and promotes better comprehension. Mohammed and Musa (2024) implemented an experimental study in Kwara

State focusing on physics students. The findings revealed that students taught with concept mapping scored significantly higher in post-tests compared to those taught with the conventional lecture method. The researchers emphasized that the visual structure of concept maps aids in understanding hierarchical relationships between concepts.

Despite the importance of nursing students' knowledge in wound care in improving the overall performance in nursing sciences, it has been observed that a remarkable percentage of nursing students do not still measure up to the expected level of knowledge and pass in wound care competencies in Semesters examinations. Students' performance keeps dwindling especially in Foundation of Nursing courses for the past many years. Precisely, in the results of the Class October, 2019 Set of 10th November, 2021, it has been observed that all the second year nursing students failed (100% failure) in GNS: 211: Foundation of Nursing III from the College of Nursing Sciences, Calabar. The results of Class October, 2020 Set of 2nd November, 2022 revealed that only 44.55% of the second year nursing students scored between 50 to 100 (Passed) in GNS: 211: Foundation of Nursing III from the College of Nursing Sciences, Calabar, while the remaining 55.45% of students scored between 0 to 49 (Failed).

Also, the results of Class October, 2021 Set of 28th November, 2023 revealed that only 68.70% of the second year nursing students scored between 50 to 100 (Passed) in GNS: 211: Foundation of Nursing III from the College of Nursing Sciences, Calabar, while the remaining 31.30% of students scored between 0 to 49 (Failed). This discouraging performance has left parents, students and the general public to keep asking questions as to the rationale behind the inconsistency, even as nursing sciences is recognized as a profession that is playing an integral role in the healthcare industry in Nigeria. Even though, there seems to be some slight improvements in students' performance, performance pass is yet to reach 50% and above average. Therefore, there are rooms for improvement.

The researcher also observed that nursing students demonstrated inadequate proficiency in wound care. This included inaccurate assessment of the type, size, and depth of wounds. Many

students showed insufficient understanding of wound healing principles, infection control measures, and appropriate wound care interventions. Additionally, documentation was often incomplete or inconsistent, especially regarding wound characteristics, treatment plans, and patient responses. There were also errors in dressing techniques, such as inadequate coverage, improper alignment, or failure to secure the dressing properly, among other issues. In the same vein, since nursing instructors are at the helm of imparting the required skills and relevant knowledge to nursing students, the blame is usually apportioned to them. This poor performance of students seems to have contributed to the withdrawal of many students from nursing programme. Thus, it is imperative to broaden the teaching/learning of nursing to include student-centered approaches - concept mapping strategy, especially in this modern era.

Cross River State Government is said to have made tremendous efforts to improve students' performance in colleges of nursing sciences in the state by providing infrastructure, organising seminars, workshops and in-service training for nursing instructors. Yet the outcomes of students in nursing have been declining. This study aimed to address several gaps in the existing literature on the effectiveness of concept mapping strategy on nursing students' wound care competencies in colleges of nursing sciences in Cross River State, Nigeria. Despite the extensive research conducted by previous authors and scholars there are still significant areas that remain underexplored or insufficiently understood. Some of the potential gaps this study filled include lack of context-specific research in Cross River State**,** limited focus on wound care competencies**,** comparative studies between concept mapping and conventional strategies are inadequate**,** neglect of student-centered outcomes in previous research**,** inadequate use of robust experimental designs**,** limited longitudinal data on competency retention**,** scarce evidence on students in Nigerian nursing colleges using concept mapping, among others**.**

Thus, the study makes several important contributions to the field of nursing education, particularly in the Nigerian and broader African context including innovative pedagogical approach in nursing education, empirical evidence from a local context, competency-based

nursing training, curriculum development implications, framework for future research, professional practice enhancement, among others. These contributions collectively underscore the transformative potential of effective teaching strategies in enhancing educational outcomes, particularly in under-resourced contexts like Nigeria. This study is a call to nursing instructors to help students to avail the opportunity of better learning of nursing through students centered approach - Concept mapping strategy. It is against this backdrop that the researchers deemed it fit to determine the effectiveness of concept mapping strategy and the conventional strategy on students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation) in colleges of nursing sciences in Cross River State, Nigeria.

Purpose of the study

The purpose of this study was to determine the effects of concept mapping strategy and conventional strategy on students' wound care competencies in colleges of nursing sciences in Cross River State, Nigeria.

Research question

What is the significant difference in the mean scores of students taught using the concept mapping strategy compared to those taught using the conventional strategy in Colleges of Nursing Sciences in Cross River State, Nigeria?

Research hypothesis

There is no significant difference on the mean score of students taught using concept mapping strategy and those taught using conventional strategy in colleges of nursing sciences in Cross River State, Nigeria.

Research design and methods

The study adopted a quasi-experimental research design. The population of the study comprised of all the year 1, 2 and 3 student nurses (Nursing department) for 2024/2025 in Colleges of Nursing Sciences in Cross River State. A total of 215 year 2 nursing students were selected for

the study through census for the two groups; one arm for each school. One group was used for the experimental and the other for the control group. The teaching covered six (6) weeks concurrently with the concept mapping strategy on wound care competence in one intact class as the experimental group (n = 115), while one intact class for the control group participated in a conventional method (n = 100). Lesson Plans on Wound Care for Student Nurses (LPWCSN), a 30 item Wound Care Achievement Test (WCAT) developed by the researchers were used as instruments for data collection. WCAT was designed to find out students' skills in wound care. The test was made up of 34 questions – objective test and essay question. The respondents were required to choose the right answer to each question by ticking the appropriate options lettered A-E.

Areas tested were introduction/definition of wound, stages of wound healing, types of wounds, types of dressings, dressing materials, method / procedure for wound dressing and prevention of wound infection. The two (2) instruments were subjected to face and content validity by two experts in two experts in department of nursing Science, University of Calabar. The content validity was determined using tables of specification which guided the development of the items for the achievement test. The reliability of the instrument was established using Kuder-Richardson 21 (KR-21) formula which yielded a reliability coefficient of .68, sing SPSS 25. Consequently, the instrument was found to be adequately reliable for use in the study. Mean and Standard Deviation were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to analyze the collected and prepared data for all the hypotheses.

Results and discussion

Mean and Standard Deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to analyze collected data for the hypothesis at 0.05 level of significance.

Research question

What effects do concept mapping strategy and conventional strategy have on students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation)? To answer this research question, descriptive statistics was employed, and the result presented on Table 1.

Table 1: Mean of pre-test and post-test scores of the difference between the concept mapping strategy and conventional strategy (N=215)

Teaching method	N	Pre-test mean score(X)	Post- test mean score(X)	Mean gain score(X)
Concept mapping	115	12.3130	18.1652	5.8522
Control group	100	10.5100	12.5000	1.9900

The results presented on Table 1 reveals that the mean gain score of students' who were taught nursing students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation) using concept mapping strategy (5.8522) was higher than those in the control group with mean gain score (1.9900) which means that teaching nursing students' wound care competencies using concept mapping has greater effect on students' wound care competencies compare to the control group.

Research hypothesis

There is no significant effect of concept mapping strategy and conventional strategy on students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation). To test this research hypothesis, Analysis of Covariance (ANCOVA) was used to analyze the collected data for the hypothesis at 0.05 level of significance.

Table 2: One-way Analysis of Covariance (ANCOVA) of the significant difference on the mean score of students taught using concept mapping strategy and those taught using conventional strategy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1254.547[a]	2	627.274	290.070	.000	.732
Intercept	906.317	1	906.317	419.108	.000	.664
PRE-TEST	90.413	1	90.413	41.809	.000	.165
CONCEPT MAPPING	733.648	1	733.648	339.260	.000	.615
Error	458.448	212	2.162			
Total	56721.000	215				
Corrected Total	1712.995	214				

a. R Squared = .732 (Adjusted R Squared = .730)

The results presented on Table 2 shows that there is a significant effect of concept mapping strategy on nursing students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation) compare to the traditional method (F=339.260: p=.000). Therefore, the null hypothesis was rejected at .05 level of significance. The result also shows the partial Eta squared estimate which is a measure of effect size as .615. This implies that treatment (concept mapping) accounted for 61.5 percent of variance observed in the post-test scores of nursing students' wound care competencies. Also, the adjusted R squared value is .730. This suggests that about 73.0 percent of the variation in the dependent variable (nursing students' wound care competencies) can be accounted for or by difference treatment and pre-test.

Discussion of findings

The result revealed that there is a significant effect of concept mapping strategy on nursing students' wound care competencies (wound assessment, cleansing, dressing selection, and documentation) compare to the traditional method. The improvement of students' wound care competencies when concept mapping strategy was used to teach may be attributed to several key

factors inherent in the nature of concept mapping and its effectiveness as a pedagogical tool. Concept mapping is a visual tool that helps in organizing and structuring knowledge, making complex topics easier to understand and remember. When applied to the teaching of wound care competencies, concept mapping can significantly enhance learning outcomes for several reasons which include enhancing understanding, improved retention, critical thinking and problem-solving skills, active learning, personalized learning, encouragement of collaborative learning, integration of theoretical and practical knowledge.

Another possible reason could be that the use of concept mapping strategy in teaching wound care to nursing students offers a multifaceted approach to learning that addresses various aspects of cognitive and skill development. Through enhanced understanding, improved retention, development of critical thinking, active engagement, personalized learning, collaborative learning, and the integration of theory with practice, concept mapping significantly contributes to the improvement of wound care competencies among nursing students.

This finding corroborates the findings of Saradindu and Ramakanta (2016) who found students that exposed to concept mapping strategy significantly achieved better than those exposed to the traditional teaching method at their applying, analyzing, evaluating and creating level of cognitive processes. In addition, the students exposed to the concept mapping strategy significantly higher than those exposed to the traditional teaching method in respect to their gained scores at every level of cognitive processes. The concept mapping strategy is capable of improving student's mastery of content at the higher order levels of cognition. The result also strongly supports the findings of Sor, Jamabo and Igwe (2018) who found that Concept Mapping Instructional Strategy (CMIS) is effective instructional methods for teaching. This result agreed with Awodun (2017) finding that students in concept mapping teaching strategy group performed significantly better than their counterpart of conventional method.

This result agreed with Achor, Imoko, and Uloko (2021) who found that the concept mapping group significantly outperformed their counterparts ($p < 0.05$), attributing the improvement to the

ability of concept mapping to enhance visualization and retention of abstract concepts. This result also agreed with Ibrahim and Mohammed (2022) who found a statistically significant difference in the mean achievement scores of students exposed to concept mapping (M = 78.4) versus those taught conventionally (M = 61.2), with a p-value less than 0.05. This finding corroborated with the findings of Mohammed and Musa (2024) who that students taught with concept mapping scored significantly higher in post-tests compared to those taught with the conventional lecture method. The researchers emphasized that the visual structure of concept maps aids in understanding hierarchical relationships between concepts.

Conclusion

The findings clearly demonstrate that the concept mapping strategy significantly enhances nursing students' wound care competencies - including wound assessment, cleansing, dressing selection, and documentation - when compared to the traditional teaching method. This strategy promotes critical thinking, deeper understanding, and better integration of knowledge, ultimately leading to improved clinical performance in wound care practices. Therefore, integrating concept mapping into nursing education holds substantial promise for developing more competent and confident future practitioners.

Implications to nursing education practice

1. Nursing education programs should consider integrating concept mapping into wound care and other clinical skill training modules. This strategy promotes critical thinking and enables students to make meaningful connections between theoretical knowledge and clinical practice.
2. The use of concept mapping encourages active learning and student engagement. Replacing or supplementing passive traditional methods with concept mapping can enhance comprehension, retention, and application of wound care procedures.

3. Since concept mapping helps in organizing and visualizing complex information, its use can foster better clinical judgment and decision-making skills among nursing students, which are essential in wound care management.
4. Nurse educators should receive training on how to effectively implement concept mapping strategies in their teaching. This includes designing appropriate concept maps and facilitating student-centered learning environments.
5. Nursing schools may need to revise their assessment methods to incorporate evaluation tools that reflect students' conceptual understanding and clinical reasoning, not just rote memorization.
6. By promoting a deeper understanding of wound care procedures through structured and visual learning tools, concept mapping can help bridge the often-cited gap between theory and clinical practice in nursing education.
7. This result provides empirical support for adopting evidence-based teaching strategies in nursing education. Concept mapping aligns with contemporary educational standards that emphasize critical thinking and competency-based learning.

Recommendations

Based on the findings of the study, it was recommended among others that:

1. Nursing education programs should formally incorporate concept mapping strategies into the curriculum, particularly in clinical skill courses such as wound care, to enhance students' critical thinking and procedural competence.
1. Instructors should employ concept maps as tools for simulating real-life wound care scenarios, helping students connect theoretical knowledge to clinical practice and systematically assess competencies like wound assessment and dressing selection.
2. Nursing Sciences development workshops should be organized to equip nursing educators with the knowledge and skills required to effectively design, implement, and assess concept mapping activities in both classroom and clinical settings.

3. Group-based concept mapping exercises should be encouraged to promote teamwork, discussion, and deeper understanding of wound care procedures, especially for improving clinical decision-making and documentation accuracy.
4. Nursing schools should continuously evaluate the effectiveness of concept mapping strategies in skill acquisition and refine teaching methods based on student performance outcomes and feedback in areas such as wound cleansing and care documentation.

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