KTO Karatay Üniversitesi Sağlık Bilimleri Dergisi ISSN: 2717-8501 KTO Karatay University Journal of Health Sciences
Geliş Tarihi: 10 Haziran 2025 Kabul Tarihi: 27 Ocak 2026
Yıl 2026 | Cilt 7 | Sayı 1 **Araştırma Makalesi/ Research Article** DOI: 10.59244/ktokusbd.1717026


# Efficiency of Concept Mapping in Midwifery Education: A Mixed Method Research

# Ebelik Eğitiminde Kavram Haritalama Yönteminin Verimliliği: Karma Yöntem Araştırması

**Ayşegül Unutkan[1], Emel Elem [2], İmran Boylu Gülek [3]**

**ABSTRACT**

**Objective:** This study aims to evaluate the effects of theoretical and clinical instruction using concept mapping on midwifery students' critical thinking, problem-solving skills, and post-teaching experiences.

**Materials and Methods:** A mixed-methods design integrating quantitative and qualitative approaches was employed. In the quantitative phase, designed as an experimental study, the sample consisted of 142 midwifery students. At the beginning of the term, students received 4 hours of theoretical training and were instructed to apply concept-mapping techniques in their clinical practice for 10 weeks. Quantitative data were collected before and after the intervention using a Sociodemographic Questionnaire, the Problem-Solving Inventory (PSI), and the California Critical Thinking Disposition Inventory (CCTDI). Data analysis included descriptive statistics, independent samples t-test, and Pearson correlation analysis. The qualitative phase, based on a phenomenological design, included 22 students. Written reflections on students' experiences with concept mapping were analysed using content analysis.

**Results:** Students' pre-test and post-test mean scores on both the CCTDI and the PSI differed significantly ($p < 0.05$), indicating improvements in critical thinking and problem-solving abilities. No significant correlation was found between PSI and CCTDI scores ($p > 0.05$). Qualitative analysis revealed four themes regarding students' experiences: holistic thinking, facilitating learning, enhancing knowledge retention, and negative aspects.

**Conclusion:** Concept mapping positively contributed to midwifery students' critical thinking and problem-solving skills, supported learning, and improved knowledge retention. Further studies are recommended to explore areas for improvement and to broaden the integration of concept-mapping strategies in midwifery education.

**Keywords:** concept mapping; midwifery student; problem solving; critical thinking; qualitative research.

**ÖZET**

**Amaç:** Bu çalışma, kavram haritalama kullanılarak verilen teorik ve klinik eğitimin ebelik öğrencilerinin eleştirel düşünme, problem çözme becerileri ve öğretim sonrası deneyimleri üzerindeki etkilerini değerlendirmek amacıyla yapılmıştır.

**Gereç ve Yöntem:** Nicel ve nitel yaklaşımları birleştiren karma yöntem tasarımı kullanılmıştır. Deneysel bir çalışma olarak tasarlanan nicel aşamada, örneklem 142 ebelik öğrencisinden oluşmuştur. Dönem başında, öğrenciler dört saatlik teorik eğitim almış ve on hafta boyunca klinik uygulamalarında kavram haritalama tekniklerini uygulamaları talimatı verilmiştir. Müdahale öncesinde ve sonrasında, Sosyodemografik Anket, Problem Çözme Envanteri (PSI) ve California Eleştirel Düşünme Eğilimi Envanteri (CCTDI) kullanılarak nicel veriler toplandı. Veri analizi, tanımlayıcı istatistikler, bağımsız örneklem t-testi ve Pearson korelasyon analizini içeriyordu. Fenomenolojik bir tasarıma dayanan nitel aşamaya 22 öğrenci katıldı. Öğrencilerin kavram haritalama deneyimleri hakkındaki yazılı yansımaları, içerik analizi kullanılarak analiz edildi.

**Bulgular**: Öğrencilerin CCTDI ve PSI'da test öncesi ve test sonrası ortalama puanları arasında önemli bir fark vardı ($p < 0,05$), bu da eleştirel düşünme ve problem çözme becerilerinde gelişme olduğunu gösteriyordu. PSI ve CCTDI puanları arasında önemli bir korelasyon bulunmadı ($p > 0,05$). Nitel analiz, öğrencilerin deneyimleriyle ilgili dört tema ortaya çıkardı: bütünsel düşünme, öğrenmeyi kolaylaştırma, bilgiyi daha iyi hatırlama ve olumsuz yönler.

**Sonuç:** Kavram haritalama, ebelik öğrencilerinin eleştirel düşünme ve problem çözme becerilerine olumlu katkı sağladı, öğrenmeyi destekledi ve bilgi kalıcılığını artırdı. İyileştirme alanlarını araştırmak ve ebelik eğitiminde kavram haritalama stratejilerinin entegrasyonunu genişletmek için daha fazla çalışma yapılması önerilir.

**Anahtar kelimeler:** kavram haritalama; ebelik öğrencisi; problem çözme; eleştirel düşünme; nitel araştırma.

1 Assistant Professor, Kütahya Health Sciences University, Faculty of Health Sciences, Midwifery Department, Kütahya, Türkiye. ORCID: 0000-0002-0311-2177

2 Research Assistant, Kütahya Health Sciences University, Faculty of Health Sciences, Midwifery Department, Kütahya, Türkiye. ORCID: 0000-0002-2113-7239

3 Lecturer, Kütahya Health Sciences University, Faculty of Health Sciences, Midwifery Department, Kütahya, Türkiye. ORCID: 0000-0002-1575-6551 **(Corresponding Author)**

**Correspondence:** Lecturer, Kütahya Health Sciences University, Faculty of Health Sciences, Midwifery Department, Kütahya, Türkiye. ORCID: 0000-0002-1575-6551, e-mail: imran.boylu@ksbu.edu.tr

## INTRODUCTION

The clinical work environment is complex, and healthcare professionals face different, often challenging situations every day. Particularly given the unpredictable and rapidly complex nature of the birth process, it is inevitable that midwives must make critical decisions regarding maternal and infant health within a short timeframe (Bass et al., 2020). To effectively manage such challenging situations, midwives and nurses must possess strong critical thinking and problem-solving skills (Mangena and Chabeli, 2005). In this context, it is crucial for midwifery and nursing educators to create student-centred learning experiences that encourage students to think, question, generate knowledge, and think critically (Rosciana, 2017).

Today, educators in many disciplines are moving beyond traditional teaching methods and turning to alternative teaching strategies that promote meaningful and lasting learning (Carr et al., 2014; Castellino and Schuster, 2002). Active learning approaches such as flipped learning, collaborative learning, and problem-based learning are widely accepted methods that aim to develop critical thinking in students (Popil, 2011; Worrell and Profetto-McGrath, 2007; Rosciana, 2017). In addition to these strategies, concept mapping has also emerged as an effective method for deepening students' learning processes (Zipp et al., 2009).

The concept mapping technique was first developed by Joseph D. Novak and Gowin (1984) based on meaningful learning theory. Novak defined concept maps as ‘schematic tools that represent the meaning of a set of concepts through propositions’ (Novak, 2010; Novak and Gowin, 1984). Buzan and Buzan (2010) express concept maps as ‘the graphical representation of radiant thinking.’ This technique is a non-linear form of information organisation that branches out from a central idea and includes words, images, colours, and connections (Buzan and Buzan, 1996).

The colourful, visual, and multisensory structure of mind maps facilitates the transfer of information from short-term to long-term memory (D'Antoni et al., 2010). For meaningful learning that ensures the retention of information, students need to relate new information to their existing knowledge base (Zipp et al., 2009). Concept mapping supports this process by enabling students to build new knowledge upon existing knowledge foundations (Buzan and Buzan, 1996; Davies, 2010; Spencer, Anderson, and Ellis, 2013). Furthermore, the free-form and unlimited structure of concept maps increase the capacity to generate associations and relationships, thereby encouraging brainstorming and creativity (Davies, 2010).

The concept mapping method has been integrated into learning and teaching processes in many disciplines, particularly medicine and nursing (Davies, 2010; D’Antoni et al., 2010; Wickramasinghe et al., 2007; Farrand et al., 2002). In recent years, it has been used as an innovative learning approach in nursing education, particularly to develop critical thinking and clinical reasoning skills (Booker and Peterson, 2016). Mueller et al. (2002) stated that concept mapping develops students' critical thinking, patient-centred care, and holistic assessment skills. Other studies also show that concept mapping facilitates the transfer of knowledge to clinical practice, reduces students' anxiety levels, and is positively related to clinical reasoning (Kaddoura et al., 2016; Lee et al., 2013).

Although concept mapping has been used in nursing education for a long time, studies on this method in midwifery are limited. Accordingly, this study aims to evaluate the effect of the concept mapping technique on midwifery students' critical thinking and problem-solving skills and to examine students' experiences with this technique.

## MATERIALS AND METHODS

### Quantitative Stage

#### *Design of the Study*

This study used a non-randomized quasi-experimental pretest–posttest control group design.

#### *Sample*

The study population consisted of 238 students in their 1st, 2nd, 3rd, and 4th years studying midwifery during the spring semester of the 2020–2021 academic year who were enrolled in the "Care Process in Midwifery" course. The study was completed with 142 students (59.7%) who participated voluntarily and completed the questionnaire forms in full. Third-year students studying during the same period could not be included in the study due to a clash between their course schedules and the researchers' schedules. Furthermore, students who did not complete the data collection forms in full or who did not wish to continue participating in the study were excluded from the analysis.

#### *Implementation*

Students were provided with a 4-hour theoretical training on concept mapping techniques at the beginning of the relevant academic term. Following the training, case studies specific to each class level were presented, and students were asked to prepare concept maps for these cases. Researchers provided feedback on the concept maps prepared by the students; furthermore, these maps were discussed with the students in the classroom setting over a period of 10 weeks. Surveys were administered to collect data before the application and 15 days after the application. Written consent was obtained from the students participating in the study.

#### *Data Collection Tools*

A questionnaire on socio-demographic characteristics, the California Critical Thinking Disposition Inventory (CCTDI), and the Problem Solving Inventory (PSI) were used.

***Questionnaire on Sociodemographic Characteristics:*** It consists of 12 questions containing socio-demographic data of students such as age, marital status, and place of residence (Abd El-Hay et al., 2018; Hsu et al., 2016).

***Problem Solving Inventory:*** Taylan (1990) carried out validity and reliability studies on the scale created by Heppner and Peterson (1982). Individuals were asked how frequently they behave as each of the 35 items on the scale, which is in the form of a 6-point Likert scale. Points ranging from 1 to 6 were awarded for the responses provided. Items 9, 22, and 29 were not included in the scoring process. Reverse scoring applies to items 1, 2, 3, 4, 11, 13, 14, 15, 17, 21, 25, 26, 30, and 34. The range of scores was 32–192. A low score denotes effectiveness in solving problems as well as the attitudes and behaviors necessary for successful problem solving. A high score denotes a lack of ability to solve problems in an efficient manner. There were three sub-dimensions on the scale. The Problem-Solving Inventory consists of three sub-dimensions: 'confidence in problem solving', 'approach and avoidance style', and 'personal control' The PSI scale we employed in our study had a Cronbach Alpha test result of.745. The high total score obtained on the scale indicates that the individual perceives themselves as lacking in problem-solving skills (Heppner and Peterson, 1982). The scale's Cronbach's alpha reliability coefficient was determined to be .82.

***California Critical Thinking Disposition Inventory (CCTDI):*** It was developed by Facione in 1990 and adapted to Turkey by Kökdemir in 2003. As a result of the item-total score correlation analysis, 75 items in the original scale were reduced to 51 items and six subscales. The internal

consistency coefficient (alpha) of the scale was found to be .88. The CCTDI is a Likert-type scale with six items. The scale has a score range of 51-306. A low score indicates a low critical thinking disposition, and a high score indicates a high critical thinking disposition. Items numbered 05, 06, 09, 11, 15, 18, 19, 20, 21, 22, 23, 25, 27, 28, 33, 36, 41, 43, 45, 47, 49, 50 in the scale were scored by reversing. The scale has six subscales that have been determined theoretically and tested psychometrically. These subscales are "truth seeking", "open-mindedness", "analyticity", "systematicity", "self-confidence" and "curiosity" (Kökdemir, 2003). The CCTDI scale we used in our study was .721 with the Cronbach Alpha test result.

***Data Analysis***

Descriptive statistics such as mean, standard deviation, number and percentage were used in the analysis of quantitative variables; t-test was used in comparisons between two groups because the data were compatible with normal distribution. Normality test was performed with Kolmogorov-Smirnov test ($p>0.05$). The relationship between the scales was assessed using Pearson correlation. The statistical significance level was set at $p<0.05$.

**Qualitative Stage**

***Design of the Study***

This study employs a phenomenological qualitative research design.

***Sample of the Research***

The sample of the study consisted of fourth-year midwifery students (22), who were enrolled in the midwifery department in the 2020-2021 academic year, learned the concept mapping technique in the course, applied concept maps during clinical practices, and volunteered to participate in the study. Standard situation sampling was used in this study. The term 'typical situation' refers to conditions that can be used to describe the population and share most of its fundamental characteristics (Marshall & Rossman, 2014).

***Data Collection Tools***

The feedback form that the students completed about the concept mapping method served as the foundation for the research data. Students were asked to list both the advantages and disadvantages of the concept mapping method on the form. Student feedback was assessed using the following questions:

1.How would you describe your overall experience using concept mapping? What did this process mean to you?

2.What were the main contributions of this method to your learning? What were the most significant advantages for you?

3.What challenges or difficulties did you encounter during concept mapping? What do you think caused these?

4.What were the key differences when comparing this method to other learning techniques? Which aspects were more compatible or incompatible with your learning style?

5.Would you consider using concept mapping in your classes or in your learning process in the future? Why?

Students who agreed to participate in the study were informed at the end of the application process and their verbal and written consent was obtained. Students were informed that the confidentiality of the information they provided would be protected.

***Data Analysis***

The data was analysed separately by two researchers using content analysis method. The themes determined by two independent researchers were compared. At the conclusion of the analysis (analysis trilogy), all researchers agreed on the themes after a third independent researcher reviewed them.

***Validity and Reliability of the Research***

Informed consent on the confidentiality and use of the information obtained in the research for scientific purposes was an important factor in ensuring mutual trust. In order to increase the external validity of the research, the research process was explained in detail. In order to increase the internal reliability (consistency) of the research, the findings were given directly. Additionally, the researcher and a specialist with experience in qualitative research coded the collected data independently. A comprehensive validation review was conducted to enhance the external reliability (confirmability) of the study. To this end, all data collection tools, raw data, the coding process, and the analysis notes and written documents that form the basis of the report were provided to an independent external expert, not involved in the study, with expertise in qualitative research methods and midwifery/health education. The external expert assessed the consistency between the data obtained and the researcher's interpretations and independently examined whether the interpretations were based on participant statements, thus contributing to the elimination of researcher bias in the findings.

***Ethical Aspect of the Research***

Ethical approval was obtained from the university for the study to be implemented (2021/07-15). The Helsinki Declaration of Human Rights was followed during this study. The participants gave their informed consent. Furthermore, it was declared that the data collected from the students would remain private, and that the recruitment of willing participants complied with ethical standards such as "respect for autonomy" and "confidentiality and protection of confidentiality."

## FINDINGS

### Quantative Findings

Students studying midwifery at a Health Sciences Faculty of a university in the inner west of Türkiye's participated in the study. 2.8% of the 142 midwifery students, whose mean age was 21.03±2.99, were married. The table below provides the sociodemographic details of the students taking part in the study (Table 1).

**Table 1. Distribution of Students by Demographic Variables**

| **Class** | **f** | **%** |
|---|---|---|
| 1st grade | 36 | 25.4 |
| 2nd grade | 51 | 35.9 |
| 4th grade | 55 | 38.7 |
| Total | 142 | 100 |
| **Marital Status** | **f** | **%** |
| Married | 4 | 2.8 |

| | | |
|---|---|---|
| Unmarried | 138 | 97.2 |
| Total | 142 | 100 |
| **Family Type** | **f** | **%** |
| Nuclear Family | 110 | 77.5 |
| Extended Family | 27 | 19.0 |
| Fragmented Family | 5 | 3.5 |
| Total | 142 | 100 |
| **Place of Longest Residence** | **f** | **%** |
| Province | 70 | 49.3 |
| District | 48 | 33.8 |
| Village | 24 | 16.9 |
| Total | 142 | 100 |
| **Mother's Education Level** | **f** | **%** |
| Illiterate | 10 | 7.0 |
| Literate | 5 | 3.6 |
| Primary Education | 93 | 65.5 |
| High School | 28 | 19.7 |
| University | 6 | 4.2 |
| Total | 142 | 100 |
| **Father's Education Level** | **f** | **%** |
| İlliterate | 3 | 2.1 |
| Literate | 7 | 4.9 |
| Primary Education | 69 | 48.6 |
| High School | 49 | 34.5 |
| University | 14 | 9.9 |
| Total | 142 | 100 |
| **Current Place of Residence** | **f** | **%** |
| At Home With Her Family | 76 | 53.6 |
| At Home With Friends | 23 | 16.2 |
| Dormitory | 33 | 23.2 |

| | | |
|---|---|---|
| Private Dormitory | 10 | 7.0 |
| Total | 142 | 100 |
| **Household Income Status** | **f** | **%** |
| Income Less Than Expenses | 21 | 14.8 |
| Income More Than Expenses | 10 | 7.0 |
| Income Equivalent to Expense | 111 | 78.2 |
| Total | 142 | 100 |
| **Training on Concept Map** | **f** | **%** |
| Yes | 56 | 39.4 |
| No | 86 | 60.6 |
| Total | 142 | 100 |

**f:** frequency, **%:** percentage

After the case discussions using the concept mapping method, it was determined that the midwifery department students' total PSI score averages decreased statistically significantly compared to the pre-implementation (Table 2) ($p< 0.05$).

The PSI hasty approach, avoidant approach, evaluative approach, self-confident approach, and planned approach subscales showed statistically significant declines in participant mean scores following implementation ($p< 0.05$). No significant difference was found in the PSI thoughtful approach sub-dimension ($p >0.05$) (Table 2).

**Table 2. General Average Results of Students by Sub-Dimensions of Problem-Solving Inventory**

| | **Pre-Test** | | | | | **Post-Test** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sub-Dimensions** | **N** | **Min** | **Max** | $\bar{X}$ | **SS** | **N** | **Min** | **Max** | $\bar{X}$ | **SS** | **Test** |
| **Hasty Approach** | 142 | 21.00 | 43.00 | 33.34 | 4.32 | 142 | 23.00 | 39.00 | 31.15 | 3.50 | **d.f:141 t:5.38 p:0.00** |
| **Thoughtful Approach** | 142 | 11.00 | 27.00 | 18.52 | 2.34 | 142 | 12.00 | 23.00 | 18.59 | 2.39 | d.f:141 t:-227 p:0.82 |
| **Avoidant Approach** | 142 | 9.00 | 24.00 | 20.09 | 3.39 | 142 | 10.00 | 24.00 | 19.05 | 2.68 | **d.f:141 t:-3.92 p:0.00** |
| **Evaluative Approach** | 142 | 5.00 | 18.00 | 14.31 | 6.63 | 142 | 4.00 | 15.00 | 12.35 | 2.48 | **d.f:141 t:8.33 p:0.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Self-Confident Approach** | 142 | 11.00 | 36.00 | 27.07 | 5.22 | 142 | 13.00 | 30.00 | 20.80 | 2.94 | **d.f:141 t:13.81 p:0.00** |
| **Planned Approach** | 142 | 10.00 | 24.00 | 16.90 | 2.96 | 142 | 10.00 | 21.00 | 15.65 | 2.48 | **d.f:141 t:4.56 p:0.00** |

| | n | X | S | sd | t | p |
|---|---|---|---|---|---|---|
| **Pre-Test** | 142 | 136.16 | 14.15 | 11.77 | 10.78 | **0.000** |
| **Post-Test** | 142 | 125.51 | 7.55 | | | |

**N:** Sample size, **Min:** Minimum value, **Max:** Maximum value, **$\bar{X}$:** Arithmetic mean, **SS:** Standard deviation, **d.f:** Degree of freedom, **t:** t-test statistic, **p:** Significance level

After the implementation, it was determined that the total mean scores of the students' CCTDI increased statistically significantly compared to the pre-implementation ($p< 0.05$).
After the implementation, it was found that the students' mean scores of all subscales of CCTDI (curiosity, analytical, systematic, open-mindedness, truth seeking, self-confidence) increased compared to before the implementation and the difference was statistically significant (Table 3) ($p< 0.05$).

**Table 3. Students' General Average Results by California Critical Thinking Scale Sub-Dimensions**

| | Pre-Test | | | | | Post-Test | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sub-Dimensions** | **N** | **Min** | **Max** | **$\bar{X}$** | **SS** | **N** | **Min** | **Max** | **$\bar{X}$** | **SS** | **Test** |
| **Inquisitiveness** | 142 | 22.00 | 40.00 | 32.17 | 3.84 | 142 | 20.00 | 54.00 | 41.61 | 7.21 | **d.f:141 t:14.25 p:0.00** |
| **Analyticity** | 142 | 19.00 | 52.00 | 39.74 | 5.59 | 142 | 30.00 | 60.00 | 47.83 | 6.78 | **d.f:141 t:14.23 p:0.00** |
| **Systematicity** | 142 | 8.00 | 25.00 | 17.00 | 3.24 | 142 | 12.00 | 34.00 | 23.92 | 4.60 | **d.f:141 t:13.86 p:0.00** |
| **Open-mindedness** | 142 | 28.00 | 58.00 | 39.01 | 5.49 | 142 | 29.00 | 69.00 | 52.92 | 9.31 | **d.f:141 t:15.49 p:0.00** |
| **Truth-seeking** | 142 | 11.00 | 31.00 | 20.32 | 3.46 | 142 | 13.00 | 41.00 | 27.83 | 5.81 | **d.f:141 t:13.86 p:0.00** |
| **Self-confidence** | 142 | 16.00 | 31.00 | 23.31 | 2.83 | 142 | 17.00 | 42.00 | 29.80 | 6.02 | **d.f:141 t:17.72 p:0.00** |

| | n | $\bar{X}$ | S | sd | t | p |
|---|---|---|---|---|---|---|
| **Pre-Test** | 142 | 171.58 | 26.97 | 28.68 | 21.77 | **0.000** |

| | | | |
|---|---|---|---|
| **Post-Test** | 142 | 223.98 | 7.50 |

**N:** Sample size, **Min:** Minimum value, **Max:** Maximum value, **$\bar{X}$:** Arithmetic mean, **SS:** Standard deviation, **d.f:** Degree of freedom, **t:** t-test statistic, **p:** Significance level

There was no low/moderate/high, positive/negative, and significant relationship between the PSI (Mean=125.51, SD=7.55) and CCTDI (Mean=171.58, SD=7.50) scores of the students participating in the study (Table 4) (r= -0.070, p > 0.05).

**Table 4. Corelation Between PSI and CCTDI**

| | | **CCTS** |
|---|---|---|
| **PSI** | Pearson r | -,070 |
| | p | ,407 |
| | n | 142 |

**Pearson r:** Pearson Correlation Coefficient, **p:** Significance level, **n:** Sample size.

## Qualitative Findings

When the students' feedback on the concept mapping method was examined, 4 themes were determined in the learning experiences obtained: holistic thinking, facilitating learning, permanent and negative aspects of knowledge. The themes is given in Figure 1.

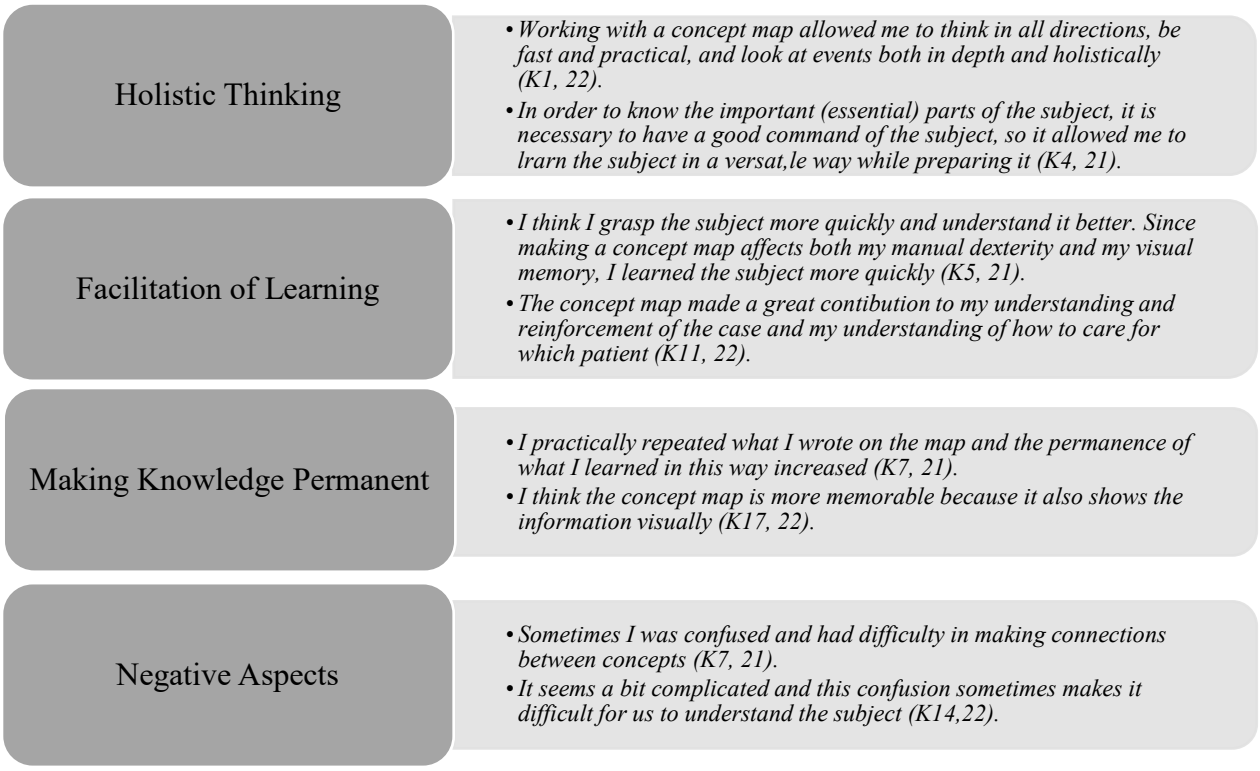


**Figure 1. Tree for Themes**

1. **Theme: Holistic Thinking**

The students who participated in the study stated that concept mapping allowed them to look at the subject or case from multiple perspectives, to see complex issues more clearly, to see the big picture, and to gain holistic approach skills. Examples of these views are given below:

*Working with a concept map allowed me to think in all directions, be fast and practical, and look at events both in depth and holistically (P1, 22).*

*In order to know the important (essential) parts of the subject, it is necessary to have a good command of the subject, so it allowed me to learn the subject in a versatile way while preparing it (P4, 21).*

*Summarizing the case with a concept map on a single page enabled us to approach the subject holistically (P8, 23).*

2. **Theme: Facilitation of Learning**

The students who participated in the study reported that using colours while establishing the relationship between concepts increased attention more and contributed to the reinforcement of what they learned, thus facilitating their learning. In addition to these, they stated that concept mapping enables them to understand the case better and faster, and that they experience great convenience in making connections between diagnoses. Examples of expressions leading to this theme are given below:

*I think that I grasp the subject more quickly and understand it better. Since making a concept map affects both my manual dexterity and my visual memory, I learned the subject more quickly (P5, 21).*

*The concept map made a great contribution to my understanding and reinforcement of the case and my understanding of how to care for which patient (P11, 22).*

*I think that I understand the transitions between concepts and information better. I think that I have increased my knowledge about finding solutions (P12, 21).*

3. **Theme: Making Knowledge Permanent**

The students who participated in the study stated that concept mapping accelerates the learning of concepts by both summarizing the subject and being visual and contributing to the retention of the concepts in long-term memory. They also stated that instead of memorizing the subject, it provides the opportunity to see the relationship between concepts in a hierarchical and holistic way, thus ensuring that the knowledge becomes permanent. Examples of these views are given below:

*Explaining a subject with a wide scope by associating it with symbols and arrows on a single page instead of working for pages took a bigger place in my memory (P5, 21).*

*I practically repeated what I wrote on the map and the permanence of what I learned in this way increased (P7, 21).*

*I think the concept map is more memorable because it also shows the information visually (P17, 22).*

4. **Theme: Negative Aspects**

Students stated that preparing a concept map is time consuming, they have difficulty in establishing the connection between concepts and it is very complex. Examples of expressions leading to this theme are given below:

*Sometimes I was confused and had difficulty in making connections between concepts (P7, 21).*

*It seems a bit complicated and this confusion sometimes makes it difficult for us to understand the subject (P14,22).*
*Some concept maps were very confusing and difficult to understand (K20,21).*

## DISCUSSION

In the current study, it was determined that case discussions with the concept mapping technique improved the problem-solving skills of the students. Similar to our study, in a study conducted with nursing students, it is stated that concept mapping is directly related to problem-solving abilities (Abd El-Hay et al., 2018). On the other hand, in the study of Wu et al. (2020), concept mapping was found to be ineffective in improving participants' problem-solving skills. It is thought that the difference between the studies may be due to the differences in the methods applied and the time spent so that students can learn the concept mapping technique and develop their skills.

In the current study, it was determined that concept mapping improved students' critical thinking skills. In addition, it was determined that all sub-dimensions of the critical thinking scale (curiosity dimension, analytical dimension, systematicity dimension, open-mindedness dimension, truth-seeking dimension, self-confidence dimension) increased positively. Similarly, in the study of Wu et al. (2020), it was shown that critical thinking dispositions developed after the intervention, and their attitudes increased positively in the dimensions of analyticity, self-confidence, curiosity, and cognitive maturity. These findings are consistent with Kaddoura et al. (2016), Atay and Karabacak (2012), Lee et al. (2013)**,** Chen and Zhang (2014) and Rosciano (2017) are consistent with research results. Smawi (2014), on the other hand, reports that, unlike our study, concept mapping does not affect critical thinking skills. It is important to explain the concept mapping technique gradually and integrating it with practical lessons so that students can digest it. It is thought that the differences between the studies may be due to the differences in the teaching methods and the time spent for teaching.

In our study, it was determined that the concept mapping technique increased the students' ability to evaluate the patient holistically. Similar to our study, in the study of Toqan et al. (2019) with nursing students, it was reported that patient discussions with concept maps allow students to manage all aspects of patient care holistically. Wu et al. (2020), on the other hand, determined that students stated that concept mapping contributes to gain permanent knowledge and analytical abilities and to organize knowledge systematically. These results suggest that concept mapping technique can be a good strategy to improve students' ability to evaluate patient problems in a multi-dimensional way and to individualize care.

In our study, students stated that concept mapping facilitates learning and ensures that knowledge is permanent. Similarly, in a study conducted by Davies (2010), it was stated that processing information visually and pictorially facilitates learning. In Rosciano's (2017) study, most of the students stated that concept mapping encourages collaboration with peers, is interesting, and encourages learning. Kaddura et al. (2016) report that concept mapping moves students from learning by rote to a deep and meaningful learning approach. In Noonan's (2013) study, it was determined that students stated that concept mapping 'makes them think' and provides a clearer view on the subject. On the other hand, Hagell et al. (2016) stated that theoretically learned information should be experienced interactively, and consequently, concept mapping offers students the chance to actively test their knowledge**.** In nursing

education, it is stated that students create a concept map, associate the new information they learn with the previous ones, and improve their learning experiences in this way **(**Atay & Karabacak, 2012; Trevisani et al., 2016; Hsu et al., 2016; Chatzi & McNamara 2025; Ashipala et al., 2023; Lin et al., 2025)**.** In line with these results, it can be said that concept mapping can be a method that will allow students to transfer the knowledge they have learned theoretically to practice, thus building a bridge between theory and practice. On the other hand, in our study, it was determined that some students found concept mapping time-consuming and confusing. Zipp et al. (2009) and Wu et al. (2020) obtained similar results with our study findings in their studies. The fact that the concept mapping technique requires active participation and is challenging for students who are accustomed to traditional and surface learning strategies may have led to negative experiences.

***Limitations of the Research***

We should evaluate the findings of this study within the framework of certain limitations. First, the study sample consisted solely of volunteer participants. This means that students who chose to participate may have differing characteristics from other students in terms of motivation, attitudes, or academic interests, limiting the generalizability of the findings to the entire student population.

Secondly, the lack of a control group in the study resulted in the quantitative findings being evaluated solely based on the experiences of the intervention group. Therefore, direct comparison of the effectiveness of the concept mapping method with other teaching methods was not possible, and certain limitations arose in terms of internal validity.

Thirdly, despite the nature of the mixed-method design, the absence of in-depth individual interviews or focus group discussions in the qualitative data dimension limited the ability to uncover students' more comprehensive and multidimensional experiences with the concept mapping method. Because the qualitative data collection process relied solely on written feedback forms, the nuances in participants' expressions, emotional tone, and interactional processes were only captured to a limited extent. Considering these limitations, it is recommended that future studies use comparative designs with a control group and support the qualitative data collection process with in-depth interviews or focus group studies.

## CONCLUSIONS

According to this study, using concept mapping as a teaching method guarantees learning and knowledge retention while also helping students develop their critical thinking and problem-solving abilities. These results suggest that concept mapping may be a strategy that can increase student active participation in midwifery education and contribute to closing the gap between theory and practice. Concept mapping is recommended to be included in the curriculum for the development of midwifery teaching. In addition, it would be appropriate for instructors to use effective methods in teaching concept maps and to develop reliable measurement tools for the evaluation of concept maps.

**Ethical Statement:** Approval was obtained from the institutions where the study was conducted were taken and the Ethics committee approval was obtained with the decision having the protocol number of 2021/07-15 of the Kutahya Health Sciences University Clinical Researches Assessment Commission in order to conduct the research.

**Declaration of Interest**
Authors declare no conflict of interest.
**Funding**
No financial support was received from any institution or person during the conduct of the study.
**Author Contributions**
Study design: AU, EE, İBG; data collection and analysis: AU and EE; manuscript preparation: AU, EE, İBG.
**P.S:** Presented as an abstract at the International Anatolian Midwives Association Congress, Eskişehir, Turkey, 19 May 2022.

## REFERENCES

Abd El-Hay, S. A., El Mezayen, S. E., & Ahmed, R. E. (2018). Effect of concept mapping on problem solving skills, competence in clinical setting and knowledge among undergraduate nursing students. *Journal of Nursing Education and Practice*, *8*(8), 34-46. https://doi.org/10.5430/jnep.v8n8p34

Ashipala, D,O, Elias S., & Lifalaza A. (2023). Nursing students' experiences of utilizing a concept map as a learning method in human anatomy and physiology: A qualitative descriptive study. *International Journal of Africa Nursing Sciences,* 18, 100547. https://doi.org/10.1016/j.ijans.2023.100547

Atay, S. & Karabacak, U. (2012). Care plans using concept maps and their effects on the critical thinking dispositions of nursing students. *International Journal of Nursing Practice*, 18, 233-239. https://doi.org/10.1111/j.1440-172X.2012.02034.x

Bass, J., Sidebotham, M., Creedy, D., & Sweet, L. (2020). Midwifery students' experiences and expectations of using a model of holistic reflection. *Women and Birth*, *33*(4), 383-392. https://doi.org/10.1016/j.wombi.2019.06.020.

Booker, S.Q., & Peterson, N. (2016). Use of the knowledge tree as a mind map in a gerontological course for undergraduate nursing students. *J Nurs Educ,* 55, 182–184. https://doi.org/10.3928/01484834-20160216-13

Buzan, T., & Buzan, B. (2010). The Mind Map Book Unlock your creativity, boost your memory,change your life. Pearson, Harlow.

Castellino, A., & Schuster, P. (2002). Evaluation of outcomes in nursing students using clinical concept map care plans. *Nurse Educator,* 27, 149-150. https://doi.org/10.1097/00006223-200207000-00001

Chen, H.J., & Zhang, Y.M. (2014). Research progress on application of mind mapping in nursing education and clinical practice. *Chin Nurs Res,* 20, 2438–2440.

D'Antoni, A.V., Pinto Zipp, G., Olson, V.G., & Cahill, T.F. (2010). Does the mind map learning strategy facilitate information retrieval and critical thinking in medical students? *BMC Medical Education*, 10, 61. http://www.biomedcentral.com/1492-6920/10/61.

Davies, M. (2010). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter? *Higher Education,* 36(May), 426–431. https://doi.org/10.1007/s10734-010-9387-6.

Facione, P. A. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction- Executive summary- The Delphi Report. Millbrae, CA: The California Academic Press.

Farrand, P., Hussain, F., & Hennessy, E. (2002). The efficacy of themind map'study technique. *Medical Education*, *36*(5), 426-431. https://doi.org/10.1046/j.1365-2923.2002.01205.x

Hagell, P., Edfors, E., Hedin, G., Westergren, A., & Hammarlund, C. (2016). Group concept mapping for evaluation and development in nursing education. *Nurse Education in Practice*, 20, 147-153. https://doi.org/10.1016/j.nepr.2016.08.006

Heppner, P. P. &Petersen, C. H. (1982). The development and implications of a personal problem solving inventory. *Journal of Counseling Psychology,* 29, 66–75. https://doi.org/10.1037/0022-0167.29.1.66

Hsu, L.L., Pan, H.C., & Hsieh, S.I. (2016). Randomized comparison between objective-based lectures and outcome-based concept mapping for teaching neurological care to nursing students. *Nurse Education Today,* 37, 83-90. https://doi.org/10.1016/j.nedt.2015.11.032

Kaddoura, M., Van-Dyke, O., & Yang, Q. (2016). Impact of a concept map teaching approach on nursing students' critical thinking skills. *Nursing and Health Sciences,* 18, 350-354. https://doi.org/10.1111/nhs.12277

Kökdemir, D. (2003). Decision making and problem solving under uncertainty (Unpublished PhD Thesis). Ankara University Institute of Social Sciences. Ankara.

Lee, W., Chiang, C.-H., Liao, I.C., Lee, M.L., Chen, S.L., & Liang, T. (2013). The longitudinal effect of concept map teaching on critical thinking of nursing students. *Nurse Education Today, 33*, 1219-1223. https://doi.org/10.1016/j.nedt.2012.06.010

Lin, C. C. Han, C.Y. Huang, Y.L., & Chen, L.C. (2025). Constructing learning confidence through jigsaw, concept maps and group cooperative learning: A qualitative study. *Nurse Education in Practice,* 82, 104239. https://doi.org/10.1016/j.nepr.2024.104239

Mangena, A., & Chabeli, M.M. (2005). Strategies to overcome obstacles in the facilitation of critical thinking in nursing education. *Nurse Education Today,* 25, 291–298. https://doi.org/10.1016/j.nedt.2005.01.012

Marshall, C., & Rossman, G.B. (2014). Designing Qualitative Research. New York: Sage.

Mueller, A., Johnston, M., & Bligh, D. (2002). Joining mind mapping and care planning to enhance student critical thinking and achieve holistic nursing care. *Nursing Diagnosis, 13*(1), 24–27. https://doi.org/10.1111/j.1744-618X.2002.tb00161.x

Noonan, M. (2012). Mind maps: Enhancing midwifery education. *Nurse Education Today,* 33(8), 847−852. http://dx.doi.org/10.1016/j.ned.2012.02.003.

Novak, J., & Gowin, B. (1984). Learning How to Learn. Port Chester, New York. https://doi.org/10.1017/CBO9781139173469

Novak, J.D. (2010). Learning, creating, and using knowledge: concept maps as facilitative tools in schools and corporations. *Journal of E-Learning and Knowledge Society*, 6, 21-30. https://www.learntechlib.org/p/43512/.

Popil, I., (2011). Promotion of critical thinking by using case studies as teaching method. *Nurse Education Today*, *31* (2), 204–207. https://doi.org/10.1016/j.nedt.2010.06.002

Rosciano, A. (2017). The effectiveness of mind mapping as an active learning strategy among associate degree nursing students. *Teaching and Learning in Nursing,* https://doi.org/10.1016/j.teln.2015.01.003

Spencer, J. R., Anderson, K. M., & Ellis, K. K. (2013). Radiant thinking and the use of the mind map in nurse practitioner education. *The Journal of Nursing Education,* 52(5), 291−293, http://dx.doi.org/10.3928/ 01484834-20130328-03.

Taylan, S. (1990). Heppner'in problem çözme envanterinin uyarlama, güvenirlik ve geçerlik çalışmaları. Yayımlanmamış yüksek lisans tezi, Ankara Üniversitesi, Ankara.

Toqan, D. A., Khalaf, I. A., & Ayed, A. J. (2019). The impact of concept mapping on caring efficacy of Palestinian nursing students at clinical setting. *Open Journal of Nursing, 9*(1), 59-67. https://doi.org/10.4236/ojn.2019.91006

Trevisani, M., Cohrs, C.R., Soares, M., Duarte, J., Mancini, F., Pisa, I., & Domenico, E. (2016). Evaluation of learning in oncology of undergraduate nursing with the use of concept mapping. *Journal of Cancer Education,* 31, 533-540. https://doi.org/10.1007/s13187-015-0869-1

Wickramasinghe, A., Widanapathirana, N., Kuruppu, O., Liyanage, I., & Karunathilake, I. (2007). Effectiveness of mind maps as a learning tool for medical students. *South-East Asian Journal of Medical Education*, *1*(1). https://doi.org/10.4038/seajme.v1i1.506

Wu, H. Z., & Wu, Q. T. (2020). Impact of mind mapping on the critical thinking ability of clinical nursing students and teaching application. *Journal of International Medical Research*, *48*(3), 0300060519893225. https://doi.org/10.1177/0300060519893225.

Zipp, P.G., Maher, C., & D'Antoni, A.V. (2009). Mind maps: useful schematic tool for organising and ıntegrating concepts of complex patient care ın the clinic and classroom. *Journal of College Teaching and Learning,* 6 (2), 59–6. https://doi.org/10.19030/tlc.v6i2.1173