

EVALUATION OF THE MIND MAPPING LEARNING STRATEGY'S EFFECTIVENESS ON PERMANENT LEARNING

BİR ÖĞRENME STRATEJİSİ OLAN ZİHİN HARİTASININ KALICI ÖĞRENME ÜZERİNE ETKİNLİĞİNİN DEĞERLENDİRİLMESİ

Meryem FIRAT ¹, Seçkin KARAKUŞ ², Yalçın KANBAY ³

¹ Binali Yıldırım University, Faculty of Health Sciences, Department of Nursing, Mental Health and Psychiatry Nursing Erzincan, Turkey

² Binali Yıldırım University, Faculty of Health Sciences, Department of Nursing, Surgical Nursing Erzincan, Turkey.

³ Çoruh University, Faculty of Health Sciences, Department of Nursing, Mental Health and Psychiatry Nursing, Artvin, Turkey.

ABSTRACT

Objectives: This study was conducted to evaluate the effectiveness of the mind mapping learning strategy on permanent learning in comparison to the instruction given using the classical method.

Materials and Methods: This study adopted a non-randomized controlled experimental design. The target population was nursing students enrolled in the Faculty of Health Sciences, and the sample was composed of first-year students who received the Psychology course. The data were collected in 3 stages through the Socio-demographic Form prepared by the researchers and the Schizophrenia Knowledge Form. The data obtained were analyzed in the SPSS package program. Data analyses included percentages, means, independent groups t-test, Friedman Test, Wilcoxon signed-rank test, and Bonferroni Correction.

Results: The pretest mean score of the experimental group was 2.96 ± 1.260 , the posttest mean score was 5.82 ± 2.124 , and the Permanence test mean score was 7.24 ± 1.540 . As to the control group, the pretest mean score was 3.00 ± 1.242 , the posttest mean score was 4.00 ± 1.633 , and the Permanence mean score was 6.18 ± 2.455 . The permanence test was analyzed to determine the effect size of the methods used in the experimental and control groups. It was found that the instruction given using the mind mapping method was more effective than the instruction given using the classical method.

Conclusions: As a result of the comparison of the mind mapping method with the traditional teaching method, it was concluded that the mind mapping method was more effective in storing and recalling knowledge. The effectiveness of mind mapping has been proven by implementing it in nursing education for the first time, addressing an abstract topic, and having assessments in longer intervals than other studies.

Keywords: Learning, Mind Map, Nursing, Student.

ÖZET

Amaç: Araştırma bir öğrenme stratejisi olan zihin haritasının klasik sistemle verilen eğitime göre kalıcı öğrenme üzerine etkinliğinin değerlendirilmesi amacı ile yapılmıştır.

Gereç ve Yöntem: Araştırma yarı deneysel olup evrenini Sağlık Bilimleri Fakültesi hemşirelik bölümü öğrencileri, örneklemini ise psikoloji dersini alan 1. sınıf öğrencileri oluşturmuştur. Veriler araştırmacılar tarafından oluşturulan kişisel bilgi formu ve şizofreni bilgi formu ile 3 aşamada toplanmıştır. Elde edilen veriler SPSS paket programında değerlendirilmiştir. Verilerin değerlendirilmesinde yüzde, ortalama, bağımsız gruplarda t testi, Friedman Testi, Wilcoxon İşaretli Sıralar Testi, Bonferroni Düzeltmesi kullanılmıştır.

Bulgular: Deney grubunun ön test puan ortalaması 2.96 ± 1.260 , son test puan ortalaması 5.82 ± 2.124 , kalıcılık testi puan ortalaması 7.24 ± 1.540 olarak belirlenmiştir. Kontrol grubunun ön test puan ortalaması 3.00 ± 1.242 , son test puan ortalaması 4.00 ± 1.633 , kalıcılık testi puan ortalaması 6.18 ± 2.455 olarak belirlenmiştir. Deney ve kontrol gruplarındaki öğrenciler üzerinde uygulanan yöntemlerin etki büyüklüğünü belirlemek için kalıcılık testi incelenmiş ve zihin haritaları yöntemi ile verilen eğitimin klasik sistemle verilen eğitimden daha etkili olduğu belirlenmiştir.

Sonuç: Araştırmada zihin haritası yönteminin geleneksel öğretim yöntemi ile karşılaştırılması sonucunda zihin haritasının bilgiyi depolama ve hatırlamada daha etkili olduğu sonucuna varılmıştır. Zihin haritalamanın etkinliği hemşirelik eğitiminde ilk kez uygulanması, soyut bir konuyu ele alması ve diğer çalışmalara göre daha uzun aralıklarla değerlendirme yapılmasıyla kanıtlanmıştır.

Anahtar kelimeler: Hemşirelik, Kalıcı Öğrenme, Öğrenci, Zihin Haritası.

Sorumlu Yazar / Corresponding Author: Meryem FIRAT, Assoc. Prof. Dr., Erzincan Binali Yıldırım University, Faculty of Health Sciences, Department of Nursing, Mental Health and Psychiatry Nursing Erzincan, Turkey. **E-mail:** meryemfirat@hotmail.com

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INTRODUCTION

From past to present, educators have had the role of transmitting knowledge to students by using various methods. Making the knowledge transferred permanent is of great importance because permanent knowledge enables students to work in their profession more successfully and productively.

The effectiveness of classical methods used in the education system needs to be reevaluated and revised because studies report that only 5% of the information learned and even less than that remains after 6 months (Bhat & Mohan, 2019). Therefore, there is a need for analyzing, developing, and testing additional alternative methods to classical learning methods. Using memorization intensively instead of learning, and later forgetting most of the information memorized have been the primary problems that gain widespread attention and still need solutions (Buitron de la Vega vd., 2018). Mind mapping is one of the methods that help teachers to teach better and learners to learn better and to store information in mind longer. Mind mapping is a method that enables a more holistic and concrete demonstration of information about a specific topic. The method is based on the brain studies conducted by Sperry et al. in the 1960s. These studies found the differences between the right brain and the left brain. This information led to the use of Buzan mind maps in the 1970s (Buzan & Buzan, 2010).

Mind maps were formed to facilitate students' learning, clarify their thoughts through mental mapping, and help them to sort information. Mind mapping is a visual technique used for the association of the information and concepts about a topic using various elements such as keywords, images, and colors (Buitron de la Vega vd., 2018; Choudhari vd., 2021; Gossack-Keenan vd., 2020).

Mind mapping is defined as the organization of words or ideas around a central keyword and the illustration of all components related to a topic with a diagram (Choudhari vd., 2021). The main topic is drawn at the center, and the keywords about the sub-topics branch out from the major ideas (Yang vd., 2020). Little branches are produced from the sub-topics, and they are included in a more advanced branching organization of the topic. The map is expected to have an artistic design and be accompanied by lots of creativity (Gossack-Keenan vd., 2020). It is based on the idea of presenting the concepts, relationships between the concepts, and examples about the concepts on a single page. Mind maps, which are shortly called the two-dimensional presentation of a set of concepts, are different from concept maps because they are based also on creativity. Mind maps not only enable a visual presentation of the concepts, knowledge, and thoughts but also later facilitate recalling the information transferred to a paper using figures, images, and keywords (Kalyanasundaram vd., 2017; Wu & Wu, 2020).

Health education also aims to identify new teaching strategies for critical thinking and permanent learning through various methods (Maryam vd., 2021). Mind maps, one of these teaching strategies, not only enable students to recall the information they use to improve health more easily but also facilitate the process of preparing the care plans (Rosciano, 2015). In addition, it provides convenience for both learners and teachers (Gossack-Keenan vd., 2020; Wu & Wu, 2020).

Health educators should design and practice learning strategies that help students to think and learn more permanently (Baker vd., 2021; Yang vd., 2020). Therefore, the study was conducted in three stages to identify the effectiveness of the mind mapping method and examine the permanence of knowledge.

MATERIALS AND METHODS

Research Design and Sample Selection

This study adopted a non-randomized controlled experimental design. The target population of the study was students enrolled in the Nursing Department of Faculty of Health Sciences, and the sample was composed of first-year nursing department students who took the Psychology course. The students enrolled in the Nursing department of the Faculty of Health Science are provided education in two branches called A and B. Each group involves more than 60 students. As both the experimental and control group students were composed of students who were enrolled in the same school, special attention was paid to form the experimental and control groups from different classrooms to decrease the probability of groups' affecting each other to a minimum. Similarly, to prevent groups from affecting each other, the schedule of the groups was checked, and the group in which the course was conducted first was identified as the control group. Hence, while the experimental group was composed of Group A students, the control group was composed of Group B students. Then the students in the experimental and control groups were informed about the purpose of the study, and all the students who agreed to

participate were involved in the study. Hence, the study was conducted with 45 students in the experimental group and 49 students in the control group (Figure 1).

Inclusion Criteria for research

- Being a nursing student
- Take a psychology course
- Agree to participate in the research
- Filling the data collection forms completely and without errors

Exclusion Criteria for research

- Not being a nursing student
- Not taking a psychology class
- Not wanting to participate in the research
- Giving incomplete and incorrect data form

Data Collection Tools

The Socio-demographic Form: The form that was prepared by the researchers is composed of 4 questions (age, gender, accommodation during the education year, and frequency of studying) that aimed to identify the demographic features of the students in the experimental and control group.

The Schizophrenia Knowledge Form: The form was developed after reviewing the literature by the lecturer of the course to identify students' knowledge about schizophrenia and revised in line with the views of 5 instructors in the field of Mental Health and Psychiatric Nursing (Baysan Arabacı, 2020). The form includes 10 questions in total. The questions are multiple-choice questions that measure students' level of knowledge about schizophrenia (course of the schizophrenia disease, symptoms, treatment, and nursing care). Each question is scored 1 point, and the total scores range between 0 and 10 points.

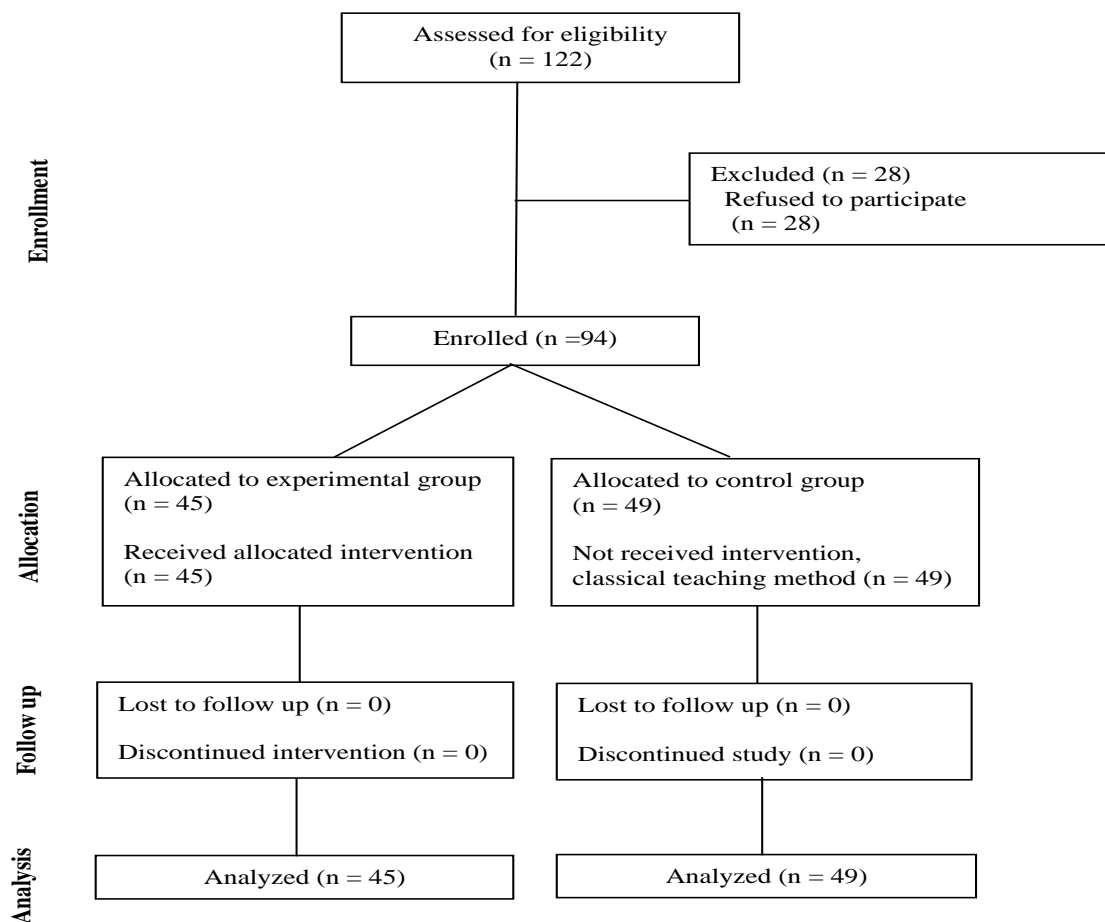


Figure 1. Flowchart of students' progress through the phases of the research

Data Collection Process

Data were collected in the fall semester of the 2019-2020 academic year (September-December, 2019). Before the course topics were instructed in the course to be received, the students were given information about the study, and those who agreed to participate in the study were administered the pretests (Socio-demographic Form and the Schizophrenia Knowledge Form). The posttest forms, the second measurement of the study (Socio-demographic Form and the Schizophrenia Knowledge Form), were administered 2 weeks after the topic was instructed. Finally, the permanence of the knowledge was measured 5 weeks later through another measurement. Hence, the measurements were completed in 3 stages. The students who wanted to withdraw from the study during the dates when the data were collected were excluded from the study.

Intervention

Within the scope of the 14-week psychology course, a week was determined to teach the subject of schizophrenia using the mind mapping method. This topic was identified by drawing lots among the topics to be instructed within the scope of the course. Initially, a mind map was prepared for the schizophrenia topic, and this map was copied according to the number of students (Figure 2).

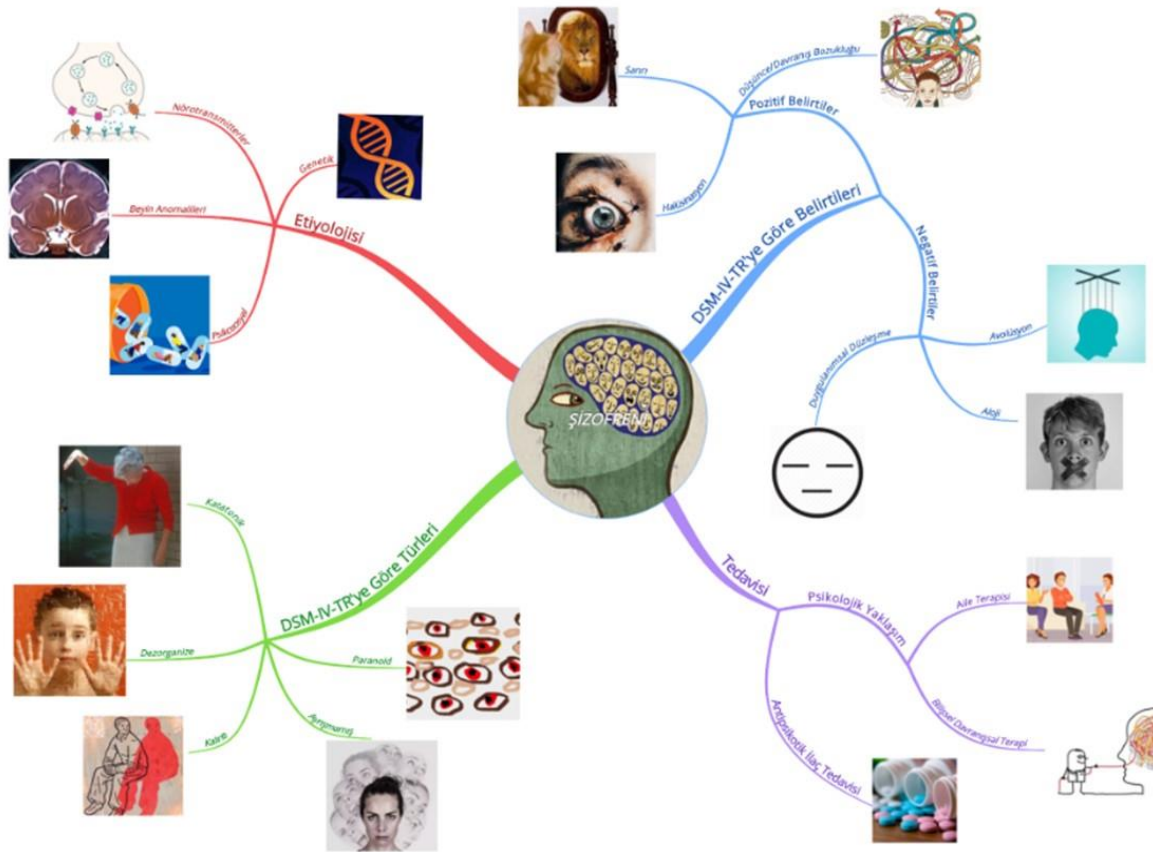


Figure 2. The sample mind map prepared for the students within the scope of the study

After the pretest was administered, the mind map prepared by the researchers was given to the students in the experimental group. The instructor of the course instructed the topic by drawing the same mind map on the board. During the instruction, special attention was paid to associate the topics with the figures and visuals in the mind map. The mind maps were not collected back, the students kept them. After the topic instruction, the lesson was ended by having a question and answer session with students about the parts they did not understand.

The control group was instructed the topic using classical teaching methods. No materials were used during the instruction of the topic. After the topic instruction, the lesson was ended by having a question and answer session with students about the parts they did not understand. Both the experimental and control groups were instructed the same topic by the same researcher.

Data Analysis

The data collected in this study were analyzed using SPSS 23 (Statistical Package for the Social Sciences) package programming. Numbers, means, percentages, and median values were used for descriptive statistics.

As the number of the participants in the groups was less than 50, normality was tested using the "Shapiro-Wilk Test". It was found that the pretest, posttest, and permanence test measurements of both experimental and control groups did not distribute normally. Therefore, the comparison of repeated measures was done using non-parametric tests. For this purpose, the "Friedman Test" was utilized for the non-parametric repeated measures, the "Wilcoxon signed-rank Test" was performed as a post hoc test for the paired comparisons of the groups with statistically significant differences, and the "Bonferroni correction" was performed for the corrected significance level. The significance level for the Bonferroni correction was found $p=0.016$ in both experimental and control groups. The analysis of the differences between the permanence test and pretest according to the groups was done using a t-test in independent groups as the data distributed normally.

Ethical Considerations

Written permission was obtained from the Human Research Ethics Committee of University (protocol number 11/07 dated 07.11.2019) and the Faculty of Health Sciences of University. The students were told that participation in the study was on a voluntary basis, and their verbal consent was obtained. The students in the control group who wanted so were instructed the topic again using the mind maps.

RESULTS

Table 1 demonstrates the data obtained from the Socio-demographic Form. As it is shown in the table, while the average age of the experimental group students was 18.8 ± 0.82 , the average of the control group students was 19.0 ± 0.81 . Besides, 77.8% of the experimental group students and 69.6% of the control group students were females, and 82.2% of the experimental group students and 89.8% of the control group students stayed in a dormitory. Finally, 66.7% of the experimental group students and 65.3% of the control group students studied regularly.

Table 1. Characteristics of the Experimental and Control Group about Age, Gender, Type of Accommodation, And Study Habits (Experimental Group $n=45$; Control Group $n=49$)

Descriptive characteristics	Experimental Group		Control Group	
	Mean	St. Deviation	Mean	St. Deviation
Age	18.82	0.82	19.0	0.81
Gender	<i>n</i>	%	<i>n</i>	%
Female	35	77.8	34	69.4
Male	10	22.2	15	30.6
Type of Accommodation				
Dormitory	37	82.2	44	89.8
Other	8	17.8	5	10.2
Study Habits				
Regularly	30	66.7	32	65.3
Not regularly	15	33.3	17	34.7

Table 2 demonstrates the comparison of the pretest, posttest, and permanence test mean scores of the students by the groups. While the pretest mean score of the experimental group was 2.96 ± 1.26 , it was 3.00 ± 1.24 for the control group, and the difference between the groups was not statistically significant ($t=-0.17$, $p>0.05$). The posttest mean scores were 5.82 ± 2.12 in the experimental group and 4.00 ± 1.63 in the control group, which indicated statistically significant differences between the groups ($t=4.68$, $p<.000$). The permanence test mean score of the experimental group was 7.24 ± 1.5 and that of the control group was 6.18 ± 2.45 , and the difference between the groups was statistically significant ($t=2.48$, $p<.05$).

Table 2. Comparison of the Pretest, Posttest and Permanence Test Mean Scores in the Experimental and Control Groups

Measurements	Experimental Group		Control Group		Significance	
	X	St. Deviation	X	St. Deviation	t*	p**
Pretest	2.96	1.26	3.00	1.24	-0.17	.864
Posttest	5.82	2.12	4.00	1.63	4.68	.000
Permanence test	7.24	1.54	6.18	2.45	2.48	.015

* T-test in Independent Groups, ** $p < 0.05$ level of significance

Table 3 demonstrates the comparison of the intra-group pretest-posttest permanence test scores. The pretest mean score of the experimental group was 2.96 ± 1.26 , and the median value was 3; the posttest mean score was 5.82 ± 2.12 and the median value was 6; the Permanence test mean score was 7.24 ± 1.54 , and the median value was 7. The difference between the pretest, posttest, and permanence test mean rank of the experimental group was found to be statistically significant. According to the Wilcoxon Signed Rank Test and Bonferroni Correction results performed to find out which groups caused significant differences ($p \leq 0.0167$ was accepted significant), the differences among all the three tests in the experimental group were statistically significant.

As shown in Table 3, the control group's pretest mean score was 3.00 ± 1.24 , and the median value was 3; the posttest mean score was 4.00 ± 1.63 and the median value was 4, and the Permanence mean score was 6.18 ± 2.45 and the median value was 7. The difference between the pretest, posttest, and permanence test mean rank was found to be statistically significant in the control group. According to the Wilcoxon Signed Rank Test and Bonferroni Correction results ($p \leq 0.0167$ was accepted significant) performed to find out which groups caused significant differences, the differences among all the three tests in the experimental group were statistically significant.

Table 3. Comparison of the Intra-Group Pretest and Posttest and Permanence Test in the Experimental and Control Groups

Group	Test	Mean	Sd	Median	Significance
*Experimental Group	^a Pretest	2.96	1.260	3	** $\chi^2(2, n=45) = 55.55$ $p=0.000$
	^b Posttest	5.82	2.124	6	
	^c Permanence Test	7.24	1.540	7	
*Control Group	^d Pretest	3.00	1.242	3	** $\chi^2(2, n=49) = 43.517$ $p=0.000$
	^e Posttest	4.00	1.633	4	
	^f Permanence Test	6.18	2.455	7	

*Significance level for Bonferroni Correction $p \leq 0.0167$ ** Friedman Test; $a > b > c$; $d > e > f$

In Table 4, the pretest scores were taken out from the Permanence test scores to identify the effect size of the methods administered to the experimental and control groups, and the scores obtained were compared in the experimental and control groups. The pretest score of the students in the experimental group was 2.96 ± 1.26 ; with a 4.29 ± 0.30 increase, their permanence test score increased to 7.24 ± 1.54 . As to the control group, the pretest mean score was 3.00 ± 1.24 , and with a 3.18 ± 0.33 increase in the score, the permanence test score increased to 6.18 ± 2.45 . Statistical analyses of the mean scores obtained showed that the difference between the groups was statistically significant.

Table 4. Comparison of the Permanence Test and Pretest Mean Score Differences (Permanence Test-Pretest) according to the Experimental and Control Groups

Group	n	Mean	Sd	Significance
Experimental	45	4.29	0.30	$t=2.41$ $p=0.018$
Control	49	3.18	0.33	

DISCUSSION

This study aims to evaluate the effectiveness of mind mapping, one of the alternative learning methods, on permanent learning and the findings obtained are discussed in line with the literature. Statistical analyses conducted between the groups showed that the pretest mean scores were not statistically significant. This finding indicates that the students' knowledge levels were similar before the intervention. Posttest and permanence measurements conducted after the topic instruction showed that the knowledge levels increased in both the experimental and control groups, but the increase in the experimental group was statistically significant (Table 2). Intra-group analyses showed that the level of knowledge about the topic increased in both groups. In both groups, students' permanence test scores were significantly higher than their posttest scores, and their posttest scores were significantly higher than their pretest scores (Table 3). However, a comparison of the levels of increase in the groups showed that this increase was higher in the experimental group, and it was statistically significant (Table 4). In light of all these findings, the mind mapping method applied was found to be more effective than the classical method based on verbal instruction. Besides, although more than one month passed after the instruction, it was found that the knowledge of students did not decrease. The mind mapping method aims to make recalling complicated information about any topic easier by associating it with each other. Through mind maps, students can increase the amount of knowledge recalled and create a new environment for processing knowledge. Students organize the information learned and associate it with each other more easily through mind mapping (Bawaneh, 2019; Bhat & Mohan, 2019; Gossack-Keenan *et al.*, 2020).

A review of the related literature shows that the studies investigating the effectiveness of mind mapping at a higher education level are very limited in number, and this topic has not been investigated in the studies about nursing education. Hence, a number of studies in the field of health were found when the effectiveness of mind mapping was investigated in the literature. For instance, Deshatty and Mokashi investigated the effectiveness of mind mapping in learning and recalling information in the anatomy course in the medical faculty (Deshatty & Mokashi, 2013). While one group learned by taking standard notes, the other group took notes utilizing the mind map; the findings showed that the group that utilized the mind mapping method received higher scores. The mind mapping technique was utilized throughout the term, and the assessment was done through a single measurement done at the end of the term (Deshatty & Mokashi, 2013). Another study conducted by Bhat and Mohan investigated the effectiveness of mind mapping in dentistry department students. That study similarly formed two groups; while one group was instructed using mind mapping, the other group was instructed using the classical method. The assessments were done before the intervention and one week after the intervention, and the mind mapping was found to be effective (Bhat & Mohan, 2019).

In this study, the measurements were done in longer intervals and the permanence test was administered 5 weeks later to identify the effectiveness of the mind mapping in a longer period. The group that was instructed through mind mapping was found to remember the information more. The students were considered to achieve this through the visuals and mental associations used in the mind map. It was proven that mind mapping was not merely a method to be used for instruction; it was of importance for studying and recalling the topics. In addition, this study is different from the other studies in the literature as mind mapping was used for instructing a topic with abstract concepts rather than a concrete topic. It can be concluded that by using the mind mapping method, students could associate, organize, recall, and practice the information more easily for all abstract and concrete topics.

CONCLUSION AND RECOMMENDATIONS

The comparison of the mind mapping method with the traditional teaching method showed that mind mapping was more effective in storing and recalling knowledge.

Mind mapping is a cost-effective method that can be applied easily. Like students in many fields, students enrolled in health sciences would be able to process the knowledge they gained in their minds easily and use mind mapping to recall this information more easily.

It is recommended to evaluate the effectiveness of the method over time through more comprehensive and longitudinal studies.

The results of this study showed that including the mind mapping method in the curriculum could increase students' success levels and decrease their load.

Limitations

The limitations of the study are that the term still continued when the study was conducted, the students studied particularly due to the quizzes done in all courses, some students might already know the intervention, they might know whether they were included in the experimental or control group, and although they did not know the exact assessment time they knew the assessment week.

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Author Contributions

Plan, design: MF, SK; Material, methods and data collection: MF, SK; Data analysis and comments: YK; Writing and corrections: MF, YK, SK.

Conflict of interest

The authors declare that they have no conflict of interest

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