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EFFECT OF CREATING AND PRESENTING CONCEPT MAPS BY GROUP COMPUTER-BASED METHOD ON CREATIVE AND ANALYTICAL THINKING IN NURSING STUDENTS

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ABSTRACT

This study evaluated the effect of group computer-based creating and presentation of concept map on creative and analytical thinking in nursing students. Thirty nursing students participated in a pretest-posttest quasi-experimental study. The participant were divided into 6 groups and they designed and presented five conceptual maps in emergency situations nursing course using MindMapper software. The results showed that there is a significant increase in creative thinking compared to analytical thinking immediately and one month after the intervention.

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Introduction

The process of creative thinking is the ability to extract past thoughts and experiences, and combining them into new practices [1]. Findings of several studies show that creativity can be trained [2]. Regarding the need for training creative thinking to medical students, it should be said that these people should step beyond the normal course of care and develop creative thinking in order to decide in a better manner due to the dynamism and applicability of their profession as well as exposure to unexpected conditions and care for patients [3]. To confirm this, researchers believe that there is a direct

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significant relationship between creativity and the quality of clinical care [4]. Studies have shown that traditional teaching methods prevent students from developing creativity at the end of their courses [3]. Therefore, the teaching of various medical disciplines should develop student-centered teaching methods to form problem-solving learning, group skills, and creativity, among which it can refer to the "conceptual map" method [5].

Some researchers defined the concept map as a tool for illustrating the relationships among concepts in a coherent and organized way [6]. Applying this method would enable professors and learners to deepen the teaching and learning process as well as provide the conditions for achieving higher levels of cognitive, abstract, creative, and critical thinking [7]. Concept maps, such as the "teacher-made" concept map and "learner-made" conceptual map, were used in educational situations and in the teaching–learning process in a variety of ways [6].

Different studies reported contradictory results on the effect of presenting the mapping concept. For example, [8] believed that the greatest benefit of training the concept map belonged to its developer, not the person who received it. There is another study were consistent with it [9]. The result of previous research indicated that the concept map developed by the teacher would be more effective than the one made by the student as the former would be a more complete and precise concept map [10].

In terms of the used tools, the concept map fell into "pencil-paper" and "computer" methods [11]. In drawing a concept map with the pencil-paper method, the learner could easily create shapes, words and lines, and add some brief descriptions. However, erasing the words could be tedious and could cause problems with revision of the maps [11]. The same reasons encouraged learners to use the conceptual mapping software. The most important advantages of using a computer method could be the ease of drawing, revising, and customizing it [12].

In another study, there was no significant difference between the effectiveness of creating by paper-pencil and computer-based methods on learner learning [13]. In terms of developing and creating, the concept map fall into "individual" and "group" forms [14]. The results of the studies showed that when members of the group made concept maps during group discussions, there was a significant learning between the group members [9]. In connection with the concept map with group method, it was argued that the process of developing a concept map as a group activity could be more productive than developing it individually [15].

Regarding the contradictory results on the effects of using the concept map, the importance of considering creative thinking in the theoretical and clinical fields, and the lack of a similar study in the students of nursing, we decided to determine the effect of creating and presenting a concept map in a group computer-based method on creative and analytical thinking in the students of nursing.

Methods

This was a pretest-posttest quasi-experimental study. The purpose of this study was to evaluate the effect of creating and presenting a concept map by using a computer software and group method on creative and analytical thinking of nursing students in nursing and midwifery faculty in Saveh University of medical sciences in 2017.

The inclusion criteria included all of the nursing students who had selected the course of "nursing in emergency course", and not attending similar and concurrent sessions. Exclusion criteria included discontinuation of education, absence of more than three continues sessions, and unwillingness of the students with the continuation of the study. To select the samples, a census method was used in this study and thirty nursing students in the second year of the Academic Year 2016–2017 were selected and randomly divided into six groups.

After obtaining the informed consent from subjects and ethics code from the ethic committee of vice chancellor of research of the university, the necessary information was collected before and after the intervention (as mentioned below). Data was collected in three steps; before the conceptual map, immediately after the concept map, and one month after implementation of the conceptual map (Fig. 1). To collect information "Peter Honey's Creative Thinking Questionnaire" was used. The questionnaire included demographic information and creative-thinking questions. The questions were divided into 24 phrases and 12 pairs. In this questionnaire, students were asked to mark one that was closer to their behavior among each pair of questionnaire statements.

In general, the manner of scoring the questionnaire was that questions related to creative thinking, that is, those who had scored more points in questions 1-4-5-7-10-12-14-15-17-19-22-24 had a higher creative thinking. In this questionnaire, the maximum score 12 and the minimum was zero. The remaining questions were about analytic thinking, where those who scored high in those questions had a higher analytical thinking. In this section, the maximum score was 12 and the minimum was zero. In the previous study it was confirmed the validity of the questionnaire and reported its reliability as 0.85 by Cronbach's alpha coefficient [16].

Each group designed and presented five conceptual maps in emergency situations nursing course using MindMapper software. The intervention plan was to draw up and present a concept map for the aforementioned course based on the content announced by the approved chapters of Ministry of Health and Medical Education of Iran.

In order to implement a conceptual map, three steps were considered—preparation, engagement, and evaluation steps. In the preparation stage, the teacher read the course content and explained the words and the method of working with the software with the participating students. The learners got acquainted with the conceptual map, concept map features, how to draw the

map, and samples of the conceptual map. They were then asked to identify the main concept of the text and the sub-concepts, these concepts were recorded by the teacher on the board. The students—individually and with the help of the teacher—drafted a concept map of the text using the software.

At the engagement stage, students were asked to draw up a concept map for specific processes of content during the next session with the participation of their team members. During each session, a student from each group was selected to present a concept map of the group for 20 minutes.

The final phase (evaluation) included the developmental assessment of sessions and feedback from students performance by the teacher and other students.

Data was analyzed using descriptive statistics and inferential statistics (Paired t-test and analysis of variance with the repeated measures) using SPSS version 20 software.

Results

The results of demographic information showed that the mean age of participants was 20.8 ± 0.95. Moreover, 73% of subjects were female and 27% of them were male. The mean and standard deviation of their "grade point average" of the students were 16.98 ± 0.87.

The paired t-test showed that there was no significant difference between the mean scores of creative thinking and analytical thinking in the pre-test stage ($p = 0.17$), but the same test showed a significant difference between post-test scores of creative thinking and analytic thinking scores ($p < 0/0001$). The difference in creative thinking scores on analytical thinking was observed in the follow-up phase one month later, in which case the paired t-test showed a significant difference ($p < 0.0001$) (Table 1).

As shown in Table 2, the results of the variance analysis test with repeated measure showed that the mean change trend in the score of creative thinking in the three tests—pre-test, post-test, and one month after the intervention (follow-up) —was incremental and these changes were statistically significant ($p < 0/0001$). However, the mean changes trend of the analytical thinking scores decreased in the three mentioned times, and there was a significant difference in this case ($p < 0.0001$).

Discussion

The findings of this study indicated that creating and presenting concept maps by the group method, using the mental mapping software had a positive effect on students' creative thinking. Accordingly, the findings showed that there was no significant difference between the scores of pre-test of creative thinking and analytical thinking, but after the end of the intervention and one month later, the students' creative thinking scores increased significantly compared to the pre-test scores. Moreover, the analytical thinking scores of participants fell significantly a week and a month later.

In a research similar to Hsu, it was shown that training in the form of conceptual mapping helped develop and strengthen skills such as creative thinking, problem-solving, analysis, and communication power in nursing students [17]. Also, the results of Torre et al. showed that developing concept maps enabled the creativity development through an intellectual structure consisting of a modeling and the ability to think deeply on different subjects, and eventually the integration of knowledge became possible [18]. it also believed that the concept maps helped foster creativity [19]. In addition, the results of Brinkman's study showed that the use of concept maps promoted the creativity of learners in mathematics, which was the reason for this kind of creativity enhancement, using expressions, colors, symbols, or images in this way [20].

Another research findings showed that the technique of synectics had a positive effect on people's creativity [21]. Moreover, the positive effect of using concept maps on critical thinking and creativity of learners was confirmed previously [22]. Also, it was shown that concept map creating as a group had a significant correlation with the participatory interactions among students [12]. The results of a recent study showed that creating concept maps in groups had a positive effect on learner-cognitive indices [23]. It was also believed that the use of concept map as a meta-cognitive intervention could lead to profound and significant learning in nursing students [24]. Some researchers also believed in their studies that teaching with brainstorming [25], problem-solving [26], and Electronic Dashboard [27], had contributed to the growth and prosperity of creativity and creative thinking of learners.

In spite of the existence of research confirming the positive effect of concept maps on creative thinking, there were also studies that had reported the lack of influence of this method on creation and promotion of creativity, which emphasized the confusing and time-consuming nature of this method as its weaknesses [28]. In addition, the study by RILEY and Ahlberg suggested that there was no significant difference between the group with the concept map teaching and the traditional teaching group in terms of creativity promotion [29].

In justifying the growing trend of creative thinking and reducing the level of analytical thinking of learners in this study, it could be said that the kind of used instrument lead to increasing in score in an aspect of thinking and reducing in other aspect of thinking. In fact, it seemed that the questionnaire also showed people's desire for thinking. Of course, it was necessary to remind and emphasize that both types of thinking were necessary to solve problems. Further review of the literature suggested that creativity was, in fact a new, useful, appropriate, accurate, and accessible response, with innovative dimensions, to solve the problem and issues [30], and it seemed that most of these features in the teaching method of "Concept map with Group Participation" had been integrated as an active teaching method. In fact, this teaching method

emphasized the participation of other students in finding new solutions. In justifying the effectiveness of this teaching method, the growth mindset theory could be referred to. This theory supported educational programs aimed at developing creativity by learning and practicing creative thinking strategies.

In principle, the transfer of information and experiences through the teaching of new knowledge and creativity skills could be done through active teaching methods. It should be noted that in this study to develop creative thinking, creating and presenting a concept map using a computer software program was used.

The limitations of this study included the absence of a control group due to the lack of identical samples and the impossibility of comparing this with other methods in equal conditions. However, it was suggested that further research in this field be conducted in other medical and control groups.

Conclusion

In summary, it may be acknowledged that creating and presenting a concept map in a group using software could enhance the creative thinking of students; it may turn out to be one of the new methods of teaching and learning that could develop creativity in learners. Therefore, it seems that creativity, which is the product of creative thinking, could lead to a new line of thinking and design to improve the quality and quantity of educational activities.

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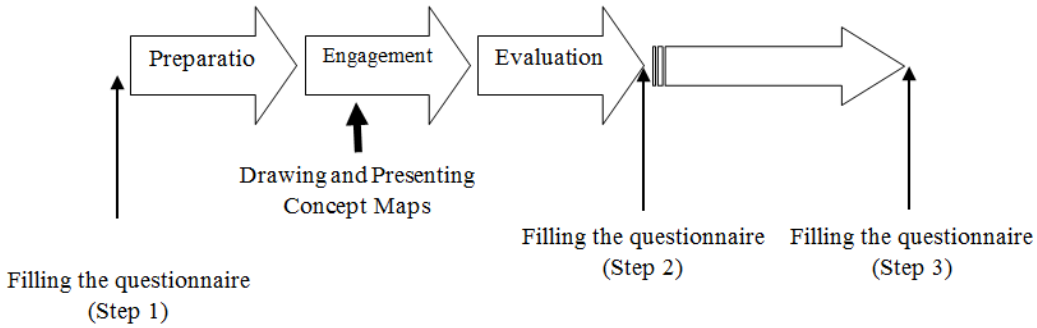

Fig 1. Schematic view of method. As it was depicted, in the present study the questionnaire was filled in three step by the students as indicated above.

Table 1. The difference between creative and analytical thinking scores in pre-, post and one month after intervention (follow up).

Variables	P Value	Analytical thinking	Creative thinking
Pre-test	0.017	6.25 ±1.51	5.75±1.51
Post-test	<0.0001	4.35±1.63	7.65±1.63
Follow up	<0.0001	3.75±1.58	8.25±1.58

Table 2. The variation of mean and standard deviation of creative and analytical thinking scores in pre-, post and one month after intervention (follow up).

Variables	Pre-test	Post-test	Follow up	F	P Va
Creative thinking	5.75±1.51	7.65± 1.63	8.25± 1.58	109.09	<0.0001
Analytical thinking	6.25 ±1.51	4.35±1.63	3.75±1.58	109.09	<0.0001

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Research highlights:

- Creating and presenting concept maps by group computer-based method can improve creative thinking in nursing students.
- Improvement in creative thinking scores in the three phase tests-pretest, posttest, and follow-up test - after by group computer-based method concept maps is incremental in nursing students.
- The analytical thinking scores for the nursing students had a decreasing trend during the three phase tests-pretest, posttest, follow-up test- after group computer-based method concept maps.

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Conflicts of Interest: None**.**

References

1. Gibson, C., Folley, B. S., & Park, S. (2009). Enhanced divergent thinking and creativity in musicians: A behavioral and near-infrared spectroscopy study. Brain and cognition, 69(1), 162-169.
2. Kim, K. H. (2006). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). Creativity research journal, 18(1), 3-14.
3. Chan, Z. C. (2013). A systematic review of creative thinking/creativity in nursing education. Nurse Education Today, 33(11), 1382-1387.
4. Edwards, S. L. (2007). Critical thinking: A two-phase framework. Nurse education in practice, 7(5), 303-314.
5. Young, L. E., & Paterson, B. L. (2007). Teaching nursing: Developing a student-centered learning environment: Lippincott Williams & Wilkins.
6. Novak, J. D. (2010). Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations: Routledge.
7. Zebarjadian, Z., & Nili Ahmadabadi, M. R. (2012). A comparison of concept mapping and integration method impacts on third-graders of Karaj elementary schools. Educational Psychology, 8(26), 84-106
8. Wandersee, J. H. (1990). Concept mapping and the cartography of cognition. Journal of research in science teaching, 27(10), 923-936.
9. Saeedi, A., Saif, A. A., Asadzadeh, H., & Qavam, S. E. (2013). Comparing effectiveness of methods of presentation and providing concept maps on reading comprehension. European Journal Of Experimental Biology, 3(2), 545-550.
10. Wellman, H. M., & Lagattuta, K. H. (2004). Theory of mind for learning and teaching: the nature and role of explanation. Cognitive Development, 19(4), 479-497.
11. Liu, P.-L., Chen, C.-J., & Chang, Y.-J. (2010). Effects of a computer-assisted concept mapping learning strategy on EFL college students' English reading comprehension. Computers & Education, 54(2), 436-44
12. Hwang, G. J., Shi, Y. R., & Chu, H. C. (2011). A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning. British Journal of Educational Technology, 42(5), 778-789.
13. Erdogan, Y. (2009). Paper-based and computer-based concept mappings: The effects on computer achievement, computer anxiety and computer attitude. British Journal of Educational Technology, 40(5), 821-836.
14. Chang, K.-E., Sung, Y.-T., & Chen, I.-D. (2002). The effect of concept mapping to enhance text comprehension and summarization. The Journal of Experimental Education, 71(1), 5-23.
15. O'donnell, A. M., Dansereau, D. F., & Hall, R. H. (2002). Knowledge maps as scaffolds for cognitive processing. Educational psychology review, 14(1), 71-86.
16. zahbyon L, & GH, A. (2009). Creative Thinking and Its` Relation to Students `Academic Achievement. [Research]. Research in curriculum planning, 1(21), 61-78.
17. Hsu, L., & Hsieh, S.-I. (2005). Concept maps as an assessment tool in a nursing course. Journal of Professional Nursing, 21(3), 141-149.
18. Torre, D., Daley, B., Stark-Schweitzer, T., Siddartha, S., Petkova, J., & Ziebert, M. (2007). A qualitative evaluation of medical student learning with concept maps. Medical Teacher, 29(9-10), 949-955.
19. Mueller, A., Johnston, M., & Bligh, D. (2001). Mind-mapped care plans: A remarkable alternative to traditional nursing care plans. Nurse Educator, 26(2), 75-80.

20. Brinkmann, A. (2003). Graphical knowledge display–mind mapping and concept mapping as efficient tools in mathematics education. Mathematics Education Review, 16(4), 35-48.
21. Tanjitanont, P. (2011). Using Synectic Technique for Developing Creative English Writing Proficiency. 1st symposium on Hands-on Research and Development, Chiang Mai, Thailand.
22. Hsueh-Chih, C., Yau-Ting, S., Tsai-Wen, L., & Hung-Teng, C. (2010). Climate change and environmental education: The application of concept map for representing the knowledge complexity of climate change. World Academy of Science, Engineering and Technology, 68, 1411-1413.
23. Zavvar, T., Mesrabadi, J., & Amirian, L. (2016). Effectiveness of group conceptual mapping on cognitive - emotional indicators of chemistry courses. Educational Psychology, 12(41), 59-78.
24. Nejat, N., Kouhestani, H., & Rezaei, K. (2011). Effect of concept mapping on approach to learning among nursing students. Journal of hayat, 17(2), 22-31.
25. Yaghoobi, A., & Jahan, F. (2015). Comparing the Effectiveness of teaching TRIZ and Brainstorming on Students' Creativity. New Thoughts on Education, 11(1), 103-122.
26. Shaebani, M., Maleki, H., Abas por, A., & Saedi por, E. (2017). Effectiveness of training based on creative problem solving (CPS) on creative thinking among the Employees of Kosar Credit Institute. Scientific Journal Management System, 6(4), 149-170.
27. Badali, M., Mazraeh, A. D., Farokhi Tir Andaz, S., & Herfeh Doust, M. (2014). The Impact of Using E-Portfolio on Students' Creativity. Scientific Journal Management System, 3(3), 45-68.
28. Havens, R. L. (1997). Cognitive/concept mapping: a teaching strategy for nursing. Journal of advanced nursing, 25(6), 1210-1219.
29. Golkari, S., Ayati, M., & Rastgoo Moghadam, M. (2013). The effect of blog based curriculum on creativity of high school students. Journal of technology of education (journal of technology and education, 7(4), 325.
30. Pandey, S., & Sharma, R. (2009). Organizational factors for exploration and exploitation. Journal of technology management & innovation, 4(1), 48-58.