ORIGINAL ARTICLE

The Effect of Metacognition Instruction in Multimedia-based Learning Environments on Nursing Students' Spiritual Health

Hossein Moradimokhles[1,*], Jamshid Heydari[2], Vahid Salehi[3]

[1]Department of Educational Technology, Sayyed Jamaleddin Asadabadi University, Asadabad, Iran

[2]Department of Educational Technology, Allameh Tabataba'i University, Tehran, Iran

[3]Department of Educational Technology, Sayyed Jamaleddin Asadabadi University, Asadabad, Iran

[*]Department of Educational Technology, Sayyed Jamaleddin Asadabadi University, Asadabad, Iran

Sayyed Jamaleddin Asadabadi University

Rezaee st.

Hamedan, Asadabad, 6541861841 IRAN

Tel: +989120249086

Email: hmmkh2000@yahoo.com

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Background: One of the main competencies required for enabling Nursing students to provide effective clinical care is spiritual health. The growth and development of nursing students' spiritual health rely on strengthening their cognitive and metacognitive components. What is more associated with spirituality and spiritual health is students' metacognition. This study aimed to investigate the effect of metacognition instruction in multimedia-based learning environments on nursing students' spiritual health.

Methods: In this study, a multiple-group pretest, posttest design was used. The population included all the undergraduate students of nursing at Alborz University of Medical Sciences in the academic year 2015-2016. Of these, 60 were selected through a convenience sampling method and randomly assigned to three experimental groups: face-to-face, online, and blended instruction (each including 20 participants). The instruments included an instructional multimedia and a spiritual health questionnaire. For data analyses, a one-way analysis of variance (ANOVA) was applied.

Results: One-way analysis of variance between the experimental groups showed that there were significant differences in terms of the spiritual health variable. Further analyses using Tukey post hoc test revealed that the effect of instruction of metacognitive components on spiritual health in the blended learning environment was higher than face-to-face and online learning environments. In addition, metacognition instruction in face-to-face learning environment had a more positive effect on spiritual health when compared with the online learning environment.

Conclusions: Metacognition instruction in blended learning environments was more effective in spiritual health in comparison with face-to-face and online learning environments.

Keywords: Instructional multimedia, Metacognition, Learning environment, Spiritual health.

تأثير تعليم ما فوق المعرفي في مجالات التعلم المبتني على عدة أساليب تعليمية على السلامة المعنوية عند طلاب التمريض

التمهيد و الهدف : من أهم المؤهلات التي يجب أن تلاحظ في مجال المراقبات السريرية المؤثرة عند طلاب التمريض هي السلامة المعنوية . إن تنمية السلامة المعنوية عند الطلاب تعتمد على تقوية بعدين، البعد الأول هو المعرفة و البعد الثاني هو ما فوق المعرفة.

إن الهدف من هذه الدراسة هو كشف مستوى تأثيرالتعليم الفوق المعرفي في البيئة التعليمية المبنية على أساليب تعليمية متعدده ،على السلامة المعنوية عند طلاب التمريض .

الاسلوب : تم استخدام اسلوب الاختبار القبلي و البعدي في هذه الدراسة . و تم الاختبار على جميع طلاب التمريض في جامعة البرز للعلوم الطبية في عام ١٣٩٤–١٣٩٥ هـ ش. تم اختيار ٦٠ شخص من كل المجموعة حسب معايير احصائية و تم تقسيمهم الى ثلاث مجموعات : التعليم الحضوري ، عبرالنت و الثالث التلفيقي. تم استخدام استمارات و ادوات تعليمية و تم تحليل المعلومات عبر اختبارات احصائية .

النتائج : اشارت تحاليل المعايير الإحصائية الى ان هناك اختلاف يعتني به بين المجموعات .اشارت نتائج هذه الدراسة عبرالإختبار التعقيبي (توكي) الى أن تأثيرتعليم اس الفوق المعرفه على السلامة المعنوية في البيئة التعليمية التلفيقية كان اكثر من بيئة التعلم الحضوري و عبر النت و اضافة على ذلك كان تأثير تعليم الفوق المعرفي على السلامة المعنوية في البيئة التعليمية الحضورية اكثر من بيئة التعلم عبرالنت .

الاستنتاج : تعليم الفوق المعرفي في بيئة التعلم التلفيقية مؤثره اكثر على السلامة المعنوية بالنسبة الى البيئة التعليمية الحضورية و عبرالنت .

كلمات المفتاح : الاساليب التعليمية ، فوق المعرفة ، البيئة التعليمية ، السلامة المعنوية

اثربخشی آموزش فراشناخت در محیط های یادگیری مبتنی بر چند رسانه ای بر سلامت معنوی دانشجویان پرستاری

زمینه و هدف: یکی از شایستگی های اصلی که به منظور ارائه مراقبتهای بالینی مؤثر باید در دانشجویان پرستاری پرورش داده شود،سلامت معنوی است. رشد و توسعۀ سلامت معنوی دانشجویان نیازمند تقویت دو مولفۀ شناختی و فراشناختی آنان است. آنچه بیش از شناخت با معنویت و سلامت معنوی ارتباط دارد، فراشناخت دانشجویان است. هدف پژوهش حاضر بررسی تأثیرآموزش فراشناخت در محیطهای یادگیری مبتنی بر چند رسانه ای برسلامت معنوی دانشجویان پرستاری بود.

روش: در این پژوهش از طرح پیش آزمون – پس آزمون چند گروهی استفاده شد. جامعه آماری پژوهش را کلیه دانشجویان پرستاری دانشگاه علوم پزشکی البرز در سال تحصیلی ۹۵-۱۳۹۴ تشکیل می‌دادند. از این تعداد، ۶۰ نفر به شیوه نمونه‌گیری در دسترس انتخاب و به صورت تصادفی در سه گروه آزمایشی: آموزش حضوری، آنلاین و تلفیقی (هر یک به تعداد۲۰ نفر) گماشته شدند. ابزار مورد استفاده شامل چند رسانه‌ای آموزشی و پرسشنامه سلامت معنوی بود. به منظور تحلیل داده ها از آزمون آماری تحلیل واریانس یک طرفه(آنوا) استفاده شد.

یافته ها: تجزیه و تحلیل واریانس یک طرفه نشان داد که بین گروه های آزمایش در متغیر سلامت معنوی تفاوت معناداری وجود دارد. نتایج تجزیه و تحلیل با آزمون تعقیبی توکی نشان داد که تأثیر آموزش مؤلفه های فراشناختی بر سلامت معنوی در محیط های یادگیری تلفیقی بیشتر از محیط های یادگیری حضوری و آنلاین است. افزون بر این، تأثیر آموزش فراشناخت بر سلامت معنوی در محیط های یادگیری حضوری بیشتر از محیط یادگیری آنلاین می باشد.

نتیجه گیری: آموزش فراشناخت در محیطهای یادگیری تلفیقی اثربخشی بیشتری بر سلامت معنوی دانشجویان نسبت به محیط های یادگیری حضوری و آنلاین دارد.

کلمات کلیدی: چندرسانه‌ای آموزشی، فراشناخت، محیط یادگیری، سلامت معنوی

نرسنگ طلباو طالبات کی معنوی سلامتی پر ملٹی میڈیا ماحول میں میٹا کاگنیشن metacognilion کی روش کے اثرات

بیک گراونڈ: نرسنگ طلباء و طالبات میں جو ایک اچھی صفت کی پرورش دی جاسکتی ہے وہ ان کی معنوی سلامت ہے۔طلباء میں معنوی سلامتی کی نشوو نما اور اسے پروان چڑھانے کےلئے کاگنیشن اور میٹا کاگنیشن کے عناصر کی ضرورت ہوتی ہے۔ اس تحقیق کا ہدف نرسنگ طلبا و طالبات کی معنوی سلامتی پر ملٹی میڈیا ماحول میں میٹا کاگنیشن metacognition کی روش کے اثرات کا جائزہ لینا ہے۔

روش: اس تحقیق میں پوسٹ ٹسٹ اور پری ٹسٹ کی روشوں سے استفادہ کیا گیا۔ اس میں البرز یونیورسٹی آف میڈیکل سائنس کے طلباء نے شرکت کی ان کا تعلق دوبزار پندرہ اور سولہ سے تھا۔ ان میں سے ساٹھ افراد کا انتخاب کیا گیا۔ ان میں تین گروہ تشکیل دئے گئے۔ ایک گروہ کو کلاس میں تعلیم دی گئی ایک گروہ کو آن لائن تعلیم دی گئی اور تیسرا گروہ ان دونوں گروہوں کو ملاکر بنایا گیا۔ ہر گروہ میں بیس بیس طلباء تھے۔ انہیں ایک سوالنامہ دیا گیا تھا جس میں معنوی سلامتی کے بارے میں سوالات تھے۔ ڈیٹا کا تجزیہ ویرینس ٹسٹ اینووا سے کیا گیا۔۔

نتیجہ: اس تجزیے سے پتہ چلا ہے کہ تحقیق میں شرکت کرنے والی گروہوں کے درمیان خاص فرق پایا جاتا ہے اور میٹاکاگنیشن کے اثرات کلاس میں تعلیم حاصل کرنے اور آنلائن تعلیم حاصل کرنے سے کہیں زیادہ ہیں۔

سفارش: میٹاکا گنیشن روش سے طلباء بہتر طور پر تعلیم حاصل کرسکتے ہیں اور اس سے ان کی معنوی سلامتی پر بھی مفید اثرات پڑتے ہیں۔

کلیدی کلمات: میٹاکاگنیشن، طلباء، کلاس، تعلیمی ماحول، معنوی سلامت

INTRODUCTION

The spiritual dimension has an important role in the health, well-being, and the quality of patients' life. Meeting the spiritual needs of patients in clinical care is an essential element. Therefore, nurses and Nursing students need to achieve this competence in order to provide suitable and effective clinical care [1]. Spirituality is a set of attributes and actions that create strong yet logical passion and appeal in man in order to advance his incredibly on the way toward the one and universal God of the world [2]. Spirituality may be defined as "whatever or whoever gives ultimate meaning and purpose in one's life, that invites particular ways of being in the world in relation to others, oneself, and the universe". Themes associated with the concept of spirituality include meaning, purpose, hope, faith, existentialism, transcendence, a sense of peace, and connectedness among others. Spiritual health refers to having a sense of acceptance, positive emotions, ethics, and a sense of positive interaction with a superior and sacred governmental authority, others, and self that comes during a dynamic and coordinated cognitive, emotional, functional, and personal process [3].

According to the American Association of Colleges of Nursing (AACN) and the Joint Commission on Accreditation of Health Care Organizations, one responsibility of nursing education is to prepare nurses for identifying spiritual distress and providing spiritual care [4]. Unfortunately, current research shows that many nurses in the workplace do not feel adequately prepared to provide spiritual care because of various reasons, including lack of adequate time to build rapport, the belief that spiritual care should be left to chaplains, insufficient education about providing spiritual care, and uncertainty about their personal spirituality [5, 6, and 7]. Thus, one of the main components needing attention in nursing education programs is developing spiritual health among nursing students.

The growth and development of nurses and Nursing students' spiritual health rely on strengthening their cognitive and metacognitive components. What is more associated with spirituality and spiritual health is students' metacognition. Metacognition means thinking about thinking and is a process that occurs in the working memory [8]. The term metacognition is applied to our knowledge with respect to our cognitive processes and their optimal use to achieve the learning objectives [9, 10]. Generally, there are two types of metacognition. The first is the knowledge about cognition and the second is related to the knowledge about cognitive regulation and supervision [11]. Thinking processes should be brought to the awareness level. Students should be encouraged to reflect more and more. Paying attention only to the structures and integration of knowledge is not enough; rather, directing the individual's attention to the inner knowledge and facilitating this process is also as important. This type of learning is not only thinking, but it also includes thinking about thinking as a metacognitive process [9] .In addition to dealing with cognition as understanding, remembering, and thinking, spirituality has the greatest level of interaction with metacognition and is affected by it [3]. It should be noted that there is a difference _____

between metacognitive knowledge and metacognitive activities. The former is a cognitive process and is involved in reviewing and reflecting on people's common or new ideas. In contrast, a metacognitive activity occurs when students purposefully accommodate and manage their way of thinking while solving problems and thinking [12]. Moreover, there are cognitive strategies referring to different ways of learning. Metacognitive strategies are, nevertheless, measures to monitor, control, and guide the cognitive strategies. Monitoring and evaluation indicate that learners have a deliberate supervision of their progress. Among these strategies are monitoring attention during reading a text, asking oneself questions while studying, and checking the time and pace of the study [9]. The regulation provides flexibility in learners' behavior and helps them, whenever necessary, to change their learning strategies. Regulatory strategies coordinate with monitoring and evaluation strategies [13]. Reynolds and Wade pointed to three important components of metacognition including self-monitoring, self-assertion, and self-regulation. They argued that cognitive regulation itself includes planning, monitoring, and evaluation [8]. Baker and Brown also identified two components for metacognition: knowledge (awareness) and controlling (regulation). The former refers to the awareness of the skills, strategies and cognitive resources for the effective performance in the task in hand and the second is related to the ability to use mechanisms to ensure the successful completion of the task [14]. However, the issue is how to develop students' metacognition, thus paving the way for their spiritual growth and development? In other words, which learning environments are suitable for developing Nursing students' spiritual health? In this regard, the present study aimed to investigate the effect of metacognition instruction in different multimedia-based learning environments on nursing students' spiritual health. In terms of the effect of metacognitive instruction, little research has been done in different learning environments. The following is an account of some of the related research conducted in this area.

In a longitudinal study on 619 nursing clinics, Chiang, Lee, Chu, Han, and Hsiao concluded that nurses' spiritual health had a positive effect on their professional commitment to health care [15]. Mohri Adaryani, Jalili, and Roshani, [5] Mohamadamini, [6] and Bassue [7] reported in their studies that metacognitive strategies had a significant positive correlation with spiritual health. Investigating the status of Nursing students' spiritual health and the factors involved in spiritual health, Hsiao, Chiang, and Chien, came to the conclusion that Nursing instructors should be made aware of the factors contributing to students' spiritual health, promote spiritual programs among them, and provide psychological care [3]. Hamjaha, Ismail, Sham, Mohd, Rasita, and Ismail investigated the effect of spiritual approaches to managing work stress among 38 institutions of Islamic Studies in Malaysia. The researchers found that experiencing stress could lead to heavy work load, resulting in physical and emotional exhaustion, which is, in turn, exacerbated when receiving any new obligations and responsibilities. They also argued that adopting spiritual approaches could ring about relief and comfort for the people working in these _____

institutions [16]. The results of another study conducted in Brazil revealed that spirituality had a strong relationship with mental health [17]. However, lack of descriptions of moral behavior, created by religious institutions, was evident in the related studies. Spiritual care is very effective in reducing depression in patients. Nevertheless, religious institutions should strive for a proper description of spirituality, provide the context for training and testing the patients, and integrate traditional care with spiritual care. Nurses have also identified the importance of spiritual care to facilitate healing and produce positive results. Griffin and Yancey, who used two surgical techniques, life transition and uncertainty during a surgical experience, to improve the patients' spiritual health, have achieved satisfactory results [18]. Momeni, Rezaie, Karimian, and Ebrahimi found that breast cancer patients with higher levels of spiritual health exhibited lower levels of depression [19]. Personal spiritual health can also play an effective role in improving nurses' attitudes toward mental care and professional dedication and improve their caring ability [15]. Cancer patients are often affected by various aspects of psychological stress during chemotherapy. Metacognitive components have a key role in reducing stress and anxiety in cancer patients during chemotherapy; this is more common among women. Despite the negative attitudes in this case, controlling thoughts as a component of metacognition could have an effective role in reducing anxiety and depression during chemotherapy [20]. Spiritual health, adjustment, and social order could also significantly predict the quality of personal life [21].

Based on the findings of the research studies reviewed, it can be argued that spiritual health is one of the important components in clinical care, and those like nurses, who deal with patients and are effective in their healing must have a high degree of spiritual health to be able to play their role in patients' spiritual care. This calls for the development of metacognitive knowledge and fostering its components such as self-evaluation, self-control, self-monitoring, and planning through instruction in suitable learning environments. Thus, the purpose of the current study, set into a multimedia-based learning environment, was to explore the effectiveness of metacognition instruction in changing the level of spiritual health among nursing students.

METHODS

The present study was a quasi-experimental in nature and a multiple-group pretest, posttest in design. The population included all the undergraduate students of nursing at ... University of Medical Sciences in the academic year 2015-2016. Of these, 60 were selected through a convenience sampling method and randomly assigned to three experimental groups: face-to-face, online, and blended instruction (each including 20 participants).

Two instruments were employed in the study: instructional multimedia and spiritual health questionnaire. The instructional multimedia content covered metacognition components of planning, self-monitoring, self-expression, self-regulation, and self-evaluation. In terms of content validity, the instructional multimedia were checked by instructional technology experts and instructional designers.

To this end, the experts were asked to rate the instructional multimedia with respect to such criteria as the delivery of content and the instructional design. Besides, the experts were also encouraged to openly provide their critical feedback; accordingly, necessary modifications were made to the instructional multimedia. To further ensure the appropriation of the instructional multimedia in relation to the final pool of the participants, it was piloted among five nursing students who did not take part in the main study but were from the same population as that of the final sample. The students were asked to interact with the instructional multimedia and make comments in case the content was unclear, difficult, and/or incomplete. Consequently, the problems voiced by the students were addressed, and measures were taken to revise the instructional multimedia so that the end result was ready for the main study.

For assessing students' spiritual health, Paloutzian and Ellison's spiritual health questionnaire, developed in 1982, was used [22]. The questionnaire comprised 20 items in two subscales: existential well-being and religious well-being (each including 10 items). Each subscale ranged in score from 10 to 60, with higher scores indicating higher existential and religious well-beings, respectively. The sum of the total scores related to the two subscales, ranging from 20 to 120, indicated the overall spiritual health. All the items were on a 6-point Likert-type scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). In negative statements, the scoring was reversed. Based on the scores obtained, each individual spiritual health was categorized as either *low* (20-40), *moderate* (41-99), or *high* (100-120). The reliability indexes for the subscales related to religious and existential well-beings were shown to be as high as 0.89 and 0.81, respectively, in the previous research [23]. In the present study, the reliability index of the scale was estimated to be 0.82 using Cronbach's alpha and 0.81 using the split-half method.

Initially, 60 students were randomly assigned to three groups of 20 participants. Before the treatment sessions, the participants responded to the spiritual health questionnaire. Then, the groups were exposed to multimedia-based metacognition instruction for eight 30-minute sessions. The first group received their multimedia instruction in a face-to-face class. The second group received multimedia content through online access to a learning management system (LMS). And finally, the third group observed instructional content in a blended form (face-to-face and online). Multimedia content included spiritual health concepts such as praying to God, the source and resurrection, supervision of God, friendship with God, and the meaning of life, which were combined with metacognitive components such as planning, self-monitoring, self-expression, self-regulation, and self-evaluation. After the training sessions, the spiritual health questionnaire was administered again.

RESULTS

The results of the metacognition instruction in three learning environments were analyzed using descriptive and inferential statistics. Table 1 shows the descriptive statistics on groups with respect to spiritual health before and after implementing metacognition instruction.

Table 1. Descriptive Statistics of Spiritual Health Variable before and After Implementing Metacognition Instruction (N = 60)						
	Experimental groups					
Measure of Spiritual Health	Blended (n = 20)		Face-to-face (n = 20)		Online (n = 20)	
	M	SD	M	SD	M	SD
Pretest	50.35	4.56	52.80	4.08	53.15	3.58
Posttest	80.20	4.73	72.80	4.08	63.15	3.58

Table 2. ANOVA for the Spiritual Health Variable After the Implementation of Metacognition Instruction					
Source	Sum of squares	df	Mean squares	F	p
Between-subjects	2923.90	2	1461.95	84.43	0.000[*]
Within-subjects	986.95	57	17.32		
Total	3910.85	59			

[*] p < 0.0001

As evident in the table, pretest scores of groups trained in blended, online, and face-to-face learning environments were not significantly different, $F_{(2, 57)} = 0.14$, $p = .728$; however, in terms of posttest scores, the blended group ($M = 80.20$, $SD = 4.73$) outperformed both face-to-face ($M = 72.80$, $SD = 4.08$) and online groups ($M = 63.15$, $SD = 3.58$).

Table 2 displays the results of the analyses of data obtained after the implementation of metacognition instruction using a one-way analysis of variance (ANOVA). Before conducting the ANOVA, however, the index of Levene's test for the assumption of the homogeneity of variance was estimated to be non-significant, $F_{(2, 57)} = 1.29$, $p = 0.286$, indicating that the variances for the groups were similar.

As can be viewed in the table, there were significant differences between the groups after implementing metacognition instruction, $F_{(2, 57)} = 84.43$, $p = .000$, indicating that the instruction of metacognitive components could have a positive effect on spiritual health of different groups. To further identify the significant differences, Tukey post hoc test was conducted (see Table 3).

As seen in the table, there were significant differences between different groups in terms of spiritual health at $p = .000$. Specifically, the effect of metacognition instruction on spiritual health was greater for a blended learning environment when compared with face-to-face and online learning environments (with the mean differences of 7.40 and 17.05, respectively).

In addition, the effectiveness of metacognition instruction in spiritual health was more pronounced for face-to-face learning environment than for online learning environments (with the mean difference of 9.65).

DISCUSSION

There is a professional requirement for nurses to achieve competence in the delivery of spiritual care and to assess and meet their patients' spiritual needs. One of the main ways to develop Nursing students' spiritual health is through metacognition instruction that could positively affect their overall well-being and spiritual health. This study aimed to investigate the effect of metacognition instruction in multimedia-based learning environments on nursing students' spiritual health. A sample of Nursing students were randomly assigned to three learning environments (viz., face-to-face, online and blended). Before the treatment sessions, the participants responded to a spiritual health questionnaire. Then, the groups were exposed to multimedia-based metacognition instruction for eight sessions. After the training sessions, the spiritual health questionnaire was administered again.

The results showed that the effect of metacognition instruction on spiritual health in the blended learning environment was higher than that in face-to-face and online learning environments. In addition, metacognition

Table 3. Results of Tukey Post Hoc Test for Significant Differences Between Groups				
Group Comparison	Mean difference	SE	95% CI	p
Blended vs. Face-to-face	7.40	1.32	[4.23, 10.56]	0.000[*]
Blended vs. Online	17.05	1.32	[13.88, 20.21]	0.000[*]
Face-to-face vs. Online	9.65	1.32	[6.48, 12.81]	0.000[*]

Note. CI = confidence interval.
[*] p < .0001.

instruction in face-to-face learning environment had a more positive effect on spiritual health when compared with the online learning environment. Despite the findings, the study faced the limitation of using a convenience sampling procedure, although the participants were randomly assigned to different experimental conditions. In other words, the findings of the study are limited to the particular group of nursing students readily available at the time of the study; further studies should, thus, be conducted using completely random sampling procedures in order to ensure the generalizability of the findings.

Because of the scarcity of empirical research into the effectiveness of metacognition instruction in spiritual health, it is hard to directly compare these findings with those obtained in previous related research studies.

However, it can be stated that experts have always sought to understand cognitive processes and discover techniques to improve cognitive abilities. Metacognition refers to the individual's understanding of their own cognitive system. It is a multifaceted concept that entails the knowledge, processes and strategies that evaluate cognition. Stronger metacognitive strategies help promote learning and pave the way to success. Thus, they provide the individual with a sense of happiness, hope and self-confidence, hence the improvement of well-being and spiritual, which provide coherent relations among the inner resources. It is associated with such characteristics as stability in life and peace as well as a sense of closeness

with oneself, God, society, and the environment. It determines the integrity of the individual and is an important dimension of a healthy life, which makes the life, both goal-oriented and meaningful and helps reduce stress and anxiety so that it empowers the individual to overcome cognitive barriers and solve problems. It also contributes to improved self-concept, self-confidence, and realistic knowledge of one's abilities and weaknesses, hence the improvement of well-being.

Based on the findings of the present study, it can, therefore, be suggested that spiritual health should be regarded as one of the important components in clinical care, and those like nurses and Nursing students dealing with patients should have a high degree of spiritual health to be able to play their active role in patients' spiritual care. This calls for the development of metacognitive knowledge as well as fostering its components such as self-evaluation, self-control, self-monitoring, and planning through instruction in suitable learning environments.

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