Educational Technology International
2022, Vol. 23, No 2, 183-205

https://doi.org/10.23095/ETI.2022.23.2.183
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Development of Interactive Mobile Learning Media on Teaching Terms of Mental Status Examination (MSE) for Nursing Students

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Mental status examination is an important stage in the assessment process because it serves as the foundation for establishing nursing diagnosis and intervention. Until now many students still feel difficult to understand the terms in the assessment of mental status. Interactive Mobile Learning in one of the media that is currently being developed. The use of this media will provide more in-depth learning opportunities, and students can practice their skills in carrying out practicals because of the mobility principle possessed by smartphones. The purpose of this study was to develop a smartphone-based app and evaluate the app's effectiveness by measuring nursing students' knowledge of mental status examination. Design: A randomized trial with a pre-and post-test design was conducted at a university in Indonesia. A total of seventy junior nursing students participated in this study. The intervention group received a smartphone-based app, and the control group received one-time lecture-based learning. We offered the experimental group the app and information about how to use it, and we encouraged them to use it. The control group received classroom instruction. Results: The intervention group scored significantly higher than the control group on knowledge score ($t = 19.40$, $p = 0.000$) and satisfaction with the learning method ($t = 0.640$, $p = 0.021$) Conclusion: These findings suggest that smartphone-based education could be an effective method in nursing education for teaching mental status examinations.

Keywords : Interactive mobile learning, Mental status examination, Nursing student

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Introduction

Mental health problems are now leading cause of global burden diseases associated with mental disorder (Murray et al., 2012). The number of mental disorder patients increases every year. Based on data from WHO, estimated that 20 million people worldwide have a mental disorders (WHO, 2022). To be able treat patients with mental disorders, variety of skills are needed from the assessment process to conducting evaluations. One of the most important processes for initiating treatment patient with a mental health problem is Mental Status Examination (MSE)

Mental Status Examination (MSE), which forms the basis for establishing diagnoses and nursing interventions. Using a systematic approach that involves short interviews and observations, this assessment observes patients' behavioral and cognitive data (Norris et al., 2016). Some aspects that are assessed during MSE are general appearance, motor activity, speech, affect, thought content, thought process, perception, intellect, and insight (Faber, 2009; Finney et al., 2016).

The Mental Status Examination is an important stage as a basis for establishing a diagnosis. MSE contains data on the patient's history and results from observations during interaction (Rocha Neto et al., 2019). Through MSE, the progress of the interventions can also be known. The ability to conduct MSE is important for every nurse. Because a nurse is the person who monitors the patient's progress for 24 hours. While a nurse who works closely with the patient can be a valuable resource, a nurse who is a psychiatric clinical specialist can look into drugs and characterize the previous and present diseases and behaviour (Goldenberg & Chiverton, 1984).

It is important for nurses to have a comprehensive understanding of MSE, which they typically obtain during their education at their chosen institution. According to Priyono et al., (2018) survey results from nursing students in Indonesia indicated that students found it difficult to learn the terms contained in MSE. This result is supported by Evans et al., (2008) who found that many students are confused with the structure and terms used in MSE. Based on these findings, other learning

methods are needed so that the material provided can be better understood by nurses and nursing students.

Various innovative learning methods have been developed for this purpose. Chicca & Shellenbarger (2018) stated that today's students typically belong to a generation who grew up in a technology environment and, therefore, are familiar with using multimedia. Adequate learning media is one of the factors that affect learning outcomes (Hampton, 2017). This is particularly important as nursing students pursuing a bachelor's program gain little exposure to clinical experience. Ketola & Stein (2013) state that learning using multimedia provides convenience to students who do not have access to clinical experience.

There are several types of learning media that have been used by nurse educators during teaching on MSE. For instance, Priyono et al., (2018) used interactive multimedia, which is installed as an application on a laptop or desktop, to increase knowledge and understanding of MSE. Research by Evans et al., (2008) used interactive videos, which required an internet connection to promote learning about MSE. Some of the learning media employed assists students in learning descriptions of mental patient conditions encountered in the field. However, there are disadvantages to this media, such as the fact that the applications cannot be carried anywhere and require access to a computer and internet connection. Therefore, several innovations have emerged that use smartphones, which have become another learning media for nursing students (Hsu et al., 2019; O'Connor & Andrews, 2018).

The rapid innovation of mobile applications and their increased flexibility compared to conventional learning media have increased the interest among educators in using smartphone applications in the learning process in the classroom (Zhan, 2014). The use of smartphone applications has been found to increase students' understanding and enthusiasm for their learning, as well reduce costs and paper usage and support distance learning (George & Decristofaro, 2016; Yeon & Seo, 2019).

The terms contained in the assessment of MSE which are quite difficult to

remember become an obstacle for students. Through the smartphone application, students can be self-directed in their learning, and lessons can be replayed anytime and anywhere (J. H. Kim & Park, 2019). Moreover, learning using smartphones provides high portability and accessibility, can facilitate self-directed learning, and motivates students to collaborate and communicate among students (Gomez et al., 2016; Kwon & Lee, 2011). The presence of multimedia elements in applications on smartphones, it can increase students' understanding of the material by up to 30% (Masters, 2013). This has proven useful considering the current pandemic, which has required tertiary learning activities at institutions to be carried out remotely. However, in Indonesia difficult to find research focused on the development of smartphone applications for MSE materials.

Problem of Study

The difficult of remembering and understanding the terms of Mental Status Examination (MSE) in nursing students require a more effective teaching method. Current technological developments allow every student to have a smartphone. This makes it possible to integrate learning and technology so that the proses of learning becomes more effective. By figuring out the effect of learning using a smartphone applications for nursing students, we can get implications for teaching-learning prescriptions for enhancing nursing students' learning

Methods

Research Model

This study used a randomized trial with a pre- and post-test design. In each group were measured score of knowledge and satisfaction.

Participant and Setting

This study involved third-year nursing students in Indonesia as they focused lessons on mental health nursing. The inclusion criteria were that they had to be junior undergraduates, had to have completed two credit Mental Health and Psychosocial Nursing courses, and not have been exposed to mental health examination. Participants were informed about the study's purpose, procedures, and confidentiality information via WhatsApp and Google Classroom. Students who wished to voluntarily participate in the study were required to sign a consent form and provide written informed consent. Seventy nursing undergraduate students from the School of Nursing, Faculty of Medicine, Tanjungpura University, were recruited for this study. All participants completed the pre and post-measurements.

Data Collection Tools

All of the instruments were written in Indonesian, and their content consist of General **B**ehavior, **E**motions, **S**peech, **T**hought content and processes, **P**erceptual, **I**mpulse control, **C**ognition, **K**nowledge

Score of Knowledge. The authors of the study created an instrument based on the MSE guidelines to assess score of knowledge. The instrument was designed using Bloom's Taxonomy cognitive abilities, which were revised by Anderson & Krathwohl (2001), starting from the cognitive ability to remember, understand, apply and analyze with four answer choices (A, B, C, D). A point 2.5 was assigned to each correct response., with the highest possible score being 100 points.

The development of the instrument started with the preparation of the questions grid, and content validity tests for 4 experts : 1 expert lecturer in nursing education, 1 expert lecturer in mental health & psychiatric nursing and two psychiatric nurses with at least five years of hospital experience at the Mental Health Hospital. On a

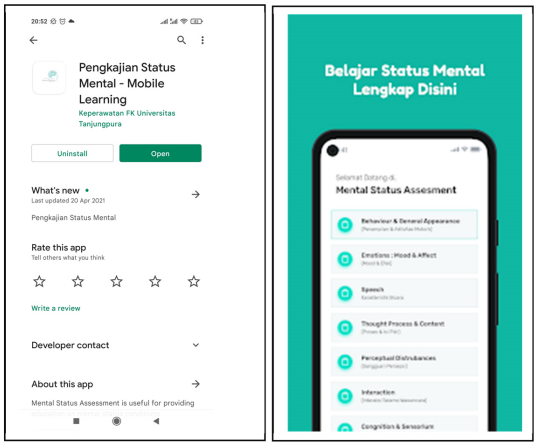
four-point Likert Scale, each expert rated the content validity. Each instrument's mean content validity score ranged from 3.62 to 4.00. The next process of the item analysis was carried out, starting with testing the validity, reliability, level of difficulty, item discrimination power, and distractor.

The result of the reliability test on the instrument are 0.94. This shows the degree of reliability is very high. The difficulty level of the instrument shows there are 16 items including the level of easy, 13 items of moderate difficulty, and 11 items of difficulty. The results of the test of discriminating power of knowledge from the instrument showed there was 40 questions with discriminatory power 50-100%. Results of this instrument's trial show a distractor that ranges from good to very good.

Satisfaction. An instrument based on the satisfaction scale developed by Otieno et al., (2007) was used to assess student satisfaction. Then after permission to using the instrument, authors revised the instrument to make it more contextually suitable and translated it from English to Indonesian. The instrument consisted of eight items that were rated on a four-point Likert scale to assess student satisfaction with the learning method, feelings about knowledge improvement, and feelings about the importance of the learning method. The higher score means more satisfied. In this study, Cronbach's alpha was 0.816. The instruments' content validity index was above 80%, which is considered acceptable (Waltz and Bausell, 1981).

Development of the Smartphone-based App MSE. We used MSE's standard learning objectives and goals. The smartphone app was developed to help undergraduate nursing students learn about the Mental Status Examination. The authors of the study looked through mental health and psychiatric nursing textbooks and several nursing journals to ensure they would have the most up-to-date information about MSE. Text, video, and instructions were used. The materials were written at a reading level appropriate for undergraduate nursing students. The content validity of the app was confirmed and approved by the four experts who

approved the instrument's content validity. The app was created by a technician team. The final product app was published on Google Play (Figure 1).



The introduction screen at Google Play Store | Table of Content

Explanation Each Terminology | Feature of Quiz

Figure 1. Screenshot of feature Smartphone-based App.

Data Collection Procedure

From November 3 to November 30, 2020, data was collected. A pre-test was given to determine whether the participants had any prior knowledge of MSE. The pre-test

and post-test questionnaires were distributed to the participants by two research assistants. The content of instruction was the same for both groups. The control group received a traditional 100-minute classroom lecture from Djoko as a researcher and given instructions to repeat the lessons independently at home. For the experimental group, Djoko showed the students how to download and use the app in the experimental group.

Before the post-test, the control group was only required to attend one lecture. The other hand, the experimental group was encouraged to use the app for a week. Each group attended separate scheduled classes before and after the intervention to prevent them from sharing information. A week after the intervention, each group received a post-test on knowledge and satisfaction with the learning method. Following the post-tests, the researcher made any necessary corrections.

Data Analysis

Demographic characteristics and measurement scores were described using descriptive and inferential statistics. To see whether there were any differences in scores between the experimental and control groups, independent samples t-tests were used. Statistical significance was assumed when $p < 0.05$.

Ethical Consideration. Ethical consideration was granted by the Ethical Committee, Faculty of Medicine, Tanjungpura University Number 5743/UN22.9/ TA/2020. Participants were informed about every aspect of the study and were assured that not able to participate would have no negative consequences. After being informed, participants were asked to sign a consent form.

Results

There were 45 females and 25 males among the 70 participants. Their ages ranged from 21 to 23, with average 22.1 years. Table 1 shows the demographic characteristics of the two groups. Academic achievement showed no statistical differences between the experimental and control groups based on their GPA (M = 3.31) and knowledge score (M = 42.52). Therefore, the groups are considered homogeneous.

The smartphone-based app was only compatible with Android operating system. We used video, text, graphic-based materials, and instruction appropriate for undergraduate nursing students. Process develop of the app based with a technician and was confirmed with experts. The application was uploaded to the Google Play Store.

Table 1
Baseline between the Groups (N=70)

Variables	Classification	Experiment (n=35) n (%) or *M* (*SD*)	Control (n=35) n (%) or *M* (*SD*)	Total n (%) or *M* (*SD*)	*p*
Gender	Male	13 (37.14)	12 (31.43)	25 (34.29)	0.751
	Female	21 (62.86)	24 (68.57)	45 (65.71)	
GPA		3.33 (0.29)	3.29 (0.35)	3.31 (0.32)	1.000
Knowledge Score		43.25 (4.72)	41.80 (4.28)	42.52 (4.50)	0.127

GPA : grade point average

Based on Table 2, the mean score of knowledge was improvement higher in the experimental group than control group with statistically significant difference between two groups (t=19.40, p=0.000). Thus, the experimental group showed improved score of knowledge compared to the control group.

Table 2
Mean Difference Score of Knowledge after Intervention

Groups	*M (SD)*	*t*	*p*
Experiment	69.52 (7.23)	19.40	0.000
Control	50.12 (4.51)		

The mean score for different satisfaction with learning methods between the two groups presented in Table 3. Based on the table, satisfaction in the experimental group was higher than control group (2.81±0.37) and there was statistically significant difference between the two groups (t=0.640, p=0.021)

Table 3
Difference Satisfaction with Learning Methods (N=70)

Categories	Experiment Group (n=35) *M* (*SD)*	Control Group (n=35) *M* (*SD)*	*t*	*p*
Total	2.81 (0.37)	2.17 (0.29)	0.640	0.021

Discussion

This study aimed to develop a smartphone-based application for MSE learning. Compared with the control group who received teaching using the classical method, the experimental group showed an increase in knowledge scores, indicating a higher level of understanding regarding the MSE material. Media-based education such as multimedia, provides new learning experiences and can be accessed anytime and anywhere.

This allows students to revisit the material provided without relying on explanations from the lecturer. The results of the current study are in accordance with Mayer's Cognitive Theory of Multimedia Learning which state that the use of interesting learning multimedia provides a greater level of understanding compared

to traditional methods (Mayer, 2005). Furthermore, information obtained through these learning methods will become new knowledge stored in long-term memory. Therefore, multimedia learning is more interesting and can provide a better understanding of the information provided (Mayer, 2005).

Students who learn to use media-based learning resources can remember learning information better and more interested in the learning materials than students who are only exposed to information once through face-to-face classroom lectures. Therefore, these learning methods encourage students to be more actively involved in learning. Learning using smartphone-based applications helps to improve student's practical skills and confidence (S. Kim et al., 2017). Several studies have compared learning using media such as videos with face-to-face lectures in class, with results showing that while both groups experience an increase in knowledge, the skill accuracy of the intervention groups are better than the control groups (Baccin et al., 2020).

Media-based available smartphones will be easier for students to access, and students can repeat the materials (Jeong, 2017). The results from Park et al., (2021) show that students who use self-instruction videos can study the video repeatedly and retain the information obtained through the video compared to students who are given one lecture method. This study also suggests that through appropriate teaching methods, we can encourage students to be actively involved in learning. Other studies using multimedia compared to traditional lecture showed both of groups increased their knowledge, but skills was higher in the group using media compared traditional method (Park et al., 2021; Yang et al., 2019).

Similar to previous research, our study showed that nursing students were significantly more satisfied with learning to use smartphones compared to traditional teaching methods. Nowadays students today are closer and prefer to use smartphone to interact and communicate. Repetition materials using smart-phone app may have been helpful to increasing their knowledge and skills. Learning to use smartphones will support self-directed learning for students. Students will easily access the subject

matter without any restrictions on time and place. Learning that is carried out repeatedly will certainly strengthen the memory of the material provided.

Finally, in the current technology era, it is necessary to combine nursing education and technology. A nurse educator as the spearhead in nursing education is highly recommended to use interactive multimedia so that it will improve student learning

In this study, the researcher did not use a question-and-answer session as an intervention. However, other studies suggest that providing such sessions further improves students' abilities. Therefore, in addition to the use of media question and answer activities in a learning session can affect the success of learning.

Conclusion

MSE is a critical component of nursing care. The application used in the study was developed to provide MSE materials for nursing students. The content for this application was developed in a systematic manner that promotes students' interest in learning. The app is currently only available in Indonesian, but anyone can download it from the Google Play Store. The authors believe that the smartphone app developed in this study will be helpful to increasing the score of knowledge of Indonesian nursing students about providing MSE. Health-related smartphone apps could be used to teach nursing students in various of content areas as an effective learning method.

Recommendations

Nurse educators have a responsibility to provide teaching techniques. The results of this study illustrate that smartphone-based applications have the potential to be used as effective teaching aids in the learning process. Therefore, smartphone-based learning media can play a significant role in nursing education.

Limitations

This research has several limitations. First, it was difficult to evaluate how many times the experimental group's students had already opened the application, which may have affected the results. Second, standard instruments for measuring knowledge scores were not used. However, the instrument used was tested and found to have good validity and reliability. Third, although the sample size was relatively small compared two groups. Therefore, to ensure the results are valid and generalizable, this application should be tested with larger sample size. Furthermore, student knowledge retention must be assessed over a longer period time.

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Appendix

Sample of Questionnaire

1. The patient performs repetitive activities, such as washing hands, is called...
   a. Agitation
   b. Compulsive
   c. Obsessive
   d. Tremor

2. Which of the following needs to be observed when conducting an assessment of speech characteristics?
   a. Tempo, volume and intensity
   b. Volume, characteristic and duration
   c. Volume, tempo and characteristic
   d. Tempo, characteristic and accuracy

3. A patient tells that in the past week he felt a lot of ants walking all over his body that it interfered his activities. Based on the patient's response above, the patient experienced…
   a. Gustatory Hallucinations
   b. Tactile Hallucinations
   c. Nihilistic Delusions
   d. Somatic Delusions

4. You will conduct a memory assessment on the patient. What is the appropriate question to ask?
   a. Can you please count down 7 numbers starting from 100?
   b. Can you tell me about the noises that have been bothering you lately?
   c. Can you tell me what you ate and what color of the medication you took today?

d. Can you tell me where you are now and tell me the name of your friends in this room?

5. A patient says "I am sad and hopeless", a weepy facial expression is shown. Based on the patient's response, the aspects of the assessment that can be documented are:
   a. Self-Insight
   b. Mood
   c. Speech Characteristics
   d. Judgement Ability

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21. An assessment conducted to determine the patient's ability to pay attention is called ...
    a. Level of consciousness
    b. Judgement Ability
    c. Memory ability
    d. Concentration ability

22. Which of the following patient responses indicates the presence of thought control?
    a. “Many police are stalking me, my neighbors want to ruin my life”
    b. “In my head there is a processor that contains programs for daily activities.
    c. “Someone else injected his thoughts on my mind”
    d. “All of the fellow nurses can read my mind”

23. A patient is admitted to the ER of a Mental Hospital with disheveled hair and dirty looking clothes. During the assessment, the patient's response was silent without any change in facial expressions. From the illustration above, how is the patient's affective condition?
    a. Innappropriate affect
    v. Blunted affect
    c. Flat affect
    d. Labile affect

24. You want to perform an assessment of self-insight of the patient being treated in the room. What is the appropriate question to ask?
    a. What would you do if you found your family's lost wallet?
    b. How do you understand your illness until you are being treated here?
    c. Can you tell us the most memorable moments here?
    d. Can you tell us where you are now and tell us the name of your friends in the room?

25. The assessment of the patient's ability to make decisions and understand the consequences of the decisions taken is called?
    a. Level of consciousness
    b. Insight
    c. Judgment
    d. Level of consciousness and making judgments

30. In some cases of mental illnesses, it was found that the patient's thought processes were in the persevering category. How do you explain the persevering thought process in mental illness patients?
    a. Conversation that has no relationship between one sentence and another
    b. Convoluted conversation that does not get to the point

c. Convoluted conversation but gets to the point

d. A conversation that is repeated many times

36. When you ask the patient "*Why did you hit your friend*?" the patient answered in a convoluted manner, but in the end the patient said that someone had whispered to him to hit someone else. From the illustration above, the aspects of thinking process assessment that can be documented are ...

a. Perservation thinking

b. Tangetial thinking

c. Circumstantial thinking

d. Loss of Associations

37. What are the questions that can be asked to the patient in order to assess the ability to judge (judgment)?

a. What would you do if you entered your house and smelled gas?

b. Can you tell me where you are and tell me the name of your friends in the room?

c. What do you do when you have free time?

37. How do you understand the disease you are currently experiencing?

38. Pay attention to the patient's statement below:

Patient: "*My heart hurts because it was stabbed by a sword*"

From the patient's response above, what is the patient's thought process?

a. Bizarre Delusions

b. Somatic Delusions

c. Nihilistic Delusions

d. Non-Bizarre Delusions

39. A patient speaks in a loud tone, the client says my parents took me here. But

my parents were hit by a car. Cars are very expensive compared to bicycles. Riding a bicycle may be healthier. Health and diet is now a business. From these data, what is the patient's thought process?

a. Perseveration thinking
b. Tangential thinking
c. Flight of ideas
d. Loss of association

40. A patient is escorted by his family, wearing dirty looking clothes inside out, disheveled hair and body odor. From these data, what are the aspects that can be documented?

a. Personal hygiene
b. Patient appearance
c. Deficit Self Care
d. Lack of hair care

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Received: June 07, 2022 / Peer review completed: September 27, 2022 / Accepted: October 10, 2022