

# Efficacy of cooperative learning model 'make a match' among pharmacy students

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## ABSTRACT

Learning innovations to improve the understanding of a concept and learning outcomes of students are required. One of which is the cooperative learning model 'make a match'. This study aimed to determine the effectiveness of applying the 'make a match' model on the learning outcomes of pharmacy students. This study is a quasi-experimental study with a one-group pretest-posttest design. The research subjects consist of all pharmacy students in 6<sup>th</sup> semester in 2015. The efficacy of the application of the 'make a match' method was assessed in terms of the increase in learning outcomes. The collected data were analyzed using descriptive and inferential statistics including paired t-test. The average score of the students after being taught using 'make a match' was higher ( $68.10 \pm 17.40$ ) than that using conventional one ( $58.36 \pm 22.91$ ), ( $p < 0.05$ ). The application of the 'make a match' model could stimulate active participation of students during learning processes and could improve the learning outcomes of pharmacy students, especially in the Clinical Pharmacology course.

**Keywords:** Games for learning, Modern learning method, Learning innovation, Pharmacy students

## Introduction

Education is one of the key instruments for the development of human resources. Lecturers are one of the elements that play an important role and they are responsible for developing tasks and dealing with any problems encountered. Lecturers are a key component in the implementation of education. Successful application of a learning strategy highly depends on the lecturer's expertise in making use of a method, technique, strategy, and learning method. Pharmacy and Pharmacists play an essential part in the well-being and health care [1, 2].

Lecturers play a vital role in creating a positive classroom atmosphere. They are also required to be able to condition the classroom to allow for interactions to take place among students.

Therefore, lecturers shall be able to use a particular learning strategy to improve student's learning outcomes. Before teaching, lecturers shall master the knowledge and understand strategies, techniques, or methods to deliver learning materials properly. Also, lecturers shall have strategies to conduct teaching and learning processes to allow students to learn efficiently, helping them achieve any desired learning outcomes.

The role of pharmacists in healthcare has dramatically changed recently from the compounding and dispensing of medications to the delivery of a wide range of health services, both in hospital and community pharmacies [3, 4]. Based on the results of the observations conducted by the researcher on pharmacy students, the following are some phenomena found during the learning processes in the Clinical Pharmacology course (1) students are not yet actively involved in the learning processes, (2) learning processes are still dominated by lecturers, (3) classroom discussion does not run well, (4) it is difficult for students to memorize and understand drug profiles. These then lead to low learning outcomes. Clinical Pharmacology is a core subject for pharmacy students who are in their sixth semester [5, 6]. In addition to being a core subject, this is a competency-based course, and students are required to pass with a minimum grade of C. This course contains materials about off-label drugs,

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emergency medicines, anesthesia, corticosteroids, and drugs for ear and eye disorders. In general, the learning outcomes for the Pharmacology course are not yet quite good with an average grade of 56.80.

Based on these phenomena, it is crucial to make efforts to create effective learning to allow students to be actively involved in the learning processes to improve their learning outcomes. Thus, it is necessary to improve learning processes by applying learning models that emphasize students' active participation. One of the models that can be applied is the cooperative model. A cooperative learning model is a series of learning activities that students perform in particular groups to achieve the desired learning outcomes [7]. There are several types of this model, one of which is the 'make a match' type. This type provides students with opportunities to interact more actively with the lecturer or other students in the classroom. Each student is required to be actively involved during the learning processes by giving suggestions, opinions, ideas, or simply answering questions asked by the lecturer by raising or submitting a card handed out by the lecturer to each student. A study conducted by Rofiqoh *et al.* (2010) showed that the implementation of 'make a match' can improve students' learning outcomes by up to 77% [8].

## Materials and Methods

This was a quasi-experimental study with a one-group pretest-posttest design [9]. The research subjects consisted of all pharmacy students, semester 6, the class of 2015, amounting to 55 students. The efficacy of the application of the 'make a match' method was assessed in terms of the increase in students' learning outcomes. Improved learning outcomes were defined as an improvement in the average score of both exams and quizzes after the application of 'make a match' compared to the average score of exams and quizzes after being taught using the only conventional method. The conventional method was defined as a teaching method where students only listen to what a lecturer explains (lecture and group discussion). The stages of the learning processes in the Clinical Pharmacology course are as follows:

### *Research preparation stage*

During the preparation stage, the researcher prepared all the things needed, namely learning tools and data collection instruments. The learning tools consisted of teaching materials, i.e. syllabus, learning plan, assignment sheets, quiz materials, matching cards, and student satisfaction questionnaires. Matching cards consisted of 10 cards that contained 10 questions with 10 answers about the topics learned during the course, namely off-label drugs, emergency medicines, anesthesia, corticosteroids, and drugs for ear and eye disorders. The questions for the quizzes and matching cards had been reviewed by the head of the science cluster.

### *Research implementation stage*

### *Application of conventional learning model during the mid-term exam (7 sessions)*

1. Conventional learning activities lasted 100 minutes, divided into introduction, core activities, and closing. The introduction lasted 10 minutes which started with praying, then the lecturer gave some motivation to the students related to the materials that the students would study.
2. At that, the lecturer divided the students into several groups, each of which consisted of 5-6 students. The groups were made by the lecturer based on the students' GPAs, combining students whose GPA was greater than three (>3) and lower than three (<3). According to Rusman [10], cooperative learning is a form of learning which allows students to collaboratively study and work in a small heterogeneous group that consists of four to six students.
3. After the introduction, the lecturer then proceeded to the core activity which lasted 70 minutes. The lecturer explained to the students about the learning objectives and course materials using a lecture method with the help of PowerPoint presentations.
4. In the closing, all the groups were given an assignment containing several questions related to the materials they learned on that day and they were asked to discuss these questions. This session finally ended with an online individual quiz.

### *Application of cooperative learning model 'make a match' in the learning process during the final exam (7 sessions)*

1. The activities in the **cooperative learning model 'make a match' type** lasted 100 minutes, divided into introduction, core activities, and closing. The introduction lasted 10 minutes, which started with praying, then the lecturer gave some motivation to the students related to the materials that the students would study.
2. After that, the lecturer divided the students into several groups, each of which consisted of 5-6 students. The groups were made by the lecturer based on the students' GPAs, combining students whose GPA was greater than three (>3) and lower than three (<3).
3. After the introduction, the lecturer then proceeded to the core activity which lasted 70 minutes. The lecturer explained to the students about the learning objectives and course materials using a lecture method with the help of PowerPoint presentations.
4. In the closing, the lecturer played a game related to the learning materials. Before starting the game, the lecturer explained the instructions/rule of the game.
5. The lecturer prepared matching cards that contained 10 questions and 10 answers (1 package) related to the materials they discussed during the course on that day. Each of these groups received 1 package of matching cards. They were asked to match the questions and answers in a limited amount of time.

6. Finally, each of the students was asked to work on an online individual quiz.

### Evaluation stage

The effectiveness of the learning method was assessed by comparing the average score of the mid-term exam (conventional methods) with the average score of the final exam (after applying the 'make a match' method), as well as by comparing the average score of the quiz using conventional methods with the average score of the quiz after applying the 'make a match' method. The pre-test scores were obtained from the average mid-term exam scores and the average quiz scores during the mid-term period, while the posttest scores were obtained from the average final exam scores and the average quiz scores during the final period. Also, this study measured students' satisfaction with the application of the 'make a match' method by conducting a survey using questionnaires.

## Results and Discussion

This study involved all the sixth-semester Pharmacy students in the class of 2015. 55 respondents participated in this study. The characteristics of the respondents are: the female respondents dominated the study if compared to the male respondents, namely 76.5%. Most of the respondents (61.7%) were 21-23 years old. **Table 1** presents the characteristics of the respondents.

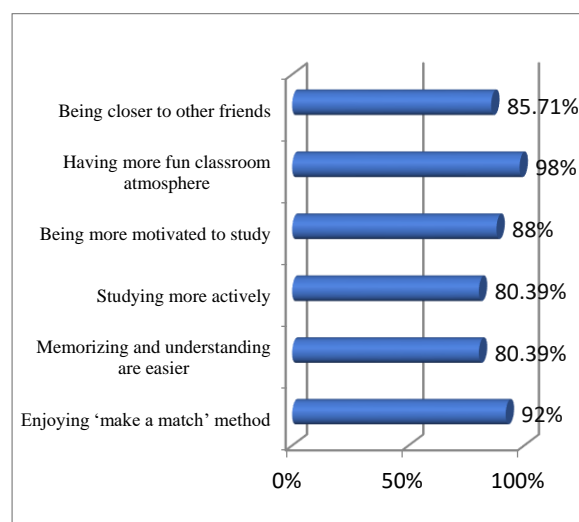
**Table 1. Characteristics of Pharmacy Students (N=55)**

Characteristics	Frequency (%)
Sex	
Male	12 (23.5)
Female	39 (76.5)
Age (Years)	
18-20	17 (36.2)
21-23	29 (61.7)
24-26	1 (2.1)

This study was conducted in 14 sessions or about four months, starting in March to June. Seven sessions were conducted using the conventional method and the remaining seven sessions were done by applying the 'make a match' model. The topics studied in this course consisted of off-label drugs, emergency medicines, anesthesia, corticosteroids, and drugs for ear and eye disorders. The application of the 'make a match' cooperative learning method ran well. Field observations showed that all the students participated actively, there were discussion and collaboration among group members in finding the pairs of each card, and these students were motivated and enthusiastic about participating in the learning processes. Cooperative learning is an approach or a series of strategies that are specifically designed to stimulate students to cooperate during a learning process [11]. Cooperative learning can improve students' learning outcomes and stimulate the attitude of helping each other as social behavior [11]. On the other hand, students tend to be passive during the learning processes using the conventional method. No student was willing to express an opinion; some students were even busy with their

smartphones even though the lecturer had already given them apperception and motivation to the students regarding the materials being studied.

The students were very enthusiastic about the application of the 'make a match' method in the Clinical Pharmacology course. It is evident from the results of the student satisfaction survey through the questionnaires (**Figure 1**). As seen in **Figure 1**, 92% of the students enjoyed the learning process using the 'make a match' method because they felt that the classroom atmosphere was more fun and they got closer to each other. Also, 80% of these students stated that it was easier for them to understand the materials and they became more active and motivated to study when the 'make a match' method was applied. A study conducted by Maduratna (2014) showed that the application of the 'make a match' method can increase students' active participation during a learning process, and students also found it fun so they could enjoy the learning process [12]. Another study conducted by Padang *et al.* (2018) showed that the 'make a match' model can increase students' learning motivation [13].



**Figure 1.** Pharmacy students' perceptions of the application of the 'make a match' method

**Table 2** shows that there was an increase in the average score during the final exam period compared to the average score during the mid-term period. This shows that the application of the 'make a match' method can increase the average score of Pharmacy students in the Clinical Pharmacology course. However, the results of the paired t-test showed that the p-value which compared the average mid-term exam score (as the pre-test) and the average final exam score (as the post-test) did not show a significant increase, indicated by p-value >0.05. This is slightly different from the results of a study conducted by Hidayat *et al.* (2016) and Rofiqoh (2010), showing that there was an increased learning outcome among students who were taught using the 'make a match' model [8, 14]. Such difference is because the effectiveness of the method was evaluated at the end of the course, meaning that it took a quite long time to conduct the post-test (around 2-3 months) during the final examination, while in the study by Hidayat *et al.* (2016) and Rofiqoh (2010), the effectiveness of the 'make a match' method was evaluated right after materials were delivered because this method works

well to measure the level of knowledge and understanding [8, 14].

**Table 2. Comparison of pharmacy students' average exam and quiz scores by using the conventional method and 'make a match' model**

	Conventional method (done during a mid-term exam)	'Make a match' method (done during the final exam)	P-value*
Average score of students' exam	62.54 ± 18.55	65.59 ± 18.26	0.220
Average score of students' quiz	58.36 ± 22.91	68.10 ± 17.40	0.007

where:

\*: paired t-test

Nevertheless, there was a significant difference ( $p < 0.05$ ) in the average quiz score after being taught using the conventional method compared to the one after being taught using the 'make a match' method. This indicates that learning using the 'make a match' method can increase students' knowledge compared to learning using the conventional method. The quiz is given right after the course session is finished. The quiz is given online using Google Forms. This result is in line with the results of some previous studies conducted by Adilah (2014) where the application of the 'make a match' method can improve students' learning outcomes [15]. A study conducted by Juliani (2017) revealed that the 'make a match' learning model is more effective than conventional learning models in terms of achieving students' understanding of new concepts learned [16].

Even though the research processes went well, some obstacles were found when applying the 'make a match' model in this research. First, related to the infrastructure in which the classroom was relatively small. In applying the 'make a match' method, students are required to move and cooperate in groups, so this method ideally requires a larger space. Second, related to the duration of the session. The pharmacology course is given only two credits so one session lasted only 100 minutes. Applying the 'make a match' method requires a longer duration because one session is divided into three activities (material delivery, games using 'make a match' cards, and quizzes). Therefore, this method is more suitable for courses with more credits, for example, a pharmacotherapy course which is given four-credit, allowing each session to last 200 minutes.

Finally, learning using the 'make a match' method is suitable for any courses which require knowledge or for learning materials that require recalling, so this method can be applied not only for the Pharmacology course but also for other pharmaceutical materials. Also, the tests in the 'make a match' method should be given not too long after learning materials have been delivered unless the tests will not be effective to measure the level of knowledge and understanding.

This study has limitations, such as this research was conducted in a small population (only Pharmacy students in the Clinical Pharmacology course), thus not allowing the results of this study to be generalized. Nevertheless, this study can provide an overview and ideas for the development of learning methods for

Pharmacy students, especially in Indonesia, because conventional methods (lecturer-centered) still dominate the learning.

## Conclusion

The application of the 'make a match' model is generally able to increase both students' active participation during learning processes and students' learning outcomes significantly if students' understanding is measured right after course materials are given. However, this method fails to significantly increase students' learning outcomes if their understanding is measured long after the materials are given.

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