

# The Influence of E-Learning to Enhance Basic Science of Medical Students' Achievement

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## ABSTRACT

**Background:** The quality of learning applied in the Faculty of Medicine, University of Muhammadiyah Surakarta since 2008 refers to the Problem Based Learning method. The curriculum is applied in FK UMS which is then adjusted to the learning method applied. However, many obstacles encountered mainly in the basic science courses which include the Premedical Science in Homeostatic Setting III Block. The density of material and basic content that is an obstacle therefore has an impact on student achievement scores which is still low and there are several students who did not graduate in this course.

**Purpose:** This activity aims to develop e-learning in the course of the Premedical Science in Homeostatic Setting III, therefore, in order to obtain satisfying student learning achievement in this course. The second objective is to test the effectiveness of using e-learning to student's performance.

**Methods:** The students involved were semester 2nd medical students, which are about 125 students. Learning Management system that will be used is Schoology. Development of material content was done using the Dick Carey Model design. Descriptive and analytic test using paired t test then be conducted to evaluate the effectiveness of using e-learning to improve student's achievement.

**Results:** Based on descriptive analytic obtained that an overall there are significance improvement in terms of mean between previous performance prior to implementing e-learning to final achievement after conducting the e-learning program, which p of 0.000 and mean difference of 4.144 and t of 5.407.

**Conclusion:** The use of E-learning as a learning method in the basic science course is proved to enhance medical students' achievement.

**Keywords:** e-learning, basic science, medical students' achievement, Dick Carey Model

## INTRODUCTION

The Premedical Science in Homeostatic Setting III block is the fifth block in the FK UMS medical education curriculum. Students participating in this block are 2nd semester students. This block consists of 4 weeks of academic activity with a load of 4 credits.

The Premedical Science in Homeostatic Setting 3 block is the fifth block in the curriculum of the Medical Education Study Program of the Faculty of Medicine UMS. The purpose of this block is to provide an integrated knowledge based

on Biomedical Sciences, namely Anatomy, Physiology, Histology, Biochemistry. The knowledge based provided in this block is expected to help students understand the normal function of cells, tissues, organs and body systems in relation to homeostasis.

Block fifth consists of four weekly topics, namely: Digestive System, Endocrine System, Female Reproductive System and Male Reproductive System. Each topic will be studied in one week so block fifth lasts for four weeks. Learning activities in this block include group discussions with tutors (tutorials), held

twice a week, students are faced with a scenario that solves clinical problems or everyday reality. Furthermore, independent study, by looking for learning resources from literature, the internet and others. Expert consultation / expert lecture, held once a week to help discuss problems that arise and cannot be resolved in the tutorial. Lectures course are given to provide an understanding of the basic concepts of each weekly topic, practicum and skills. In order to improve students' understanding of the topic, a practicum is also held in the Biomedical and Skills lab.

In the last week of the course a written examination and practical exam are held. While tutorial assessments or group discussions are conducted by tutors every week. In the implementation of the teaching and learning process, students are expected to explore their own learning goals. Therefore students must be more independent by finding information and literature from various sources related to the course materials.

Learning activities in Block fifth include group discussions with tutors, independent learning, expert consultations (individuals), block lectures, and practicum.

The problem faced so far is the low value of the final exam block in Premedical Science in Homeostatic Settings III. This activity by developing e-learning is expected to increase the final value of the block thus high learning achievement is achieved.

The formulation of the problem in this Activity is "Is the development of e-learning in the Premedical Science in Homeostatic Setting III course can improve student learning achievement?"

The purpose of this activity is to develop a teaching system (instructional system design) in the course of the Premedical Science in Homeostatic Setting III block in order to fulfill the learning achievement of the course.

Muhammadiyah University of Surakarta (UMS) is one of the Muhammadiyah Universities that organizes

higher education to produce graduates who are able to compete in the world of work. Republic of Indonesia Presidential Regulation Number 8 of 2012 concerning the Indonesian National Qualification Framework (KKNI) and the Republic of Indonesia Minister of Education and Culture Regulation Number 73 of 2013 concerning the Application of the Higher Education KKNI to become a reference for all study programs at UMS to improve the curriculum that adjusts qualification levels according to learning outcomes that must be possessed by graduates.

Learning system innovation through teaching development (instructional design) needed to support the fulfillment of the quality of learning in the form of graduate learning outcomes. The development of teaching is expected to be carried out through the creativity of educators / lecturers in creating a conducive academic atmosphere with systematic procedures (instructional system design). In general, system procedures are grouped at the development stage consisting of analysis, design and development, followed by the implementation phase which includes implementation and evaluation (Dick, Carey, and Carey, 2009).

In developing learning designs it is necessary to pay attention to the characteristics and learning styles of students. The learning style that most students like is auditory and visual learning styles. achievement (Abidin, MJZ, et al., [2011]; Pashler H., et al., [2009]; Franzoni, AL, & Assar, S. [2009]; Rogowsky B., Calhou BM, [2015]).

One of the learning design models is the Dick and Carey (2003) model. This model is included in the procedural model. Learning and Design Steps according to Dick and Carey are: a. Identify the general objectives of learning. b. Carry out learning analysis c. Identify input behavior and student characteristics d. Formulate performance goals e. Develop benchmark reference test items f. Develop learning strategies g. Develop and choose learning

material h. Design and carry out formative evaluations i. Revise learning materials j. Design and carry out summative evaluation.

Summative evaluation is a peak evaluation of the learning program that has been designed, after the program is formative evaluated and revisions are made to the product, summative evaluation is carried out (Dick, Walter, Lou Carey. & James O. Carey. (2003); Tian X. & Suppasetseree S. (2013).

Meanwhile, according to Hassan Bello and U. O. Aliyu (2012) the Dick and Carey model focuses on the relationship between context, content, learning and instruction. Learning instruction models include: analysis of learner characteristics, designing and developing learning objectives, developing learning material, implementing instructional and evaluating learning objectives.

## METHODS

The students involved in this research were semester 2 medical students, which is about 125 students. Learning Management system which is used is Schoology. Development of material content was done using the Dick Carey Model design. Descriptive and analytic test using paired t test then be conducted to evaluate the effectiveness of using e-learning to improve student's achievement.

## RESULT AND DISCUSSION

Based on research conducted in the Faculty of Medicine UMS it is found that by using Schoology as Learning Management system (sample of e-learning used illustrated underneath).

Sample of e-learning picture using Schoology

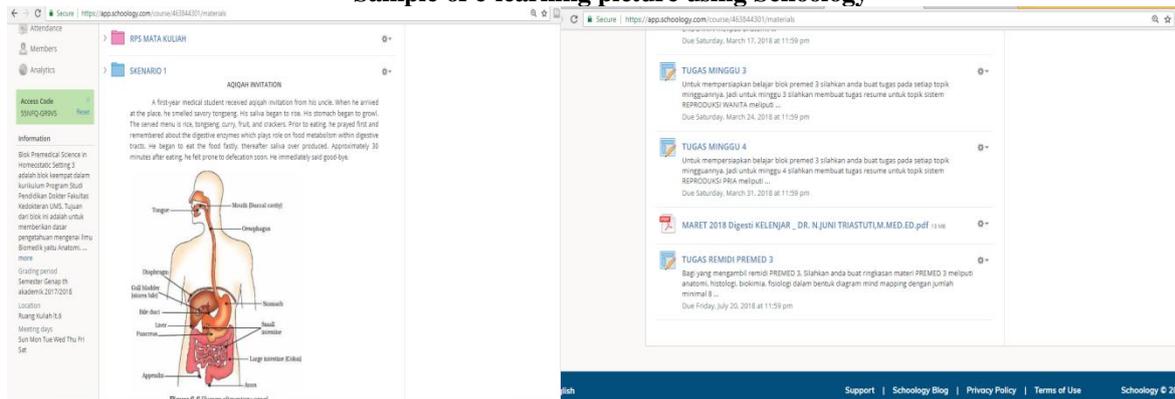


Table 1. Characteristics respondent based on student's achievement

Variable	Minimum score	Maximum score	Mean	n
Student's achievement 1	19	76	50,096	125
Student's achievement 2	20	85	54,240	125

Based on table 1, it is clearly be seen that on overall students' achievement 2 after the use of e-learning significantly improve from previous students' achievement 1 in terms of all criteria based on minimum score, maximum score, and mean which accounted for 20, 85, and 54,240 respectively. While,

the minimum score of students' achievement rising from 19 to 20, the maximum score of students' achievement made an improvement by 9 point from 76 to 85 followed by mean score which also contribute from 50.096 rising to 54.240.

Table 2. Paired T test result

variable	Correlation	Sig.	Mean difference	t
Achevement1 & Achievement2	0.833	0.000	4.14400	5.407

Meanwhile, based on paired t-test result on table 2, it is indicated that there is a significant correlation with Sig (p): 0,000 and a correlation of 0,833 which is stipulated that  $p < 0,000$  indicating a significant relationship among the variable.

In addition, it is reported that there is quite significant of mean difference from previous students' achievement to after the use e-learning of medical student which is marked by 4.144 and t of 5.407.

Data gathered than being determined as below picture.

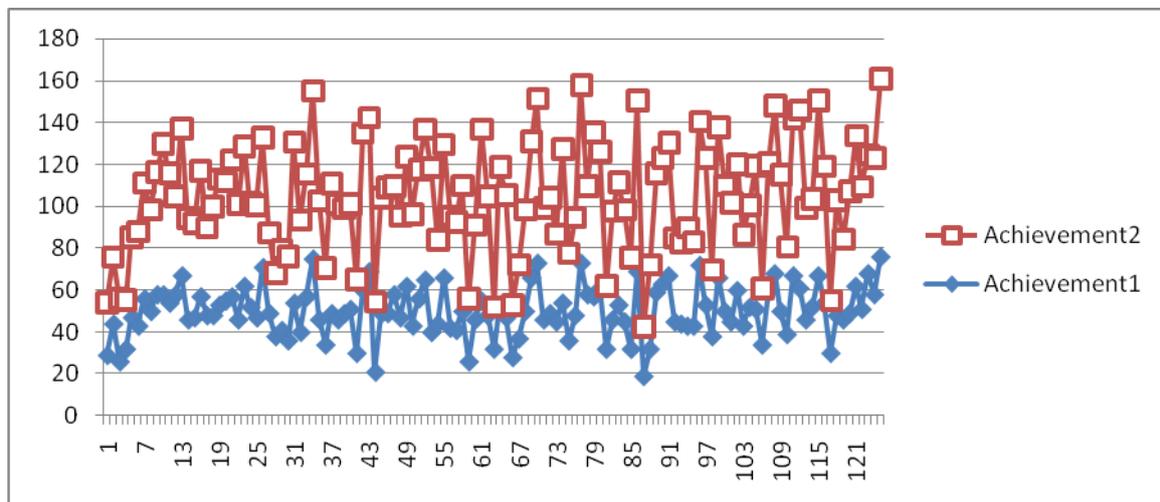
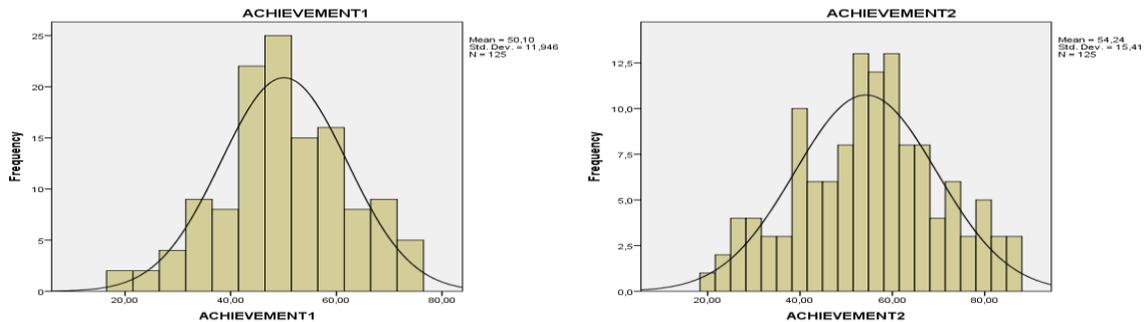


Chart 1. The difference of medical students' achievement 1(prior to implementing e-learning) compare to students' achievement 2(after implementing e-learning).

It is clearly be seen from chart 1 that in general medical students' achievement 2 (after implementing e-learning) tend to have a significantly higher than those students' achievement prior to implementing e-learning which mean difference of 4.144 and t of 5.407.

Learning media that is appropriate to the learning style and characteristics of students will be able to improve student learning achievement. This research result align with the previous study that mention the use of audiovisual learning media can improve student learning achievement (Abidin, MJZ, et al., [2011]; Pashler H., et al., [2009];

Franzoni, AL, & Assar, S. [2009]; Rogowsky B., Calhou BM, [2015]).

Another study which also align with this study is the use of computers to help medical and health students which is important to be considered for all medical and health education institutions (Cook DA. 2006). As well as this, computer-assisted learning has the advantage of increasing student knowledge and understanding so that students can become more active (Greenhalgh T., [2001]; Lewis MJ, Davies R, Jenkins D, Tait MI., [2001]; Nicklen P., [2016]). Meanwhile, web-based learning / e-learning is also a good strategy in helping learning and teaching activities for students

(Cook DA. [2007]). Previous activities have compared the effect of tutorial discussions using problem based learning by using e-learning with a face-to-face tutorial discussion system (Raupach et al., [2009]). E-learning has advantages in improving cognitive abilities, knowledge, skills and attitudes of students (Cook DA. [2007]; Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. [2008]; Fontaine, Cossette, Heppell, Boyer, Mailhot, Simard, Tanguay, [2016]). Other activities also found the cost effectiveness of computer learning compared to face-to-face learning (Stephen Maloney S., [2015]).

In addition, using this e-learning as a means to enhancing students' learning is also supported by another study which stated that students feel more interested in using online method learning and can improve students' communication skills (Nicklen P., [2016]; Liu et. Al. [2011]). Results Activities in the field of e-learning are still very lacking in the clarity of the learning design and its effectiveness on student achievement (DelSignore, Wolbrink, Zurakowski, Burns, [2016]; Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. [2008]; Cook DA, Ellaway RH. [2015]; Szpunar KK, Jing HG, Schacter DL. [2014]; Taveira-Gomes T, Ferreira P, Taveira-Gomes I, Severo M, Ferreira MA. [2016]).

## CONCLUSION

Based on this research result, it is firmly can be concluded that there is significant influence in the use of e-learning strategies to improve students' achievement of medical students.

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