Can Online Learning Fulfill the Competence of Medical Study Program Students?

Sri Sundari (✉ sundari_purbo@yahoo.com.sg)

Muhammadiyah University of Yogyakarta

Dwijoko Purbohadi

Muhammadiyah University of Yogyakarta

Muh Khotibudin

Muhammadiyah University of Yogyakarta

Research Article

Keywords: online learning, cognitive, psychomotor, competence, academic phase

Posted Date: October 22nd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-869602/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: The Covid-19 outbreak has had a huge impact on education, especially in health education both throughout the world and in Indonesia. Educational institutions are forced to close any access of offline meeting in order to reduce the spread of Covid-19. This is in accordance with the Official Letter of Ministry of Education and Culture Republic of Indonesia. No. 36962 / MPK.A / HK / 2020, the government prohibits universities from holding offline lectures then encourages online learning. Online learning in Indonesia is not popular before pandemic but it must be held. However, the learning goal must still be achieved. The learning process is aimed to achieve the expected performance also improve the quality of education. Quality assurance and personalized online learning are one of the mechanisms that help higher education to achieve planned outcomes. Online learning changes all aspects in the learning process. Both educators and students need to adapt to the online learning process. As a result, students and educators need to adapt quickly to minimize the material backlog. Due to the various reasons above, it is necessary to develop an online learning model that can help the learning process both in the cognitive and psychomotor domains in the Medical Study Program so that the expected competencies can still be achieved.

Method: The data was analyzed by using t-test statistic to compare between students' achievement in distance learning and offline learning.

Results: The results showed that the learning outcomes of students who took online learning methods were higher than those of students who took offline learning. This can be seen from the average learning evaluation score, the number of passing practicum scores, the number of passing skills lab scores and the number of passing blocks ($p < 0.05$).

Conclusion: It can be concluded that online learning helps students achieve competence at the academic stage of learning.

Background

The Covid-19 outbreak has had a huge impact on education, especially in health education both throughout the world and in Indonesia. According to [1], it also has negative impact to the education. Educational institutions are forced to close any access of offline meeting in order to reduce the spread of Covid-19. This is in accordance with the Official Letter of Ministry of Education and Culture Republic of Indonesia. No. 36962 / MPK.A / HK / 2020, the government prohibits universities from holding offline lectures then encourages online learning [2].

The occurrence of the COVID-19 pandemic has fundamentally changed the implementation of medical education. Offline educational activities must be eliminated or replaced with similar activities through other media. The implementation of offline activities at several universities has been changed to the distance learning. Distance learning utilizes technology in the form of online learning media owned by the faculty as a virtual communication medium to run the learning process. This becomes a challenge in

fulfilling all indicators of achievement in the aspects of medical education. Actually, online learning is not new thing in this faculty because students can access material related to basic and clinical medical science theory. However, it is totally different with skill aspect which requires direct supervision by the teaching staff to ensure the fulfilment of student skills. In addition, practical activities require tools and materials which students do not have. In the aspect of professionalism, the role of teaching staff and educational institutions is very important as a good role model for students.

Evaluation of the professionalism aspect has also become difficult due to the social and physical restrictions during the pandemic. Several solutions have been attempted, for example, making experimental videos to support student practicum activities. However, some things still cannot be replaced by the distance learning, namely direct interaction with patients to obtain objective data as part of clinical skills. In addition, some clinical skills procedures also require detailed supervision from teaching staff. The needs of appropriate distance learning method can help students to achieve clinical reasoning.

It is a quite challenging to do the distance learning in medical education especially in some aspects such as clinical skills, clinical experience with patients, and aspects of professionalism. Evaluation methods in the form of Objective Structured Clinical Examination (OSCE) and patient-based clinical examinations are also difficult to implement because of the social restrictions. Thus, it is not only the difficulties in achieving standard competence of Indonesian doctor but also evaluation.

The option that can be considered is extending the study period to achieve competencies that were not achieved during the pandemic. This option seems ideal, but it has an impact on increasing the educational burden that must be borne by teaching staff (lecturers) and students. this choice is not ideal if the pandemic is not controlled. Regarding preclinical education, cognitive aspects can be implemented during the distance learning but the psychomotor and affective aspects are difficult to implement. It is caused by direct contact is needed between teachers and students. Thus, there should be another method to run the learning process in medical education. The policy makers must be very careful in deciding the choice. They should take care of the health protocol which should be implemented by lecturers and students. Openness in the policy-making process is also important, considering that medical education activities cannot be separated from conditions in the field. Policy makers must also quickly adapt to situations that can change at any time, and provide firm and clear considerations so that the achievements of medical education can still be pursued optimally.

The purpose of this study is to develop a learning model in the Medical Study Program that involves all learning processes, namely lectures, tutorials, practicums and skills labs in order to meet the required competencies when students graduate from the academic stage of education.

Methods

The purpose of learning process in the Medical Study Program is students have cognitive, psychomotor, and affective competence. These three components are a unit of competence that must be possessed by

students who have completed their education. To achieve these competencies, the Medical Study Program uses several learning methods including: lectures, practicums, tutorials and skills labs. In normal times, all this learning process is carried out offline with a block system. This learning model can no longer be implemented in the current pandemic conditions. Therefore, all these learning models will be replaced with an online system that will be developed to meet the competency targets that have been set. The development in this research was online learning model for lectures both synchronous and asynchronous, online tutorial learning model that is implemented synchronously, online skills lab learning model that is implemented synchronously, online practicum learning model that is implemented synchronously, practicum learning assessment model and block evaluation conducted synchronously online, and development of learning videos that support the online learning process both synchronously and asynchronously.

The research sample was students of 2018 and 2019 medical study programs who underwent block learning. The block that was developed in the learning model is the block that runs in the even semester of 2020/2021 chosen randomly. The research was carried out in January 2020 - December 2020. The results of the study compared between the achievement of competence during conventional learning and learning outcomes during a pandemic using e-learning. The data was analysed by using t test statistics.

Results

The learning process in the Medical Study Program during the pandemic is carried out in a blended learning. The entire lecture process is carried out online using e-learning media, the practicum process is also carried out online 100% and the skills lab learning process is carried out in a blended. The learning outcomes of each activity can be seen in the following table:

From Fig. 1 it can be seen that the average score of learning outcomes in each block with the online learning system is higher than the learning outcomes with the offline learning system ($p < 0.05$). Based on the calculations, it is known that the results of the online learning evaluation are significantly different from the offline learning evaluation results

Based on Fig. 2, it can be seen that the passing of each block using online learning was higher than the passing of each offline block ($p < 0.05$). The results of statistical calculations show that passing blocks using online learning is significantly different from passing blocks using offline learning.

From Fig. 3 it can be seen that the minimum value of the learning evaluation results in the block that uses online learning is higher than the minimum value of the block that uses the offline learning system ($p < 0.05$).

The maximum score obtained by students in block learning using online learning is higher than the score obtained by students using offline learning but this difference is not significant ($p = 0.600$)

For practicum activities, the average value of practicum response, the average final grade of practicum and graduation of practicum students who take online learning is higher than students who take offline learning, this can be seen in Fig. 1 ($p < 0.05$).

The results of the skills lab learning can be seen in Figs. 5 and 6, where the images show that the average OSCE score of students who take online learning is higher than those who take offline learning. This has an impact on students whose remediation of online learning lab skills is less than online learning.

Discussion

E-learning is mostly used in the learning process of the Medical Study Program during the pandemic. Lectures, practicum, skills lab and tutorials all done in the learning process. During the pandemic, the lecture learning process is carried out online, both synchronously and asynchronously. Synchronous learning either using MS Team or Zoom applications. Tutorials are carried out directly using the MS Team which are divided into small groups and facilitated by a tutor.

Based on the results, it is known that the average score of the learning evaluation test in online learning is higher than the results of the offline exam learning evaluation with a value of $p = 0.024$ this has an impact on the number of blocks passing which increases in online learning when compared to offline learning. The average online practicum response score is also higher than the offline practicum response test average score, this also has an impact on increasing the number of practicum graduations in the online learning process. The skills lab learning process is given synchronously and asynchronously. Before the synchronous meeting, students are given a video about the skills that students will do through MyKlass. They can access the video independently before synchronous learning is implemented. Although the skills lab learning process is carried out online, the assessment process is carried out offline. Surprisingly the result show that the OSCE score of students who take online learning is higher than students who take offline skills lab learning. This result is in accordance with the results of previous studies which stated that online learning outcomes were higher than offline student learning outcomes [3]. This is also supported by research conducted by [4] which states that students are satisfied with the learning system that uses e-learning during the pandemic. The existence of satisfaction will increase confidence and foster student motivation to learn. Attitudes, motivation, self-efficacy, and the use of technology play an important role in the cognitive engagement and academic performance of students which will later affect their learning process [5]. The learning process using e-learning is in accordance with the PBL learning method used in the Medical Study Program because this method requires students to become independent learning [6], the delivery of lessons can be in the form of simulations and real cases (Hartanto et al., 2020) and can ensure lifelong learning [7], and students can also access and learn without being constrained by place, space and time [8].

The learning process using technology, especially e-learning during the pandemic, is one of the alternatives chosen by various institutions, because this learning has many advantages, including 1) having relevant content to the learning objectives; 2) using instructional methods, for example presenting

examples and exercises to improve learning; 3) using media elements such as words and pictures to convey learning materials; 4) allows direct teacher-centred (synchronous e-learning) or designed for independent learning (asynchronous e-learning); 5) build understanding and skills related to learning objectives either individually or improve group learning performance [9]. Although learning using e-learning has many advantages, there are 4 dimensions that can hinder its implementation, including (Naveed et al., 2017): students, among others, lack of motivation [5, 7, 10], self-efficacy [5] low bandwidth due to limited quota [11–14], do not have adequate online learning support facilities [12]. The second dimension is instructors, including not all educators can use technology in online learning [12], the techniques used are less varied [15]. The third dimension is Infrastructure and Technology, including inappropriate infrastructure, inadequate bandwidth and support personnel [16]. The last dimension is institutional management, including lack of funding and training support, unsupportive policies, and inappropriate instructional designs [16]. Therefore, so that the learning process using e-learning can be effective, the existing obstacles must be overcome. In addition, in developing this learning, cultural and contextual learning must be considered [17].

Conclusion

E-learning conducted in the medical study program can support the achievement of student competencies during the pandemic. In order for the learning process to run properly and effectively, the existing obstacles must be overcome.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from Faculty of Medicine and Health Sciences UMY No.521/EP-FKIK-UMY/X/2019 All methods were performed in accordance with the relevant guidelines and regulations. Permissions from the administration of all participants. Information sheets containing study objectives with written consents had been explained and the informed consent obtained from all respondents prior to completing the research, in which the participation in this study was entirely voluntary.

Consent for publication

Not applicable.

Availability of data and materials

All data and materials are available from the corresponding author by request.

Competing interests

All authors declare no conflict of interest.

Funding

This study has been funded by the Publication, Research and Community Service Institute Universitas Muhammadiyah Yogyakarta

The funding supports the research cost of this study.

Authors' contributions

Sri Sundari collected the data and wrote the main manuscript text, Dwijoko performed the statistical analysis and prepared Figs. 1, 2, 3, 4, 5, 6 and 7, and Muh Khotibudin prepare the teaching learning process. All authors have reviewed and approved the manuscript.

Acknowledgements

We would like to thank all medical students from Year 1 to 4 from School of Medicine UMY.

References

1. Abidah A, Hidaayatullaah HN, Simamora RM, et al. The Impact of Covid-19 to Indonesian Education and Its Relation to the Philosophy of “Merdeka Belajar”. *Stud Philos Sci Educ* 2020; 1: 38–49.
2. Prayogi AG, Purwanugraha A, Fakhry G, et al. Efektifitas pembelajaran jarak jauh terhadap pembelajaran siswa di sdit cendekia purwakarta. *J Pendidik Dasar* 2020; 94–101.
3. Gürsul F, Keser H. The effects of online and face to face problem based learning environments in mathematics education on student’s academic achievement. *Procedia - Soc Behav Sci* 2009; 1: 2817–2824.
4. Fontanillas TR, Carbonell MR, Catasús MG. E-assessment process: giving a voice to online learners. *Int J Educ Technol High Educ*; 13. Epub ahead of print 2016. DOI: <https://doi.org/10.1186/s41239-016-0019-9>.
5. Aguilera-Hermida AP. College students’ use and acceptance of emergency online learning due to COVID-19. *Int J Educ Res Open*. Epub ahead of print 2020. DOI: 10.1016/j.ijedro.2020.100011.
6. Balapumi R, Aitken A. Concepts and factors influencing independent learning in IS higher education. In: *Proceedings of the 23rd Australasian Conference on Information Systems 2012, ACIS*. 2012.
7. Alsoud AR, Harasis AA. The Impact of COVID-19 Pandemic on Student’s E-Learning Experience in Jordan. *J Theor Appl Electron Commer Res* 2021; 16: 1404–1414.

8. Sundari S, Nurhasanah D, Purbohadi D. Developing learning anytime, anywhere, and any device using CAI (Computer Assisted Instruction) synchronization. In: *ACM International Conference Proceeding Series*. 2018, p. <https://doi.org/10.1145/3291078.3291105>.
9. Arkorful V, Abaidoo N. The role of e-learning, the advantages and disadvantages of its adoption in Higher Education. *Int J Educ Res* 2014; 2: 397–410.
10. Al-rahmi WM, Othman MS, Yusuf LM. The Effectiveness of Using E-Learning in Malaysian Higher Education: A Case Study Universiti Teknologi Malaysia. *Mediterr J Soc Sci* 2015; 6: 625–637.
11. Irawan AW, Dwisona, Lestari M. Psychological Impacts of Students on Online Learning During the Pandemic COVID-19. *J Bimbing dan Konseling*, 7. Epub ahead of print 2020. DOI: <https://doi.org/10.24042/kons.v7i1.6389>.
12. Robandi D, Ritonga I, Nast TPJ, et al. An analysis of education policy in the pandemic covid-19. *E-Tech*; 8. Epub ahead of print 2020. DOI: <https://doi.org/10.24036/et.v8i1.109065>.
13. Pokhrel S, Chhetri R. A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning. *High Educ Futur*, 8. Epub ahead of print 2021. DOI: <https://doi.org/10.1177/2347631120983481>.
14. Gismalla MD-A, Mohamed MS, Ibrahim OSO, et al. Medical students' perception towards E-learning during COVID 19 pandemic in a high burden developing country. *BMC Med Educ*; 21. Epub ahead of print 2021. DOI: <https://doi.org/10.1186/s12909-021-02811-8>.
15. Male H, Murniarti E, Simatupang MS, et al. Attitude of undergraduate student's towards online learning during covid-19 pandemic. *Palarch's J Archaeology Egypt/Egyptology*; 17, <https://archives.palarch.nl/index.php/jae/article/view/1746> (2020).
16. Quadri NN, Muhammed A, Sanobar S, et al. Barriers Effecting Successful Implementation of E-Learning in Saudi Arabian Universities. *Int J Emerg Technol Learn*; 12, <https://online-journals.org/index.php/i-jet/article/view/7003> (2017).
17. Ardekani A, Hosseini SA, Tabari P, et al. Student support systems for undergraduate medical students during the COVID-19 pandemic: a systematic narrative review of the literature. *BMC Med Educ*; 21. Epub ahead of print 2021. DOI: <https://doi.org/10.1186/s12909-021-02791-9>.

Figures

Figure 1

Differences in Average Online and Offline Learning Evaluation scores

Figure 2

Differences in passing Blocks in Online and Offline learning

Figure 3

Comparison of Minimum Scores of Block Exams between Online and Offline learning

Figure 4

Comparison of Maximum Scores of Online and Offline Block exam

Figure 5

Comparison of Online and Offline Practicum Grades

Figure 6

Average score of OSCE Skills Lab

Figure 7

Average Number of Remediation Skills Lab Students