



Articles

Differences Score between Online and Offline Laboratory Sessions of Parasitology in Medical Faculty

Atika widyaningrum¹, Mega Pandu Arfiyanti², Kanti Ratnaningrum³

¹Medical Study Program, Medical Faculty, Universitas Muhammadiyah Semarang.

² Department of Microbiology, Medical Faculty, Universitas Muhammadiyah Semarang.

³ Department of Parasitology, Medical Faculty, Universitas Muhammadiyah Semarang.

ARTICLE INFO

Submitted : 22nd February 2022

Accepted : 1st February 2023

Published : 27th July 2023

Keywords:

Difference, Online, Offline, Parasitology

*Correspondence:

kantiratna@unimus.ac.id

This is an Open acces article under the CC-BY license



ABSTRACT

Capabilities to diagnose diseases caused by parasites is one of the competencies that must be mastered by general practitioners. This is stated in Standar Kompetensi Dokter Indonesia (SKDI). The branch of parasitology includes protozoa, helminths, and arthropods. Competency can be achieved through debriefing activities and laboratory sessions. During the pandemic, laboratory sessions of parasitology are carried out online with modification of implementation techniques. The study aims to determine the differences in scores between online and offline laboratory sessions of parasitology in medical faculty. Quantitative research used a quasi-experimental method, with a simple random sampling technique. The research data used secondary data scores of laboratory sessions of helminth and protozoa parasitology of Medical students in Universitas Muhammadiyah Semarang (Unimus). Data were analyzed by using a non-parametric Mann-Whitney u-test. From 62 students, there were significant differences in scores between online and offline helminth laboratory sessions ($p=0.00$) with the average scores of online helminth courses higher than offline laboratory sessions (70.6 ± 19.8). There was no significant difference in grades of online and offline protozoa laboratory sessions ($p=0.576$) with average scores of online protozoa courses being lower than the offline laboratory session (55.8 ± 25.5).

There is a significant difference in scores between the helminth laboratory session of parasitology and there is no difference in scores between the protozoa laboratory session in Medical Faculty.



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



INTRODUCTION

Medical parasitology is a medical science that explains the relationship between parasites which includes protozoa, helminths, arthropods, and parasitic insects, both zoonotic and anthroponotic with humans as hosts, the ways of countermeasures and handling as well as the consequences caused by the relationship (Pramana & Atmaja, 2020; Sataloff et al., 2016). Data states that more than 530 million children representing 63% of the world's total were treated because got infected by Soil Transmitted Helminths (STH) (WHO, 2018, 2021). In Indonesia, the prevalence of diseases due to parasitic infections, particularly filariasis and helminthiasis is about 20%-62% of cases (Kemenkes RI, 2015, 2017). Diagnostic examination to identify diseases caused by parasitic infections is the 4A competency standard in the *Standar Kompetensi Dokter Indonesia* (SKDI) specifically that medical graduates can diagnose and carry out management independently and thoroughly; (Konsil Kedokteran Indonesia, 2012), so that parasitology practice is a lesson that must be taught.

Laboratory session of parasitology was initially carried out using an external practice method (offline), that is offline practice in the laboratory using practice facilities in the laboratory. Nonetheless, since the Covid-19 pandemic in 2020, there has been a change in the practice method to practice in the network (online) with the use of E-learning practice. Learning video-making is a solution that is being pursued by the medical faculty, but offline activities in the laboratory more detailed explanations from the lecturer, and the lack of practice facilities at home as well as differences in assessment aspects are things that make offline practices cannot be replaced by online practices (Rozaliyani et al., 2020). Aspects of assessment for students

who do offline laboratory session are cognitive, affective, and psychomotor aspects, while online course only covers cognitive aspects (Nurhalimah et al., 2021; Syafi'i et al., 2018).

To provide an initial overview of the differences implementation of online and offline laboratory sessions of parasitology in the Medical Faculty of Unimus, researchers have conducted interviews with several Medical Faculty Students of Unimus about who has been doing online laboratory sessions of parasitology. The results of interviews about implementation and the obstacles faced by students are anxiety feeling about whether the skills they get from the theory they read and watch during the online course will be the same as the skills they will get when doing laboratory sessions in the laboratory. The unavailability of tools and supporting materials for Laboratory sessions of parasitology at home and network constraints are also students' solicitudes.

Based on the importance of laboratory sessions of parasitology implementation on the competence of medical students, as well as the problems that arise as a result of changing the laboratory session of parasitology method from offline to online which can cause differences in grades between students. Therefore, researchers are interested in researching "Differences Score between online and offline laboratory session of Parasitology in Medical Faculty"

METHODS

In a quantitative study with the Quasi Experiment Method, the use of sampling is simple random sampling. The research was conducted at Medical Faculty, Unimus. The number of samples was calculated using the two-population difference test formula with a total of 62 students (31 students from class 2016 as the control group and 31 students from class 2019 as an experimental group). The sampling takes into the inclusion criteria, it is Medical



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



Students who has been done doing laboratory session of parasitology.

Research data is used secondary data from laboratory sessions from helminth parasitology score in block 7 for class 2016 and block 6 for class 2019, also laboratory session of protozoa (*plasmodium*) parasitology with block 10 of class 2016 and block 6 of class 2019. The Medical Faculty of Unimus used a block system. The difference in block selection is based on differences in the use of the curriculum of the batch. class of 2016 has completed a laboratory session of parasitology offline in block 10 while the class 2019 has completed a laboratory session of parasitology online in block 6. The material taught in both blocks is similar.

Analysis using a normality test showed that scores of laboratory sessions of helminth and protozoa (*plasmodium*) were not normally distributed. The test was continued with a comparative non-parametric comparative Mann-Whitney U test. This research was conducted after obtaining ethical approval with No.061/EC/FK/2020 by the Health Research Ethics Commission, Medical Faculty, Unimus.

RESULT

From 62 students who became the samples. The proportion of samples by batch between the class of 2016 and 2019 is 1:1 with 31 students from each group (table 1).

Based on Table 2, the majority of the sample genders are women (61.3%) in both the 2016 and 2019 classes. Based on age, the majority of students are in the 21-25 year-old range respectively, between 2016 and 2019 (90.3% and 96.8%).

Based on Table 3, the average score of the online method of laboratory session of helminth parasitology is 70.6 ± 19.8 and the offline method is 47.4 ± 17.8 . The results of the analysis illustrate that the average score of the online method of laboratory session of helminth is different from the offline method with the sample average of the online laboratory session method being higher. The average value of the online laboratory session method is 55.8 ± 25.5 and the offline method is 57.4 ± 41.0 . The results of the analysis illustrate that the average score of the online laboratory session method of protozoa is similar to the offline method with a difference of about 1.61.

Table 1. Student Characteristics

Student Characteristics	Frequency (N=62)	Percentage (%)
Class		
2016	31	50
2019	31	50
Laboratory Session of Helminth		
Online	31	50
Offline	31	50
Laboratory Session of Protozoa (<i>plasmodium</i>)		
Offline	31	50
Online	31	50



Table 2. Frequency Distribution by Gender and Age of Students

Frequency distribution by gender and age of students	Frequency (N=62)	Percentage (%)
Gender		
Class of 2016		
Men	12	38.7
Women	19	61.3
Class of 2019		
Men	12	38.7
Women	19	61.3
Age (yo)		
Class of 2016		
<20	0	0
21-25	28	90.3
26-30	3	9.7
Class of 2019		
<20	1	3.2
21-25	30	96.8
26-30	0	0

Table 3. Laboratory Session of Parasitology Average Scores Medical Faculty Students, Unimus

Laboratory Session Score	N	Average (min-max)	Standard Deviation
Laboratory Session of Helminth			
Online	31	70.6 (20-100)	19.8
Offline	31	47.4 (12.5-81.2)	17.8
Laboratory Session of Protozoa			
Online	31	55.8 (0-90)	25.5
Offline	31	57.4 (5-100)	41.0

Table 4. Difference Score of Laboratory Session of Parasitology of Medical Faculty students of Unimus

Score of Laboratory Session of Parasitology	P-value
Laboratory Session of Helminth	
Online	0.000
Offline	
Laboratory Session of Protozoa	
Online	0,576
Offline	



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



Based on the Kolmogorof-Smirnov normality test, the online laboratory session method of Helminth showed an abnormal distribution ($p=0.000$) while the offline method showed a normal distribution ($p=0.200$) so it was concluded that the data were not normally distributed. The Levene Statistic test stated that the population data was homogeneous ($p = 0.832$). In the laboratory session of protozoa, the normality test of the online method was normally distributed ($p=0.036$) while the offline method had an abnormal distribution ($p=0.000$) so it was concluded that the data were not normally distributed. Levene Statistic test laboratory session of protozoa stated that the data was not homogeneous ($p=0.000$). Based on the results of the Mann-Whitney test (table 3), there was a difference in the value of online and offline laboratory sessions of helminth parasitology for Unimus Medical Faculty students ($p=0.000$) and there was no difference in online and offline laboratory sessions of protozoa parasitology scores for Unimus Medical Faculty students ($p=0.576$) (table 4).

DISCUSSION

Based on the description that has been done above, there are two different conclusions regarding the results of the analysis. There are:

There is a difference in the score of students' laboratory sessions of helminth parasitology of medical students, Unimus with an average online laboratory session has a higher average score than an offline laboratory session of helminth parasitology. These differences relate to the advantages of online laboratory sessions and the disadvantages of offline laboratory sessions. (Nurhalimah et al., 2021) said that there was an influence between students' interest and motivation, then the achievement of good learning outcomes. The higher the student's interest and motivation, the higher student's willingness to learn. According to

(Mustakim, 2020), students' independence is looking for course materials from various online media such as Google Scholar, journals, e-books, *Sinta*, and other media on the internet, as well as the freedom to choose the time and place of study will lead to a better ability to learn and understand laboratory session material. Laboratory session lecturers play a very important role in the success of online laboratory sessions, that is having skills in using digital technology and being able to create creative and innovative laboratory session media. For instance, making laboratory session videos, sorting out proper learning materials, encouraging students to actively participate, and pay attention to students who has experience difficulties during laboratory session activities (Nurhalimah et al., 2021; Sari, 2015).

From the description that has been done, it can be concluded that the average score of laboratory sessions of helminth parasitology is higher because it is supported by the choice of the laboratory session method used, creative and innovative teaching skills by lecturers as laboratory session of parasitology lecturers as well as student psychological factors such as interests, motivation, intelligence, attitudes, talents and abilities in managing learning activities (Baharuddin & Wahyuni, 2019; Nurhalimah et al., 2021; Sari, 2015).

Based on direct observation, the high average of online laboratory sessions of helminth parasitology can occur because: 1) The overview of helminth parasite preparations has been provided by the laboratory to facilitate identification, while the overview of helminth parasite preparations during offline laboratory sessions depends on the student's ability to use a microscope, the better the student's ability, the better presentation of the picture of the preparation and vice versa. 2) Online laboratory session provides longer time because the



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



activities carried out are only in the form of laboratory session assignments, while offline laboratory session of helminth parasitology activities which include preparations, use of a microscope, identification, and preparation of temporary reports only give ± 2 hours so that students seem rushed. 3) Laboratory session of helminth parasitology briefing through a recorded video meeting on Zoom, so students can play the video anywhere and anytime.

There is no significant difference between online and offline laboratory sessions of protozoa (*plasmodium*) parasitology scores on students' scores of the Medical Faculty of Unimus. It is evidenced by the almost similar average between the two laboratory session methods even though offline laboratory session has a higher average. Nguyen et al. said that online laboratory sessions were as effective as offline laboratory sessions, although the learning was carried out with the help of the internet without face-to-face directly, the material and the laboratory session process remained the same, the student's grades in the end did not have a significant difference. In addition, students are the millennial generation who are quick to respond to digital technology, it is easier to adjust learning with online methods (Nguyen, 2015; Siemens & Shane, 2015). According to (Ekantini, 2020), offline laboratory session allows students to be able to research, conduct experiments and get hands-on learning experiences in the field so that students' understanding will be better. Although the online laboratory session of protozoa (*plasmodium*) parasitology applies technology that allows practice material to be illustrated directly, properly, interesting and interactive so that it can replace the offline laboratory session in improving the ability and skills (Weldy, 2018) wrote that students prefer to do offline rather than an online course. It is because offline laboratory session

is a method that has been carried out for a long time so changes in laboratory session methods that occur are things that are quite difficult for students to accept.

Based on the observation, there is no significant difference between the online and offline laboratory sessions because 1) The lack of variations in the overview of *Plasmodium* preparations requires students to find additional learning resources on their own during online practicums, while the offline laboratory session offers a wide variety picture of preparations that can be seen through a microscope even from the same type of *plasmodium*. 2) The implementation of the online laboratory session of protozoa parasitology (*plasmodium*) is carried out independently (not in groups) so that when students experience difficulties, they do not immediately get help from group members, this is inversely proportional to the offline laboratory session of protozoa parasitology (*plasmodium*) which is carried out in groups supervised by laboratory assistants or supervisor lecturers. 3) Online course does not require the same effort as offline laboratory session because online course needs are available only by using the internet. Identification of protozoa (*plasmodium*) which includes preparation of preparations, use of a microscope to view the image of *plasmodium* as well as other procedures that are generally carried out in laboratories not carried out by online course students, so that students' understanding related to the online course of protozoa (*plasmodium*) activities is not as good as when students do offline laboratory session.

Based on an explanation of the factors that support the results of this study, although the laboratory session of helminth parasitology showed a difference between the online and offline laboratory session scores, the average score for the online laboratory session of helminth was higher and the laboratory session of protozoa (*plasmodium*) showed no



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



significant difference between the online and offline laboratory session scores. But, there are some sections, especially in the affective and psychomotor domains, which are still difficult to obtain using online methods because the lecturers cannot provide instruction and guidance directly, so there needs to be an appropriate solution so that online courses can still produce students who are not only capable of cognitive but also affective and psychomotor aspects (Prabowo & Wardani, 2021; Suryawan & Permana, 2020).

In addition to these shortcomings, the positive side of online courses is growing independent learning. The online course forces students to study remotely using technology, this certainly brings a change from the usual face-to-face learning. Learning without direct guidance from educators makes students independently seek information about the material and assignments given to them. This will require greater learner involvement to improve observational learning behavior. This behavior can be done by reading, interpreting discussion posts, and discussing videos or learning content on the internet. Through online courses, students can set their learning strategies freely. The online course makes students not be pressured by time because they can set their schedule and place where they want to attend lectures. The online course allows students to access information and knowledge at home and anywhere to the convenience of students. (Hidayat et al., 2020)

The limitations of this research are: 1) Only using secondary data so that factors related to differences in laboratory session scores are not analyzed more deeply. 2) The implementation methods between online and offline laboratory session is different, where in the online course that the assessment is only in the form of cognitive aspects while conducting an offline laboratory session, all aspects of the assessment

which includes cognitive, affective, and psychomotor aspects can be assessed so that the scores between the two practicum methods are difficult to compare.

Based on the differences in research results between helminths and protozoa (*plasmodium*), students are expected to be more active, critical, and independent in carrying out laboratory sessions of parasitology to achieve laboratory sessions of parasitology abilities and skills. Unimus Medical Faculty is expected to be able to improve the quality of online learning by improving online course facilities such as making videos and preparing course materials for better motivation, process, and student learning outcomes. Next researchers are expected to be able to analyze what factors are involved in the difference in the grades of online and offline laboratory sessions of parasitology for the perfection of this research.

CONCLUSION

There are differences in the score of online and offline laboratory sessions of helminth parasitology towards medical students of Universitas Muhammadiyah Semarang with the average score of students who were doing the online laboratory session of helminth parasitology being higher than those who were doing the offline laboratory session. While, in the laboratory session of protozoa (*plasmodium*), there is no difference in the score of the laboratory session of protozoa parasitology towards medical students of Universitas Muhammadiyah Semarang with the average score of students who were doing the online laboratory session of protozoa (*plasmodium*) parasitology is almost the same as the offline laboratory session, although the score of the offline laboratory session is higher.



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



REFERENCE

- Baharuddin, & Wahyuni, E. N. (2019). *Teori Belajar dan Pembelajaran*. Ar-Ruzz Media.
- Ekantini, A. (2020). Efektivitas Pembelajaran Daring pada Mata Pelajaran IPA di Masa Pandemi Covid-19: Studi Komparasi Pembelajaran Luring dan Daring pada Mata Pelajaran IPA SMP Anita. *Jurnal Pendidikan Madrasah*, 5(2), 187–194. <http://ejournal.uin-suka.ac.id/tarbiyah/index.php/JPM/article/view/3511>
- Hidayat, D. R., Rohaya, A., Nadine, F., & Ramadhan, H. (2020). Kemandirian Belajar Peserta Didik Dalam Pembelajaran Daring Pada Masa Pandemi Covid -19. *Perspektif Ilmu Pendidikan*, 34(2), 147–154. <https://doi.org/10.21009/pip.342.9>
- Kemendes RI. (2015). *PENYAKIT KECACINGAN MASIH DIANGGAP SEPELE*. Kementerian Kesehatan Republik Indonesia. <https://www.kemkes.go.id/article/view/1135/penyakit-kecacingan-masih-dianggap-sepele.html>
- Kemendes RI. (2017). *Permenkes NO.15 Tahun 2017 Tentang Penanggulangan Cacangan*. Menteri Kesehatan Republik Indonesia.
- Konsil Kedokteran Indonesia. (2012). *Standar Kompetensi Dokter Indonesia (SKDI)*. Konsil Kedokteran Indonesia.
- Mustakim, M. (2020). Efektivitas Pembelajaran Daring Menggunakan Media Online Selama Pandemi Covid-19 Pada Mata Pelajaran Matematika. *Al Asma : Journal of Islamic Education*, 2(1), 1. <https://doi.org/10.24252/asma.v2i1.13646>
- Nguyen, T. (2015). The Effectiveness of Online Learning: Beyond No Significant Difference and Future Horizons. *MERLOT Journal of Online Learning and Teaching*, 11(2), 309–319.
- Nurhalimah, Fitriyuningsih, D., Haryati, O., & Rahayuningtyas, D. K. (2021). *Faktor-Faktor yang Mempengaruhi Efektifitas Praktik Laboratorium Daring Pada Masa Pandemi Covid-19*. 6(1).
- Prabowo, A. A., & Wardani, D. K. (2021). Faktor-Faktor Yang Mempengaruhi Kecurangan Akademik Pada Perkuliahan Online (Studi Pada Mahasiswa Akuntansi Universitas Sarjanawiyata Tamansiswa). *Jurnal Kajian Bisnis*, 29(1), 16–29.
- Pramana, E. J. W., & Atmaja, G. A. M. (2020). Pengembangan Modul Focusky Parasitologi Pada Program Studi Pendidikan Biologi Ikip Budi Utomo Malang. *Jurnal Pendidikan Biologi*, 12(1), 22–29.
- Rozaliyani, A., Widjaja, H. T., Prawiroharjo, P., & Sukarya, W. (2020). Kajian Etik Pendidikan Jarak Jauh dalam Pendidikan Kedokteran di Indonesia. *Jurnal Etika Kedokteran Indonesia*, 4(2), 57. <https://doi.org/10.26880/jeki.v4i2.49>
- Sari, P. (2015). Memotivasi Belajar Dengan Menggunakan E-Learning. *Ummul Quro*, 6(2), 20–35.
- Sataloff, R. T., Johns, M. M., & Kost, K. M. (2016). *mikrobiologi dan parasitologi Keperawatan*. Kementerian Kesehatan Republik Indonesia.
- Siemens, G., & Shane, D. (2015). Preparing for the Digital University: a review of the history and current state of distance, blended, and online learning. *ICT4D Bibliography*. <http://linkresearchlab.org/PreparingDigitalUniversity.pdf>



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



- Suryawan, I. P. P., & Permana, D. (2020). Media Pembelajaran Online Berbasis Geogebra sebagai Upaya Meningkatkan Pemahaman Konsep Matematika. *Prisma*, 9(1), 108. <https://doi.org/10.35194/jp.v9i1.929>
- Syafi'i, A., Marfiyanto, T., & Rodiyah, S. K. (2018). Studi Tentang Prestasi Belajar Siswa Dalam Berbagai Aspek Dan Faktor Yang Mempengaruhi. *Jurnal Komunikasi Pendidikan*, 2(2), 115. <https://doi.org/10.32585/jkp.v2i2.114>
- Weldy, T. G. (2018). Traditional, Blended, or Online: Business Student Preferences and Experience with Different Course Formats. *Journal of Business Education & Scholarship of Teaching*, 12(2), 55–62.
- WHO. (2018). *Deworming: every girl and every woman has the right to be treated*. World Health Organization. <https://www.who.int/news/item/02-02-2018-deworming-every-girl-and-every-woman-has-the-right-to-be-treated>
- WHO. (2021). *Deworming women during pregnancy has a positive effect on child survival and health*. World Health Organization. <https://www.who.int/news/item/29-04-2021-deworming-women-during-pregnancy-has-a-positive-effect-on-child-survival-and-health>