

Analysis of Practicum Implementation During the Pandemic Period at the Department of Biology, Padang State University



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ABSTRACT: Biology learning aims to provide a variety of direct learning experiences through the practicum. During the current Covid-19 pandemic, practicums are carried out online or online. Based on the results of interviews with lecturers, there are several problems related to biology practicum activities at Padang State University, namely lecturers do not make their practicum videos and for lecturers who make their practicum videos, it is difficult to prepare good or clear practicum videos. Lecturers also cannot see and directly assess the psychomotor aspects of students. Based on the results of interviews with students, students have difficulty finding practical tools and materials, unstable networks, lack of mastery of practicum materials, difficulties in interacting with lecturers or lecturer assistants and cannot directly practice practical theory. Therefore, it was concluded that there were problems related to biology practicum activities at Padang State University during the Covid-19 pandemic. This study aims to determine the planning, implementation, and evaluation of practicum activities during the pandemic carried out by lecturers, lecturer assistants, educational laboratory institutions, and students of the Biology Department, Padang State University. This type of research is descriptive research. The population in this study were 264 semester 5 (five) students of the Department of Biology, Padang State University. Informants in this study were selected using a purposive sampling technique that is 10% of the total population. The data in this study are questionnaires, observations, interviews, and documentation of practical activities carried out by lecturers, lecturer assistants, educational laboratory institutions, and students. Data analysis techniques used are quantitative data analysis techniques and qualitative data analysis techniques. The results showed that the practicum planning carried out by lecturers, lecturer assistants, and students was in very good criteria with an average score of 89.31% each; 93.7%; and 82.18%. However, the practicum planning carried out by educational laboratory institutions is in the moderate criteria with an average value of 64.6%. The implementation of the practicum carried out by lecturers, lecturer assistants, and students is in very good criteria with an average value of 87.58% each; 97.75%; and 83.97%. However, the implementation of practicum carried out by educational laboratory institutions is in good criteria with an average value of 78.23%. The practicum evaluations carried out by lecturers, lecturer assistants, and students are in very good criteria with an average value of 89.06% each; 97.56%; and 86.32%. However, the practicum evaluation carried out by educational laboratory institutions was in the moderate criteria with an average value of 68.75%.

KEYWORDS: Planning, Implementation, Evaluation, Practicum, Covid-19

I. INTRODUCTION

Biology learning aims to develop student competencies by providing various hands-on learning experiences. Students not only understand the theories but also discover and implement the theories themselves. Biology learning actively involves students to see, observe, search, analyze various processes and find a concept (Yuhanna & Juwanita, 2017). Biology is concerned with how to find out about nature systematically, so that it is not only a collection of knowledge in the form of facts, concepts, or principles but also a process of discovery. Based on these demands, Biology Learning must emphasize direct experience to develop competencies so that students are able to explore the natural surroundings scientifically. One form of direct experience given to students is through the application of practicum methods (Agustina *et al.*, 2019).

Practicum is a learning process activity to find certain principles or explain the principles developed. Practicum is a means of introducing materials and equipment that were originally considered abstract to become more real (Sastria *et al.*, 2020). Practical activities in biology learning can help lecturers achieve learning goals and help students to better understand the material. According to Rustaman (2005) practicum has several objectives: (1) Develop problem solving skills with a scientific approach; (2) Provide opportunities for students to develop basic skills and logical thinking skills; (3) Means to improve understanding of concepts; (4) Increasing students' interest and motivation to study science; (5) Provide opportunities for students to participate actively so as to obtain information and scientific skills by means of observation. (6) Train the ability to work together and cultivate positive traits; and (7) Increasing awareness of the environment (Rustaman, 2005).

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During the current Covid-19 pandemic, practicums that are usually carried out in laboratories must be replaced with online-based practicums (Astuti *et al.*, 2021). This is in accordance with circular letter Number 4 of 2020 issued by the Minister of Education and Culture of the Republic of Indonesia regarding the implementation of education policies in the emergency period of the spread of Covid-19, in the circular it is explained that the learning process is carried out at home through online or online learning. This is done to prevent the spread of the corona virus (Kemendikbud, 2020). Based on the results of the researcher's interview with the lecturer of Vertebrate Animal Diversity and Animal Ecology, namely Drs. Ardi, M.Si on April 29, 2021 and the lecturer of Genetics I, namely Ms. Afifatul Achyar, M.Si on September 23, 2021, there are several problems related to the implementation of biology practicum activities at Padang State University during the Covid-19 pandemic, namely planning, implementation, and evaluation of practicum activities. In the practicum planning process for Vertebrate Animal Diversity, Animal Ecology, and Genetics I, the lecturer has prepared a practicum activity plan at the beginning of the semester for each material. Planning is done by lecturers by making Semester Learning Plans (RPS), module handbooks, videos, and practical guides. Lecturers do not create platforms and E-Modules specifically for practicum, but lecturers make practicum videos which are demonstrated directly by the lecturers or use reference videos from YouTube and the lecturers also prepare virtual labs with easily accessible sites.

The problem in the planning process for the Vertebrate Animal Diversity and Animal Ecology practicum is that the lecturers do not create platforms, special E-Modules and their own videos for practicum materials. Lecturers only use the WhatsApp Group platform, Zoom Meeting, and reference videos from YouTube. Meanwhile, the problem in the Genetics I practicum is that lecturers have their own challenges in preparing good or clear practicum videos because the materials used in Genetics I practicum have a small size on a microliter scale, so it is often difficult to display materials in clear videos (zoom in). This is in accordance with the research of Fatimatus (2021) regarding the Exploration Study: DDR Practicum as a Form of Adapting to New Habits during the Covid-19 Pandemic. The results show that the form of practicum that can still be done at home is practicum with virtual laboratories such as PhET, environmental analysis, independent video assignments, video-based practicum practiced by lecturers with reporting in the form of written reports or in video form (Zahro, 2021).

The implementation of the Vertebrate Animal Diversity and Animal Ecology practicum activities are carried out independently by students at their respective homes using reference videos from YouTube. The results of student observations will be presented through the WhatsApp Group or Zoom Meeting platform, then synchronized with practicum material. Meanwhile, the implementation of Genetics I uses videos that are demonstrated directly by lecturers and lecturer assistants and also virtual labs such as playing games by presenting real visualizations as if students were carrying out practical work directly. The problem with the implementation of the Vertebrate Animal Diversity, Animal Ecology, and Genetics I practicum is on the network, because accessing Zoom Meetings, virtual labs, and videos on YouTube requires a stable network. Meanwhile, not all areas where students live have a stable network like remote areas. This is in accordance with Ta'imul's research (2020) on Exploration Studies of Science Practicum Activities During the Covid-19 Pandemic. The results of the study indicate that the obstacle to science practicum activities during the covid-19 pandemic is the network, especially in the form of practicums that use applications, or must be connected to the internet. This form of practicum generally requires a fairly long internet connection time, so students make this an aspect of the obstacle (Sholikah *et al.*, 2020).

At the end of the Vertebrate Animal Diversity, Animal Ecology, and Genetics I practicum an evaluation process is carried out, the lecturer cannot see and directly assess the psychomotor aspects of students, how students work and carry out practicum steps. However, lecturers can assess students' online practicum results through video assignments made by students. Students' skills in using laboratory equipment during online practicums may be reduced. This is in accordance with Indah's (2013) research on the Analysis of Obstacles in the Implementation of Biology Practicum in Public High Schools in Palangka Raya City. The results showed that the difficulties of students in carrying out the practicum were not mastering the concepts being practiced, less skilled in using practicum tools because they were not used to it, difficult to work together in groups and less interested in making practicum reports (Dewi *et al.*, 2013).

Based on the observations of the researchers using an online practicum implementation questionnaire for 40 biology students in semester II, IV and VI, Padang State University on April 24, 2021 (Appendix 6). There are several problems related to the implementation of biology practicum activities at Padang State University during the Covid-19 pandemic, namely planning, implementing, and evaluating practicum activities. In the planning process, not all students read the practicum guide before the practicum begins and understand the material in the practicum guide. In addition, the tools and practicum materials used are also difficult to find. During the practicum, there were major obstacles faced by students such as unstable networks and limited internet quota. For example, students present the results of their group work only through the WhatsApp Group platform because if they use Zoom Meeting the network is unstable. The next obstacle is that practical tools and materials are difficult to find. For example, in the implementation of the Animal Ecology practicum regarding the introduction of measuring tools for abiotic factors, such as for measuring environmental temperature which requires laboratory equipment but modified with the help of an application in the Playstore, the results obtained are not accurate, because the temperature measured is the temperature of the

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cellphone, not the cellphone temperature. ambient temperature. In addition, in the implementation of the Vertebrate Animal Diversity practicum that uses dangerous objects such as snakes, monitor lizards and so on that do not allow students to get them, students are asked to watch videos available on Youtube, because lecturers do not make videos for practicum material.

The next obstacle is the lack of mastery of practical material. Not all practicum materials can be mastered by students, because online practicums only answer questions in the practicum guide book, while offline practicums directly observe and make their own conclusions. The next obstacle is the difficulty in interacting with lecturers or lecturer assistants, students do not understand the steps in carrying out online practicums and making reports that are not appropriate because the data used is inaccurate due to lack of communication and information. The last obstacle is that students cannot practice practical theory directly, because everything is in the form of videos or virtual images. Does not hone students' new skills in practicum. Only focuses on practicum reports rather than processes. The practicum is only limited to knowledge or theory. This is in accordance with Nur's research (2021) regarding the Analysis of Student Perceptions of Practicing at Home During the Covid-19 Pandemic Period in the Plant Physiology Course. The results showed that the main obstacles faced by students during practicum at home were the availability of tools and materials, the form of the lecturer's explanation regarding practicum procedures was still not optimal, internet network instability, limited quota, the influence of gadget quality, and students did not read the theory that was in line. with practical material so that they do not understand the purpose of practicum (Yunus, 2021). This is also reinforced by research conducted by Anggi (2021) regarding the Exploration Study of Physics Practicum Activities During the Covid-19 Pandemic. The results showed that the majority of the obstacles faced during the practicum were on the network or signal (Setiyaningsih *et al.*, 2021). Research conducted by Icha (2021) on the Opinion of Science Education Students at Tidar University on Online Practicum. The results showed that the obstacles experienced by students during online practicums were that students did not understand the online practicum guidelines, so communication harmony between lecturers and students was needed (Erliana, 2021).

At the end of the practicum, an evaluation process is carried out, not all practicum material can be mastered by students, students do not understand the steps for implementing practicum and making reports. This causes a decrease in student skills. This is in accordance with Khairun's research (2020) on Lectures and Practicum Problems in the Covid-19 Pandemic Period. The results showed that the most problems faced by students were students' lack of understanding of the process or steps of practicum work, because they were not directly involved in practice (Nisa, 2020). So, it can be concluded that the online practicum of the Biology Department, Padang State University is carried out independently using platforms in the form of a virtual lab, YouTube, WhatsApp Group and Zoom Meeting. Lecturers do not create their own platforms, special E-Modules and videos for practicum materials. Lecturers only use the WhatsApp Group platform, Zoom Meeting, and reference videos from YouTube. Meanwhile, lecturers who make their own videos for practicum materials have challenges in preparing good or clear practicum videos. Lecturers cannot see and directly assess the psychomotor aspects of students. Students do not understand the material and steps for online practicum because they experience many obstacles such as tools and materials are difficult to find, unstable network and limited internet quota, lack of mastery of practicum material, difficulty in interacting with lecturers or lecturer assistants and cannot practice directly. practical theory. Based on the problems raised, the author will conduct a research "Analysis of Practicum Implementation During the Pandemic Period in the Biology Department, Padang State University".

II. METHOD

2.1 Type of research

This type of research is descriptive research by combining quantitative and qualitative data collection techniques. This method was chosen with the consideration that researchers want to obtain data and analyze in more depth about biology practicum activities for students in the July-December 2021 semester, class of 2019 Department of Biology, Padang State University.

2.2 Research informants

Research informants are sources of data and information in a study. Informants are information providers (Gusriani, 2015). The determination of informants in the research to be carried out is as follows.

1. Informants in this study were lecturers, assistant lecturers, educational laboratory institutions, and students.
2. Lecturers and lecturer assistants as informants are determined by purposive sampling, namely with the consideration that the lecturers and lecturer assistants carry out practical and teaching activities in at least two different classes.
3. Education laboratory institutions as informants are three people, namely genetics II education laboratory, biochemistry, plant physiology, and animal microtechnics. Biochemistry and plant physiology share the same educational laboratory settings.
4. Students who are given a questionnaire act as respondents, while students who are interviewed act as research informants. Student respondents were all students of the July-December semester of 2019 class, totaling 264 people who took part in genetics II, biochemistry, plant physiology, and animal microtechnics lectures. The sample of students who were used as informants, namely students who were interviewed, were selected using a purposive sampling technique, namely students

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from classes who carried out practical activities. Furthermore, 10% of the total population of the 2019 batch were taken as many as 24 students representing four education classes and four science classes.

2.3 Research procedure

Preparation of assessment instruments, instrument validation, observing the implementation of the practicum and distribute questionnaires to lecturers, lecturer assistants, educational laboratory institutions, and students.

2.4 Data collection techniques

Data collection techniques used to collect data in the form of questionnaires, observations, interviews, and documentation.

2.5 Research instrument

The instruments used were questionnaires, supporting document observation sheets, interview guides, and documentation.

2.6 Data validity check technique

The technique used to determine the validity of the data taken is the triangulation technique. Triangulation is defined as a data collection technique that combines various existing data source collection techniques (Sugiyono, 2011). In this study, the data source triangulation technique was used, namely the process of strengthening evidence from different individuals (lecturers, lecturer assistants, educational laboratory institutions, and students) and documents. In addition, triangulation of data collection techniques was also carried out, namely combining quantitative and qualitative techniques (assessment sheets, observations and interviews). This ensures that the information obtained is more accurate.

2.7 Data analysis techniques

1. Quantitative data

The research questionnaire was processed using the following formula

$$P = \frac{f}{n} \times 100$$

2. Qualitative data

The data processed using qualitative techniques were obtained from the results of interviews, video recordings and field notes. The data was processed using the Miles & Huberman method. The Miles & Huberman method is a qualitative analysis consisting of three flow of activities that occur simultaneously, namely data reduction, data presentation and conclusion drawing and verification

III. RESULTS AND DISCUSSION

Result

3.1 Practicum Planning During the Pandemic Period at the Department of Biology, Padang State University

Data on practicum planning during the pandemic carried out by lecturers, lecturer assistants, educational laboratory institutions, and students were obtained by researchers from a questionnaire instrument. Based on data analysis, practicum planning carried out by lecturers, lecturer assistants, and students is in very good criteria, while practicum planning carried out by educational laboratory institutions is in moderate criteria. Data analysis of practicum planning carried out by lecturers, lecturer assistants, educational laboratory institutions can be seen in the following diagram.

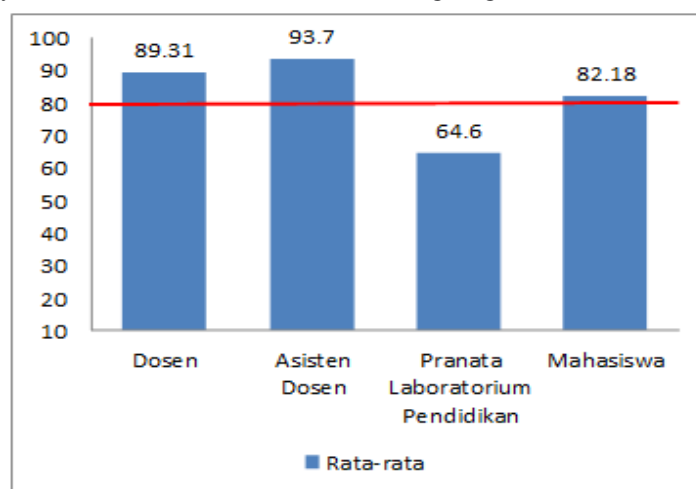


Figure 1. Percentage of Planning for Biology Department Practicum. The red line indicates very good criteria.

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Biology practicum planning during the pandemic carried out by lecturers and lecturer assistants has four indicators. These indicators consist of evaluating the availability of practicum tools and materials, compiling practicum methods according to the time allocation, preparing practicum assessment formats, and evaluating practicum guides. Biology practicum planning carried out by educational laboratory institutions or laboratory assistants has only one indicator, namely planning laboratory activities and development. Meanwhile, the planning of biology practicum carried out by students has two indicators, namely preparing practicum tools and materials and understanding the material in the practicum guide. The practicum planning carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 89.31% each; 93.7%; and 82.18%. This shows that the lecturers and teaching assistants have evaluated the availability of practicum tools and materials, developed a practicum method according to the time allocation, prepared an assessment format, and evaluated the practicum guide very well. Students have also prepared practicum tools and materials and understand the material in the practicum guide very well. However, the practicum planning carried out by educational laboratory institutions is in the moderate criteria with an average value of 64.6%. This shows that educational laboratory institutions have not planned laboratory activities and development properly.

To strengthen the results of the questionnaire, the supporting documents were observed. Based on the results of observations, most of the supporting documents for practicum planning are not available, especially supporting documents for educational laboratory institutions. Supporting documents are available only for lecturers and lecturer assistants in the form of a practicum assessment format only. Based on the results of the questionnaire obtained, lecturers and lecturer assistants have evaluated the availability of practicum tools and materials and provided practicum guides that have been evaluated every time they are used. However, the results of the observations did not find documents on the results of the evaluation of the availability of tools and materials. The lecturer only explained that the tools and materials used in the practicum were adapted to the environment around students and were easy to obtain. The tools and practicum materials used are tools and materials that are easily obtained and are located in the student's environment, because most of the practicum equipment is in the laboratory. So the practicum that is done at home is a simple practicum. Then, the practicum guides distributed by lecturers and assistants are in the form of pdf, ppt, jpg and no revision date is available so that researchers cannot know whether the practicum guide is evaluated every time it will be used or not. This is inversely proportional to the results of the questionnaire which shows that lecturers and assistants have evaluated the availability of practicum tools and materials, and evaluated the practicum guide very well. However, lecturers and teaching assistants always prepare a practicum assessment format in the form of Microsoft Excel. This is in accordance with the results of the questionnaire which showed that lecturers and teaching assistants had prepared the practicum assessment format very well. Based on the results of the questionnaire, educational laboratory institutions or laboratory assistants have not prepared a laboratory development plan, developed a laboratory administration system, and planned a good laboratory management. This is in accordance with the results of observations where educational laboratory institutions do not have supporting documents such as laboratory development plan documents, the latest laboratory administration, and management plan documents. Educational laboratory institutions only prepare tools and materials for lecturers and lecturer assistants who will only make practicum videos. Because practicum is carried out virtually and students are in their respective homes, educational laboratory institutions do not play an important role as offline practicum.

3.2 Implementation of Practicum During the Pandemic Period at the Department of Biology, Padang State University

Data from the implementation of practicum during the pandemic carried out by lecturers, lecturer assistants, educational laboratory institutions, and students were obtained by researchers from a questionnaire instrument. Based on the data analysis that has been carried out, the practicum carried out by lecturers, lecturer assistants, and students is in very good criteria. Meanwhile, the implementation of practicum carried out by educational laboratory institutions is in good criteria. Data analysis of the implementation of the practicum carried out by lecturers, lecturer assistants, educational laboratory institutions can be seen in the following diagram.

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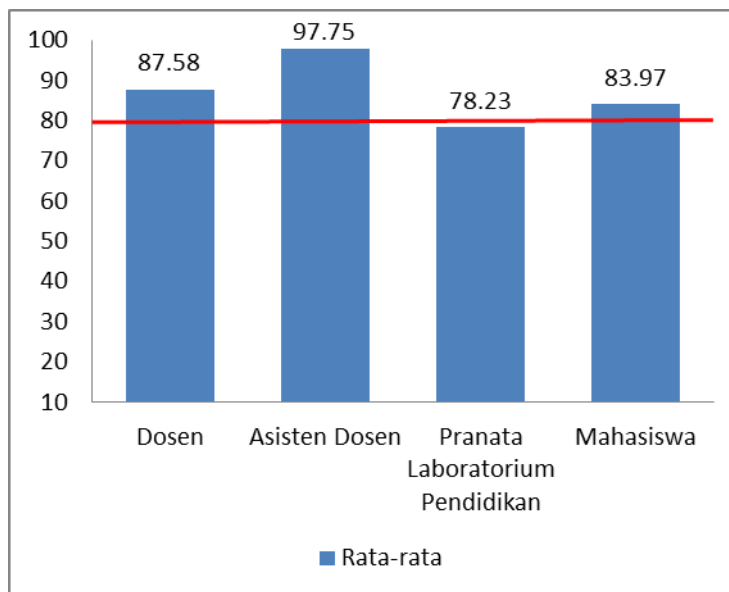


Figure 2. Percentage of Practicum Implementation in the Department of Biology. The red line indicates very good criteria.

The implementation of biology practicum during the pandemic carried out by lecturers and students consists of three indicators. The indicators consist of preliminary activities, core activities, and closing activities. The implementation of the biology practicum conducted by the teaching assistant consists of six indicators. These indicators consist of the ability to open a practicum, strengthen practicum material, teaching and learning activities (practical process), the ability to use learning media, the ability to close practicum activities, and follow-up. Meanwhile, the implementation of biology practicum conducted by educational laboratory institutions consists of four indicators. The indicators consist of serving practicum activities, making an inventory of practicum tools and materials, recording practicum activities, and managing practicum materials and equipment. The implementation of the practicum carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 87.58% each; 97.75%; and 83.97%. Lecturers and students have carried out preliminary activities, core activities, and closing activities very well. Lecturer assistants also open practicum, provide reinforcement of practicum material, carry out teaching and learning activities (practical process), use learning media, close practicum activities, and carry out follow-up activities very well, and carry out practicum carried out by educational laboratory institutions in each subject. are in good criteria with an average value of 78.23%. Educational laboratory institutions serve practicum activities, take an inventory of practicum tools and materials, record practicum activities, and manage practicum materials and equipment properly.

To strengthen the results of the questionnaire, the supporting documents were observed. Based on the results of observations, most of the supporting documents for the implementation of the practicum are not available, especially supporting documents for educational laboratory institutions. The only supporting documents available are assignments for students, attendance records for lecturers and students, as well as practicum videos made by students. Based on the results of the questionnaire, lecturers and lecturer assistants have carried out practicum very well from preliminary activities, core activities to closing activities. As a follow-up to the practicum process, lecturers and lecturer assistants give assignments to students, assignments are submitted in E-Learning every meeting in the form of reports and quizzes via google form. However, based on observations, there were several lecturer meetings that did not provide a column for submitting assignments for practicum, the lecturer only provided an independent discussion column and materials. Quizzes for practicum are not always held every meeting, only a certain time. This is inversely proportional to the results of the questionnaire which shows that lecturers and lecturer assistants always give assignments to students. Based on the results of the questionnaire, the educational laboratory institutions had carried out the practicum well, the educational laboratory institutions recorded the presence of lecturers and students from the receipt for borrowing tools. However, educational laboratory institutions do not prepare supporting equipment (worksheets, data record sheets, and so on) because the lecturers of each course prepare student worksheets and other equipment. Educational laboratory institutions also do not record the use of guidebooks because the guidebooks are distributed directly by the lecturers concerned. Educational laboratory institutions do not record equipment damage because the use of equipment directly in the laboratory is very little because the practicum is carried out in their respective homes. The role of laboratory institutions during online practicums is not fully implemented because they have been replaced by lecturers and assistant lecturers for each course. Based on the results of the questionnaire, students have carried out practicum very well, especially in demonstrating practical activities. Students demonstrate practicum activities in the form of videos, video links made by students are sent in E-Learning and uploaded

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on Instagram by marking the lecturer's Instagram account. Students not only make reports and watch videos made by lecturers and lecturer assistants, but students participate in practicum by making practicum videos.

3.3 Evaluation of Practicum During the Pandemic Period at the Department of Biology, Padang State University

Data from practicum evaluations during the pandemic conducted by lecturers, teaching assistants, educational laboratory institutions, and students were obtained by researchers from a questionnaire instrument. Based on data analysis, practicum evaluations carried out by lecturers, lecturer assistants, and students are in very good criteria. Meanwhile, the practicum evaluation carried out by educational laboratory institutions is in the medium criteria. Analysis of practicum evaluation data conducted by lecturers, lecturer assistants, educational laboratory institutions can be seen in the following diagram.

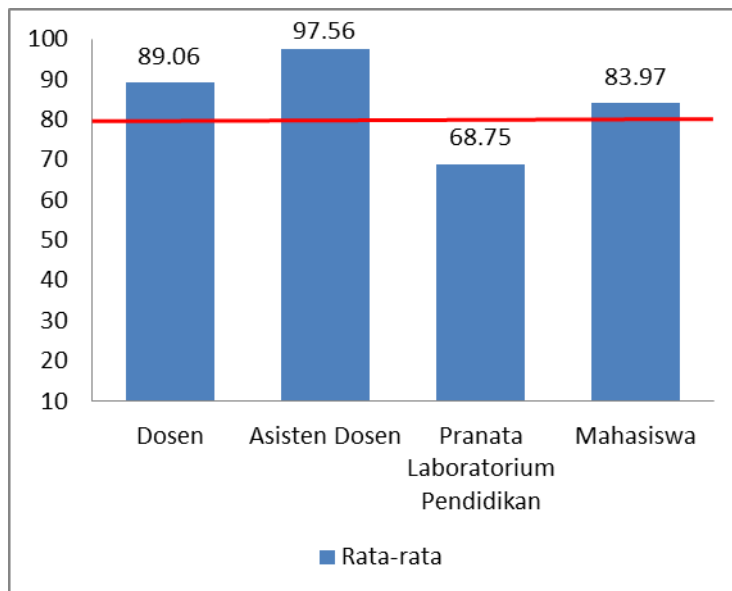


Figure 4. Percentage of Evaluation of Biology Department Practicum. The red line indicates very good criteria.

Evaluation of biology practicum during the pandemic period conducted by lecturers and assistants consists of one indicator, namely an appropriate assessment of cognitive, affective, and psychomotor aspects. The practicum evaluation carried out by students also consists of one indicator, namely making, collecting, and presenting practicum reports. Meanwhile, the evaluation of biology practicum conducted by educational laboratory institutions also consists of one indicator, namely the evaluation of practicum tools and materials for further improvement. The practicum evaluations carried out by lecturers, lecturer assistants, and students in each course are in very good criteria with an average score of 89.06% each; 97.56%; and 86.32%. Lecturers and assistant lecturers have done a very good assessment of cognitive, affective, and psychomotor aspects, students have also made, collected, and presented practicum reports very well. However, educational laboratory institutions have not properly evaluated the tools and practicum materials for further improvement with an average value of 68.75%.

To strengthen the results of the questionnaire, the supporting documents were observed. Based on the results of observations, most of the supporting documents for practicum evaluation are not available, especially supporting documents for educational laboratory institutions. The only supporting documents available are cognitive, psychomotor, and affective assessment sheets, SOPs for operating practicum equipment, and practicum reports. Based on the results of the questionnaire, lecturers and lecturer assistants have assessed the cognitive, psychomotor, and affective aspects very well. Lecturers and teaching assistants prepare cognitive, psychomotor, and affective assessment sheets. Cognitive assessment is obtained from practicum exams, quizzes, question and answer discussions, and practicum reports. Psychomotor assessments were obtained from videos and student discussion activities. Then, the affective assessment was obtained from how the attitude of the students in making the video, the tools and materials used were complete or not, otherwise it would reduce the value, and how the students' attitudes met the systematics of the report. The practicum assessment sheet for each laboratory is the same, namely in the form of Microsoft Excel. However, based on observations, lecturers and teaching assistants do not yet have a grid of cognitive, psychomotor, and affective assessments and written guidelines for cognitive, psychomotor, and affective assessments. Cognitive, psychomotor, and affective assessment grids are only explained through the theoretical RPS and handbook module. This is inversely proportional to the results of the questionnaire which shows that lecturers and lecturer assistants always make assessments that are relevant to the goals set, while written guidelines for cognitive, psychomotor, and affective assessments have not been prepared by lecturers and lecturer assistants. Based on the results of the questionnaire, the educational laboratory has not evaluated the SOP for the

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operation of practicum equipment and has evaluated the use of equipment and practicum materials for further improvement. SOPs for operating practicum equipment are distributed not in written form but in jpg or image form. There are several educational laboratory institutions that do not have SOPs for operating equipment on the grounds that they are in the old practicum manual and have not been made. Documents on the results of the evaluation of the use of equipment and practicum materials for further repairs are also not available because students do practicum at their respective homes so that there is very little use and damage to equipment and practicum materials. Based on the results of the questionnaire, students always make, collect, and present the results of their practicum reports very well. Practicum reports are made by students according to the systematics of writing practicum reports that have been distributed. And reports are collected in E-Learning with a certain time limit.

DISCUSSION

3.1 Practicum Planning During the Pandemic Period at the Department of Biology, Padang State University

The practicum planning carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 89.31% each; 93.7%; and 82.18%. This shows that the lecturers and teaching assistants have evaluated the availability of practicum tools and materials, developed a practicum method according to the time allocation, prepared an assessment format, and evaluated the practicum guide very well. Students have also prepared practicum tools and materials and understand the material in the practicum guide very well. However, the results of the observations did not find documents on the results of the evaluation of the availability of tools and materials. The lecturer only explained that the tools and materials used in the practicum were adapted to the environment around students and were easy to obtain. The tools and practicum materials used are tools and materials that are easily obtained and are located in the student's environment, because most of the practicum equipment is in the laboratory. So the practicum that is done at home is a simple practicum. Conducting experiments in science requires tools and materials. The success of an experiment or experiment often depends on the ability to choose and use the right tools effectively. The experience of using tools and materials is a concrete experience that children need to accept new ideas. It is not expected that the tools used are laboratory equipment that must be purchased, it is enough to use simple tools that can be made by the teacher, and the available materials. The environment is a laboratory of unexpected value (Rahman *et al.*, 2004).

The practicum guides distributed by lecturers and assistants are in the form of pdf, ppt, jpg and no revision date is available so that researchers cannot know whether the practicum guide is evaluated every time it will be used or not. This is inversely proportional to the results of the questionnaire which shows that lecturers and assistants have evaluated the availability of practicum tools and materials, and evaluated the practicum guide very well. There are various obstacles in implementing practicum in schools or colleges, including the unavailability of a practicum guide, so that the practicum does not run optimally, there is no assessment guide made by the teacher or lecturer. In addition, the price of materials and tools used in the practicum is very expensive (Nanangkong *et al.*, 2019). The practical guide is intended to help and guide students to be able to work continuously and directed. With the practicum guide, students have readiness before practicum activities, namely by reading the book first. Students also get an overview of the objectives, benefits and processes of the practicum activities they carry out. In addition, the practicum guide should also be able to guide students to develop creativity and scientific attitude in conducting experiments (Syamsu, 2017).

Education laboratory institutions are positions that have the scope of duties, responsibilities and authorities to manage educational laboratories with the rights and obligations given in full by the authorized official. An educational laboratory officer at a university is expected to be able to carry out its functions optimally in laboratory governance or management, as well as in their daily duties, creativity and activeness are required in serving student or lecturer activities related to the teaching and learning process, whether in the form of practicum, research, or other activities. Community Service (Harjanto *et al.*, 2019). However, the practicum planning carried out by educational laboratory institutions is in the moderate criteria with an average value of 64.6%. This shows that educational laboratory institutions have not planned laboratory activities and development properly. Educational laboratory institutions only prepare tools and materials for lecturers and lecturer assistants who will only make practicum videos. Because practicum is carried out virtually and students are in their respective homes, educational laboratory institutions do not play an important role as offline practicums.

3.2 Implementation of Practicum During the Pandemic Period at the Department of Biology, Padang State University

The implementation of the practicum carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 87.58% each; 97.75%; and 83.97%. Lecturers, assistant lecturers, and students have carried out preliminary activities, core activities, and closing activities very well. Lecturers in the implementation of the practicum act as the person in charge of discussing the practicum material in the practicum guide with assistants and providing brief training on how to use tools or instruments related to practicum material (Banggali *et al.*, 2011). The genetics II and plant physiology practicum, lecturers are not directly involved in the practicum, because the lecturer cooperates with the teaching assistant in the implementation of the practicum. The lecturer prepares practicum materials and practicum guides before the practicum is carried

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out and explains to the teaching assistant about the materials, objectives and competencies that must be achieved during the practicum. Meanwhile, the animal biochemistry and microtechnical practicum lecturer is directly involved in the practicum without the help of a lecturer assistant. The implementation of the practicum can be carried out directly by students at home, using virtual labs and videos that are self-demonstrated by lecturers and lecturer assistants or using references from YouTube. Practicum that can be carried out directly by students at home is a simple practicum. The most popular form of practicum that has been carried out by students while online is experimentation using simple tools and materials that can be easily carried out, but does not reduce the essence or essence of the praktikum objectives. Students also explained that the lecturer's explanation accompanied by clear practicum guidelines would increase student interest in carrying out practicum (Sholikah *et al.*, 2020). This is also in accordance with research by Budiyo (2020), on Philosophical Reflections: Critical Analysis of Learning Strategies for Science Practicum during the COVID-19 Pandemic. The results showed that the practicum was carried out independently at each student's home by utilizing tools and materials around their environment and learning evaluation was carried out through independent assignments or practicum videos sent to lecturers (Budiyo Saputro *et al.*, 2020).

The use of video in the practicum process which is equipped with a combination of sound, image and music brings the material to be visualized so that students can be motivated to be more happy to carry out online practicums. Based on research by Erniwati (2014) on the use of video-based practicum media in physics science learning to improve student learning outcomes on the subject matter of temperature and its changes. The results of the study indicate that using video-based practicum media can provide differences in student science-physics learning outcomes compared to using learning strategies that have been implemented by teachers (Erniwati *et al.*, 2014). Virtual lab is an artificial environment that uses visual and auditory stimulation so that it is as if the user is in the environment. This technology provides a sensation that is close to reality so it is very useful for skills transfer processes such as practicum. Even in some cases, this technology to the point of causing false memories as if the user had done the real thing. The use of virtual labs helps in providing a real practical experience even at home. In addition, another advantage of virtual laboratories is that they are cheaper and safer than actual practice in the field (Nugroho, 2021). Based on Sri Wahyu Widyaningsih's research (2016) on Student Science Process Skills Through the Use of Virtual Laboratory Media in Basic Physics Courses at the University of Papua. The results show that the use of Virtual Laboratory media can be used as an appropriate alternative that can be used in the basic physics learning process, especially to grow students' science process skills, especially if laboratory facilities and infrastructure are limited (Widyaningsih & Yusuf, 2016). This is in accordance with Solikhin's (2019) research on A need analysis in developing virtual laboratory according to the chemistry teachers. The results showed that the virtual laboratory is one of the practicum media that can solve the limitations of tools, materials and learning time. The results of this study obtained that 91.89% of respondents stated that they needed a virtual chemistry laboratory that was integrated in hybrid learning. While based on practicum, things that are considered to require a virtual chemistry laboratory are chemical equilibrium, electrochemistry and reaction rates. This research can be used as a criterion for developing technology-based media (Solikhin *et al.*, 2019). Research by Fitra (2018) on Virtual Physics Laboratory Application Based on the Android Smartphone to Improve Learning Independence and Conceptual Understanding. The results showed that the Virtual Lab is an Android application that can be operated for learning both inside and outside school and the Virtual Lab Application is quite feasible as a learning medium and of very good quality (Arista & Kuswanto, 2018).

Students have carried out practicum very well, especially in demonstrating practical activities. Students demonstrate practicum activities in the form of videos, video links made by students are sent in E-Learning and uploaded on Instagram by marking the lecturer's Instagram account. Students not only make reports and watch videos made by lecturers and lecturer assistants, but students participate in practicum by making practicum videos. The activity of reporting the results of the practicum can be more interesting when it is based on audio-visual which can facilitate a variety of learning styles and the delivery of verbal information is carried out. The report, which initially only used a handwritten portfolio, due to the demands of modernization of education and the pandemic conditions that had an impact on changes in the order of the education system, reports on the results of the practicum can be communicated orally through video presentations that can train students' communication skills and creativity. Aspects that can be evaluated from the video presentation of practicum reports are the same as reports in general, coupled with the aspect of measuring creativity and oral communication skills (Ermila Hendriyani *et al.*, 2020). The implementation of the practicum carried out by educational laboratory institutions in each subject was in good criteria with an average value of 78.23%. Educational laboratory institutions serve practicum activities, take an inventory of practicum tools and materials, record practicum activities, and manage practicum materials and equipment properly. Educational laboratory institutions record the presence of lecturers and students from the receipt for borrowing tools. However, educational laboratory institutions do not prepare supporting equipment (worksheets, data record sheets, and so on) because the lecturers of each course prepare student worksheets and other equipment. Educational laboratory institutions also do not record the use of guidebooks because the guidebooks are distributed directly by the lecturers concerned. Educational laboratory institutions do not record equipment damage because the use of equipment directly in the laboratory is very little because the practicum is carried out in their

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respective homes. The role of laboratory institutions during online practicums is not fully implemented because they have been replaced by lecturers and assistant lecturers for each course.

3.3 Evaluation of Practicum During the Pandemic Period at the Department of Biology, Padang State University

The practicum evaluations carried out by lecturers, lecturer assistants, and students in each course are in very good criteria with an average score of 89.06% each; 97.56%; and 86.32%. Lecturers and assistant lecturers have done a very good assessment of the cognitive, affective, and psychomotor aspects. Cognitive assessment is obtained from practicum exams, quizzes, question and answer discussions, and practicum reports. Psychomotor assessments were obtained from videos and student discussion activities. Affective assessment is obtained from how the attitude of students in making videos, the tools and materials used are complete or not, otherwise it will reduce the value, and how the attitudes of students fulfill the systematics of the report. The practicum assessment sheet for each laboratory is the same, namely in the form of Microsoft Excel. However, based on observations, lecturers and teaching assistants do not yet have a grid of cognitive, psychomotor, and affective assessments and written guidelines for cognitive, psychomotor, and affective assessments. Cognitive, psychomotor, and affective assessment grids are only explained through the theoretical RPS and handbook module. This is inversely proportional to the results of the questionnaire which shows that lecturers and lecturer assistants always make assessments that are relevant to the goals set, while written guidelines for cognitive, psychomotor, and affective assessments have not been prepared by lecturers and lecturer assistants. This is in accordance with Witma's research (2015) on the Analysis of the Implementation of Biology Science Practicum for Class VIII Semester 1 in State Junior High Schools throughout Lubuk Bagalung District, 2014/2015 Academic Year. The results showed that in practicum evaluation there were still teachers who did not know the form of assessment for practicum activities (Atnur *et al.*, 2015).

Students have also made, collected, and presented practicum reports very well. Practicum reports are made by students according to the systematics of writing practicum reports that have been distributed. Reports are collected in E-Learning with a certain time limit. The current practicum report preparation still has many weaknesses, including only duplicating practicum instructions and not training students to build arguments. The feedback given by the lecturer has not been carried out optimally so that students have not been trained to produce better writing. Whereas the feedback given by the lecturer will be able to help students produce better reports. Report writing has many advantages over answering exam questions. Besides being able to build arguments, preparing an investigative report can train critical thinking skills. The ability to discuss the results of investigations in reports can connect the theory learned with the results of investigations in the laboratory. Based on research by Yunita Arian (2020) on the Analysis of the Difficulties of Prospective Teacher Students in Compiling Practicum Reports, it was revealed that students still had difficulties in compiling practicum reports. It is necessary to arrange a practical implementation that can train students' writing skills (Anwar *et al.*, 2020). However, educational laboratory institutions have not properly evaluated the tools and practicum materials for further improvement with an average value of 68.75%. SOPs for operating practicum equipment are distributed not in written form but in jpg or image form. There are several educational laboratory institutions that do not have SOPs for operating equipment on the grounds that they are in the old practicum manual and have not been made. Documents on the results of the evaluation of the use of equipment and practicum materials for further repairs are also not available because students do practicum at their respective homes so that there is very little use and damage to equipment and practicum materials.

CONCLUSIONS

Based on the results of the study, the following conclusions can be drawn:

1. The practicum planning carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 89.31% each; 93.7%; and 82.18%. Lecturers and teaching assistants have evaluated the availability of tools and materials, methods, assessment formats, and evaluation of practicum guides very well. Students have also prepared tools and materials and understand the material in the practicum guide very well. However, the practicum planning carried out by educational laboratory institutions is in the moderate criteria with an average value of 64.6%. This shows that educational laboratory institutions have not planned laboratory activities and development properly.
2. The implementation of the practicum carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 87.58% each; 97.75%; and 83.97%. Lecturers and students have carried out preliminary activities, core activities, and closing activities very well. Lecturer assistants also open practicum, provide reinforcement of practicum material, carry out teaching and learning activities (practical process), use learning media, close practicum activities, and carry out follow-up activities very well, and carry out practicum carried out by educational laboratory institutions in each subject. are in good criteria with an average value of 78.23%. Educational laboratory institutions serve practicum activities, take an inventory of practicum tools and materials, record practicum activities, and manage practicum materials and equipment properly.

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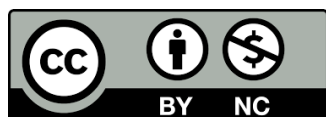
3. The practicum evaluation carried out by lecturers, lecturer assistants, and students in each course is in very good criteria with an average score of 89.06% each; 97.56%; and 86.32%. Lecturers and assistant lecturers have done a very good assessment of cognitive, affective, and psychomotor aspects, students have also made, collected, and presented practicum reports very well. However, educational laboratory institutions have not properly evaluated the tools and practicum materials for further improvement with an average value of 68.75%.

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