



## The Effectiveness of Online Learning in the Electronics Practicum Course

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**Abstract**— Online learning is a new paradigm in the world of education. Not only theory in class but online learning is also carried out practical in classes. One example is in the Electronics Practicum course. However, effective online learning in practicum courses during the Covid-19 Pandemic has never been known, especially in the Electrical Engineering Study Program at the University of Bengkulu. This study aims to find the effectiveness of online learning in electronics practicum courses. The research method used is a quantitative descriptive method with a research design model using the concept of A/B design. Data was collected through a questionnaire and analyzed using the theory of effective value range. The results show that online learning in practicum courses has been effective. The results of questionnaires from students with positive scores  $\geq 61 - 100$ . Thus, it can conclude that online learning for practicum courses is effective.

**Keywords:** Effectiveness, Electronics, Practical Courses, Online Learning

Article submitted April 2<sup>nd</sup>, 2023. Resubmitted May 25<sup>th</sup>, 2023. Final acceptance May 31<sup>st</sup>, 2023.

### 1 Introduction

The COVID-19 pandemic has changed the educational paradigm. The educational process, especially learning, can not only be completed in a real room, but can also be carried out in a virtual world. Virtual learning does not only occur in social science-based learning, but also in exact sciences, one of which is electronics.

As a result of COVID-19, many educational institutions are rethinking how to manage education during a pandemic [1], [2], [3], [4] & [5]. In addition, educational institutions must also balance the safety of students, staff, teachers, and families while continuing to strive for high-quality education to ensure good results for all students during the Covid-19 pandemic. To overcome this problem, educational institutions can choose various kinds of teaching methods. The virtual learning method is one that can be applied. Therefore, offline, and online learning can be applied to achieve the learning objectives [6] & [7].

When the Covid-19 pandemic began to spread to various regions, including Bengkulu City, the University of Bengkulu (UNIB) had a policy of conducting online lectures. This policy was taken to maintain the health and safety of all academicians, especially lecturers and students who have quite a lot of interaction in the learning process. This is a challenge for most of the study programs

in the Faculty of Engineering, UNIB. For example, how to deal with challenges that not only teach students theory, but also discipline-specific concepts detailed in the curriculum, including practicum. Practicum is one way of learning needed to shape student skills. In addition, practicums can also make students more skilled in their fields, so that they become lifelong learners [8] & [9].

The Electronics Course is one of the compulsory subjects that must be taken by students in the Electrical Engineering Study Program, Faculty of Engineering, UNIB. This course is a prerequisite for the Electronics Practicum Course. Electronics Practicum is a compulsory subject that has a total of 0-1 credits according to what is stated in the curriculum of the Electrical Engineering Study Program, Faculty of Engineering, UNIB. In addition, practicum courses are courses that apply group learning methods [10]. Group learning activities are of course difficult to carry out during the online learning process. This is due to the limited interaction that occurs during online learning, both between students themselves and between lecturers and students.

Interaction is a very important point in the teaching and learning process because it is a forum for the collaborative exchange of thoughts, feelings, or ideas between a lecturer and students or students and other students which has a reciprocal effect. Thus, special attention is needed for online learning in practicum courses so that online learning can be more effective [11].

Based on the issues described above, lecturers need to carry out evaluations as a form of professional development, support, and find feedback from students regarding the implementation of online learning, especially for practicum classes in the Electronics Practicum Course. Therefore, the formulation of the problem that can be studied is how effective online learning is in the Electronics Practicum Course.

## 2 Method

This study uses a quantitative descriptive research method with an A/B design model. In the A/B design model, researchers only use samples in one class by looking at the impact after being given treatment [12].

The sample taken is the total population, namely students who contract the Electronics Practicum Course in the Electrical Engineering Study Program, Faculty of Engineering, UNIB. The number of samples in question is as many as 42 students. Meanwhile, the treatment intended in this study is the online learning process itself.

A questionnaire consisting of 20 statements on a choice scale of 1-5 was used for data collection. This data is a series of student perceptions which are feedback during the online learning process in the Electronics Practicum Course. The statements listed in the questionnaire are made in the form of positive sentences, so that the lowest choice score is 1, and the highest choice score is 5. Thus, the lowest total score is 20 and the highest total score is 100.

Furthermore, the effectiveness analysis was measured based on the theory from Frances, et al. [13] who said that the effectiveness of learning can be measured through 2 indicators, namely (1) class management skills, and (2) positive responses from students towards mastery of the material being studied. Thus, if students give a positive response, then the learning can be said to be effective. The level of effectiveness can be measured based on Table 1.

**Table 1.** Level of Effectiveness

Rank	Category
21 – 40	Not Effective
41 – 60	Effective Enough
61 – 80	Effective
81 – 100	Very Effective

### 3 Result and Discussion

Based on the questionnaire that was filled in by the students used as the sample in this study, positive results were obtained for each given terminal. Table 2. shows in detail the total score of the results of the questionnaire.

**Table 2.** Total Score of Questionnaire from Students

Sample	Score	Sample	Score
AP	67	MDF	62
MRAS	62	LPU	61
KG	73	FNA	78
RYN	73	N	71
WL	81	AMB	73
YMK	79	PN	77
DAO	77	MRP	71
AR	61	I	86
MBF	63	MFRF	65
EF	77	AOM	63
WV	78	T	80
WA	71	YBP	67
YRG	67	MS	77
JRPB	78	AR	75
MAMS	55	VAS	52
DPK	76	WBB	61
FAF	71	LRP	85
LMN	86	RNT	70
CNN	78	LS	82
TS	64	DY	70
VDS	93	DF	73

Based on Table 2, it can be seen that as many as 6 students or 14.29% of students answered with a score above 80. It implies that the Electronics Practicum which was carried out online has been effective. Furthermore, as many as 36 students or 85.72% of students answered with scores between 61-80. It implies that the implementation of the Electronics Practicum Course online has been effective.

Even though the implementation of the Electronics Practicum Course online has been effective, there were still some obstacles related to the practicum implementation technique. First, there were still students who adapt to the online learning model in practicum courses. Second, the instability of the internet network. Third, the students could not see the tools and materials directly. Fourth, learning modules was adapted from offline to online learning. Finally, the learning time was short.

Meanwhile, the students who contract practicum courses were expected also to be able to connect both theory and practice, so that making it easier for students to get jobs in future [14]. Therefore, lecturers can provide online learning experiences in various ways. For example, using the synchronous method by combining several applications at the same time via Google Classroom or Zoom by combining other tools, such as videos. So, learning becomes easier for students to understand by using this method. Thus, online learning has created a new environment in education [15] & [16].

COVID-19 has made educational institutions innovate in teaching methods which are the heart of education. Therefore, the development of technology in learning is not only a solution, but also a challenge for educational institutions [17], [18] & [19]. Because, education holds various essential functions in developing personality, knowledge and skills needed in life, and obtaining a profession [20]. Basically, practicum learning provides concrete new experiences for students. In addition, they can build communication and interaction with classmates.

### 4 Conclusion

Online learning in the Electronics Practicum Course in the Electrical Engineering Study Program, Faculty of Engineering, UNIB, has been effective. However, some improvements are needed in the

implementation of online practicum. For example, there should be more simulations and longer practicum time. In contrast to offline learning where students can see the simulations given and immediately practice them simultaneously when the simulation takes place in the classroom.

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