

Digital Electronic Practicum with Logisim Application using Whatsapp Video Call

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ABSTRACT

The purpose of this study was to describe the effectiveness and response of students about the Digital Electronics Practicum with the Logisim Application Using Whatsapp Video Call. This type of research is descriptive research. The research subjects were 50 Physics Education Students of Lambung Mangkurat University taking Digital Electronics courses. Data collection techniques are through practicum assessment sheets and student response questionnaires. The results of the student response questionnaire showed that the format, quality, clarity, and interest of the students were in good categories. The results of student practicum assessments show the effectiveness of the Digital Electronics Practicum with the Logisim Application Using Whatsapp Video Call in the good category. Thus it can be concluded that the Digital Electronics Practicum with Logisim Applications Using Whatsapp Video Call is effective to be implemented and gets a very good response from students.

Keywords: Digital electronics, practicum, Logisim, whatsapp video call.

INTRODUCTION

Digital logic sequences are studied to introduce students to the basic theory and basic block design of digital circuits. Students will learn Boolean algebra, a sub-algebra related to digital circuits. In addition, basic gates will be studied, namely AND, OR, NOT, Exclusive-OR (XOR), NOR gates and combinations of AND and NOT gates (or NAND gates) (Al-Busaidi, 2014). An understanding of logic gates will provide further understanding of how to structure more complex circuits (Karavirta, Lindén, Kurvinen, & Laakso, 2016).

Real practicum about logic circuits is not easy, it requires many devices to calculate a complex function. This is made easier with a simulator, such as Logisim (Burch, 2002). The disadvantages of direct practice are the following, in lecturing/delivering logic circuit material, students design and analyze circuits with

direct connections to a single gate. However, this rarely happens in the real world. The circuit in an IC has several gates on one chip. Second, if a certain IC is in the laboratory, students will find it difficult to use and designate the gate on which IC pin (Al-Busaidi, 2014). Therefore, students need a simulator to build logic circuits with the basic knowledge they have (Burch, 2002).

The use of logisim software as a learning medium can be said to be effective in improving learning outcomes (Sendiawan, 2013). Logisim has been used very successfully in educational processes that study logic circuit design and digital networks (switching) (Hadžić, Luković, Krneta, & Dimopoulos, 2016). In the use of logisim, students must have a good knowledge of what to do. If not, students will not know what he will use and what he will do (Rolando, Carlos, Diana, & Mayra, 2009).

The WhatsApp (WA) social media is one of the communication media that is currently loved by all levels of society (Kusuma, 2020). Whatsapp can be used as a communication tool in the teaching and learning process (Firman & Rahman, 2020; Nasution, 2020; Waseso & Fuadi, 2019). One of the advantages of whatsapp is that it has a videocall group feature. Through this feature, student groups consisting of only 3-4 people per group can discuss with practicum assistants. They can exchange ideas and experiences for the smooth running of digital electronics practicum.

Based on various previous studies on the various advantages of WhatsApp, the researcher will use WhatsApp to bridge communication between students and practicum assistants. The purpose of this study is to describe the effectiveness and response of students about the Digital Electronics Practicum with the Logisim Application using Whatsapp Video Call.

METHODS

This type of research is descriptive quantitative research. The research subjects were 50 Physics Education Students of Lambung Mangkurat University taking Digital Electronics courses. Data collection techniques in this study were to use practicum assessment sheets and student response questionnaires. The practicum carried out with this method is about combination logic circuits, which are limited to adders (half adders and full adders, comparators, multiplexers and demultiplexers.

The practicum assessment sheet is used to describe the effectiveness of the implementation of the Digital Electronics practicum with the Logisim application using Whatsapp Video Call. Effectiveness is seen from the accumulated value of practicum using Whatsapp Video Call. The final score will be categorized as very good, good, quite good, poorly and not good based on the following table.

Table 1. Module Effectiveness Criteria

Interval of Score	Criteria
$80 < X \leq 100$	Very good
$60 < X \leq 80$	Well
$40 < X \leq 60$	quite Good
$20 < X \leq 40$	poorly
$0 < X \leq 20$	Not good

Student responses questionnaires to the Digital Electronics Practicum with Logical Applications using Whatsapp Video Call are stated to be very good, good, quite good, poorly and not good based on the following table. This student response questionnaire is an adaptation of previous research that has been validated (Dewantara et al., 2021; Dewantara, Mahtari, Misbah, & Haryandi, 2019; Dewantara, Wati, Kusuma, Rusmawati, & Melisa, 2021).

Table 2. Student Responses Criteria

Interval of Score	Criteria
$4,2 < X \leq 5$	Very good
$3,4 < X \leq 4,2$	Good
$2,6 < X \leq 3,4$	quite Good
$1,8 < X \leq 2,6$	poorly
$1 < X \leq 1,8$	Not good

RESULT AND DISSCUSSION

The implementation of the Digital Electronics Practicum with the Logisim Application using Whatsapp Video Call was carried out in five experiments. Figure 1 is an example of a display of the implementation of the Digital Electronics Practicum with a Logisim Application using Whatsapp Video Call. From this picture, it can be seen that there is an interaction between the practitioner and the practitioner's assistant, including videoing a computer / laptop screen to ensure clarity of the practicum implementation.

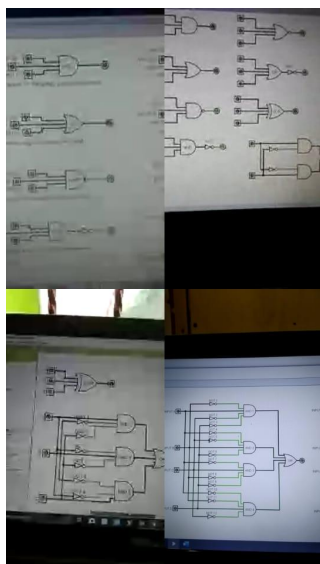


Figure 1 Screen display of whatsapp video call group

Figure 1 shows the screen display of the practicum carried out by students. Through the video call, the assistant can monitor the extent of student work in the practicum. Students can also show their work, or discuss if there are difficulties during the practicum progress. Even though the practicum is online, students still have to meet the competency targets that they must achieve in the practicum (Dewantara et al., 2021).

Effectiveness

Effectiveness is seen from the total score obtained by students in digital electronics practicum with the Logisim Application using Whatsapp Video Call. The results of the accumulated calculations can be seen in the following table.

Table 3 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
score	Statistic	Statistic	Statistic	Statistic	Std. Error
Valid N (listwise)	50	67,70	79,10	72,3120	2,71245

Based on these tables and figures, all students had the lowest score of 67.7 and the highest score was 79.1. The mean score was 72.3. Thus, the effectiveness of the implementation of the Digital Electronics Practicum with the Logisim Application using Whatsapp Video Call is in a good category. Thus, the implementation of the Digital Electronics Practicum with the Logisim Application using Whatsapp Video Call is effectively used to help smooth student communication in completing the Digital Electronics practicum.

Student Response

Student responses are seen based on the following indicators: (1) format, (2) quality, (3) clarity, and (4) interest (Batlolona, 2016; Dewantara et al., 2021; Dewantara et al., 2021). The following is a chart for each indicator.

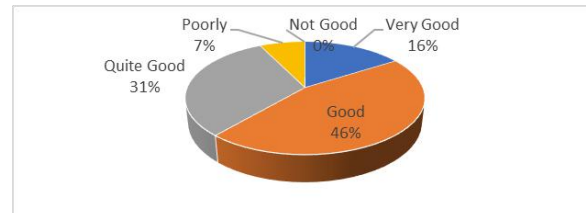


Figure 2. Student Responses on Indicator Format

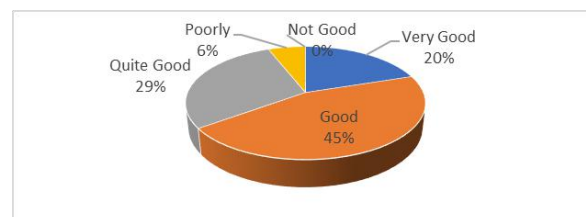


Figure 3. Student Responses on Indicator Quality

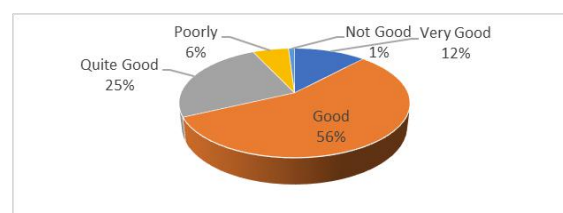


Figure 4. Student Responses on Indicator Clarity

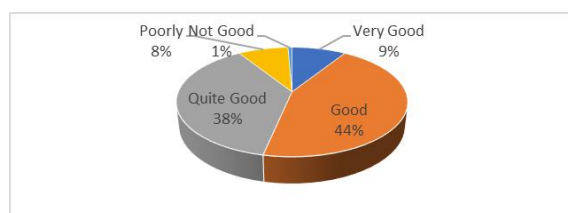


Figure 5. Student Responses on Indicator Interest

Table 4. Average Student Response Questionnaire

Indicator	Average	Category
Format	3,7	Good
Quality	3,79	Good
Clarity	3,72	Good
Interest	3,52	Good
Total average	3,68	Good

The total mean on the questionnaire was 3.68. This shows that the student response has a good category. Based on the responses to the questionnaire, there are students who think that the digital electronics practicum using Whatsapp Video Call can make practicum more interesting and it still feels like a normal practicum even though it is online. Practicum through wa is much more flexible and relaxed so that you can undergo practicum calmly. By using the Whatsapp Video Call application feature, namely Whatsapp Video Call, they can practice well, the network is smoother. Practicum using Whatsapp Video Call is also very suitable to be applied during the online learning, then using the Whatsapp Video Call application is also more economical in internet costs and more practical. Whatsapp can be used as a communication tool in the teaching and learning process (Firman & Rahman, 2020; Nasution, 2020; Waseso & Fuadi, 2019)

There are also students who think that practicum with the Whatsapp -assisted logical application has a bit of difficulty, this is because they cannot talk directly about material that is not understood if via chat wa it cannot be practiced directly. Unless sent via video or by making a video

call like when zooming. Another comment is that Whatsapp videocall is less effective, because of limited people, and the video quality is not good. This is not like the previous practicum which was assisted by zoom (Dewantara et al., 2021) or google meet (Dewantara et al., 2021). However, this makes it easier to start and discuss during the practicum.

CONCLUSION

The findings in the study showed that the effectiveness and response of students to the Digital Electronics Practicum with the Whatsapp Video Call Assisted Logisim Application was categorized as good. Thus it can be concluded that the Digital Electronics Practicum with the Whatsapp Video Call Assisted Logisim Application is effective to be implemented and gets a very good response from students..

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