VLH Development as Implementation Support for SFH (Study from Home) Policy During Covid-19 Pandemic: Analysis of Validity and Effectivity

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Abstract. There has been a paradigm shift due to the Covid-19 pandemic that has hit the world, including Indonesia, therefore the Indonesian government issues policies of working from home, studying from home, and worshipping at home. The developing V-Learn HOTS is in line with the studying from home policy launched by the Indonesian government. V-Learn HOTS was developed by combining v-learn and high order thinking (HOTS) which was useful for supporting 21st century skill. The objective of this research is to analyse the feasibility level of developed VLH in terms of the validity and effectivity of VLH use in long distance lecture in order to obtain appropriate VLH media that can be used in lectures for students. This study used a development research method with the DDD-E design which could be defined as decide, design, develop, and evaluate [1]. Data collection techniques used validation data collection techniques with validation instruments and assessment of student HOTS skills improvement, pre-test and post-test instruments which were then analysed using quantitative descriptive data analysis. Based on the data analysis that had been performed, it was found that the developed VLH had an average validity level of 79.44% with valid criteria. As for effectiveness, it was obtained from the results of the pre-test and post-test analysis so that the n-gain results were 0.43 in the moderate category. The conclusion that can be drawn from the analysis is that the VLH is valid and effective so as it is suitable for long distance lecture on basic electronics 1 in accordance with the Indonesian government policies in handling Covid-19.

1. Introduction
Corona virus disease pandemic or better known as Covid-19 has infected almost all countries in the world, including Indonesia. The Indonesian government has implemented policies of working from home (WFH), studying from home (SFH) and praying at home as efforts to break the chain of the Covid-19 virus spreading.

Several researchers have examined the current learning trend that applying student-centered learning approach. Student-centered learning has the opportunity to explore questions, provides more opportunities for students to reflect by independent learning, and also students gain a deeper understanding of physics concepts so that students have higher-order thinking skills (HOTS) [2]. Nowadays, education application by online learning has started to develop. Students are not only able to access knowledge from textbooks but also from the school outside. Teacher and student can get unlimited information and it can be accessed from worldwide libraries. The internet has ability to provide information in various forms of media (including printed recording, video, sound, and music) so that it becomes an unlimited library. Student and teacher can improve classroom learning by accessing...
information from various sources through website or other education service. This development is used by several education institutions to carry out online learning. Even the Ministries of Research, Technology and Higher Education have created guidelines for the implementation of online lectures for universities [3].

The research of v-learn HOTS which will later be called VLH is different from other researches. VLH was developed to answer the challenges of industrial era 4.0 which requires human who have character and higher order thinking skills (HOTS) and as supporter of implementing SFH (studying from home). Higher Order Thinking Skills, hereinafter abbreviated as HOTS, are the thinking patterns of student, in this case student relies on the abilities to analyses, create, and evaluate all aspects and problems faced in life. Researcher argued that higher order thinking was a thinking skill which combined critical thinking and creative thinking [4]. Higher order thinking skills are not only tested on memory aspect or memorization, but also on aspects of analysis, synthesis, and evaluation. Thereof, during the lecture process, lecturer should actively involve students so that students are able to think critically and creatively [5]. From this explanation, it can be said that students will have higher order thinking skills if they can analyses, synthetize, and evaluate a problem and can think critically and creatively in responding to an event in everyday life.

Based on the description above, a common thread can be drawn that this VLH development research aims to produce HOTS-based v-learn that are feasible in terms of validity and effectiveness. The developed VLH had a difference compared to the v-learn that had been developed by previous researchers. One of the differences between VLH and others is that at the beginning it is stated that the delivery of material is made such as face-to-face lectures, then in some parts is inserted how to practice high-level thinking (HOTS), followed by the delivery of practicum using the real lab. Another part of VLH also utilizes virtual lab applications to train how to do real and virtual practicum, data collection, data analysis and evaluate the results of data analysis until students gain a comprehensive understanding related to higher-order thinking skills (HOTS). In addition, this research is also expected to answer the need for distance learning due to the Covid-19 pandemic that is spreading around the world.

2. Method
This research is a type of development research using the DDD-E model design consisting of four stages, namely (1) the planning stage (decide), (2) the design stage (design), (3) the development stage, (4) the assessment stage. (evaluate). The following is the sequence of steps in the DDD-E research and development model as in the following figure:

![DDD-E Development Model Research Stages](image)

The data collection method for VLH validation used a validation sheet by giving a score based on the following Likert scale.

| Table 1. Likert Scale Scores [6] |
|---------------------------------|
| **Score** | **Category** |
|         |              |

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Of the total score obtained, the percentage of validity was calculated by the equation:

\[ P(\%) = \frac{\text{total score of data collection}}{\text{score criteria}} \times 100\% \]  \hspace{1cm} (1)

Score criteria = highest score \times \text{number of validated aspects} \times \text{number of respondents}

The data that had been obtained were then analyzed descriptively quantitatively using the Likert scale score interpretation criteria which aimed to determine the validity of the developed VLH.

| Score | Criteria          |
|-------|-------------------|
| 5     | Very Good         |
| 4     | Good              |
| 3     | Fair              |
| 2     | Poor              |
| 1     | Very Poor         |

Tabel 2. Interpretasi Skor Skala Likert [6]

| Percentage | Criteria          |
|------------|-------------------|
| 0% - 20%   | Very Less Valid   |
| 21% - 40%  | Less Valid        |
| 41% - 60%  | Valid Enough      |
| 61% - 80%  | Valid             |
| 81% - 100% | Very Valid        |

Based on table 2 interpretation of the Likert scale score, the developed VLH to improve scientific literacy can be declared valid if the validity reaches ≥ 61%.

Data collection methods for VLH effectiveness used pre-test and post-test instruments. It aimed to analyses the increase in student HOTS after using VLH in long distance lectures. The analysis used n-gain analysis.

\[ \langle g \rangle = \frac{\% G}{\% (G_{max})} = \frac{\% S_f - \% S_i}{100\% - \% S_i} \]  \hspace{1cm} (2)

In which:

\( \langle g \rangle \) : Increased Higher Order Thinking Skills (HOTS)

\( S_f \) : Average Percentage of pre-test score

\( S_i \) : Average Percentage of post-test score [7]

The increase in students' scientific literacy skills can be seen in Table 3.

| Score | Criteria |
|-------|----------|
| ≥ 0.7 | High     |
| 0.7 > g ≥ 0.3 | Average |
| < 0.3 | Low      |

3. Results and Discussion
The VLH developed by the researcher was v-learn which had a basis for practicing high-order thinking skills (HOTS). This developed VLH presented a motivational video about the application of the RC Integrator circuit, a theoretical video that explained the working principles of the RC Integrator, how to get real data by doing practicum and analyzing it. A video was also presented on how to use virtual
laboratory applications in learning so that practicum could be done virtually and was suitable for online learning during a pandemic like today. Everything in VLH was expected to improve students' high-level thinking skills. In addition, in this VLH there were also activities that students must carry out in order to work on Student Worksheets (LKM) so that the online lecture process run well.

Here is the display form of VLH.

Figure 2. VLH Display When Explaining RC Integrator Theory

Figure 3. VLH Display When Practicum RC Integrator Using Real Lab

Figure 4. Display of VLH during RC Integrator Practicum Using the virtual lab application.
Based on the validation results carried out by three validators, the following results were obtained:

a. Validity Results on the VLH Presentation aspect

![Figure 5. Diagram of VLH Presentation Aspect Validity Results](image)

b. Validity Result on the VLH Content Aspect

![Figure 6. Validation Results Diagram of VLH Content Aspect](image)
c. Validity Result on the VLH Language Aspect

![Diagram](figure7.png)

**Figure 7.** Validation Results Diagram of VLH Language Aspect

![Diagram](figure8.png)

**Figure 8.** Validation Results Diagram of All VLH Aspects (Presentation, Content and Language)

Based on the graph of the analysis of the VLH validity data (Figure 5, 6, 7, 8), it can be seen that the V-learn HOTS (VLH) developed has an average validity of 79.44% which is included in the "Good" category in all aspects of validity (aspects of presentation, content and language). The results showed that the developed VLH as a whole met the validity criteria with the "Valid" category and VLH could also be used in long distance lectures on the RC Integrator circuit material.

Based on the data from the n-gain analysis, the results are shown in Figure 9.
From the diagram on Figure 9, it is known that the n-gain result in the medium category has the highest percentage value, namely 92.857%, whereas the low n-gain category has a percentage value of 7.14% and the n-gain with the high category is not found.

Based on the data from the analysis of n-gain for each HOTS indicator, the results are shown in Figure 10:

From the figure 10, it is also known that the n-gain results for analyzing and evaluating indicators have increased in the high category when seen from the diagram of the increase in the average pretest and posttest, while indicators of logical, creative and systematic thinking have increased but in the low category.

The results of this study were in line with research by Ravenscroft et al which stated that 21st century learning is the learning of which oriented in process, problem solving, the ability to adapt and work effectively in different situations [9]. This is because the goal of learning in the 21st century is to prepare students to enter the world of work with a wider scope. The wider scope is due to high mobility in the present. This means that students must be able to survive outside their environment. In other words, the learning objectives of the 21st century are shifting to become global. Individuals in the 21st century are
required to have the competence or skills both hard skills and soft skills so that they can enter the world of work and be ready to compete with other countries. The Core Subjects and Interdisciplinary 21st Century Themes Are Surrounded by Three Sets of Skills Most in Demand in The 21st century said that among the 21st century skills are: (1) learning and innovation skills; (2) information, media and technology skills; (3) life and career skills [10].

This research was also in line with the results of research on Assessment and Teaching for 21st Century Skills (ATCS) which concluded four main points related to 21st century skills, namely ways of thinking, how to work, work tools and life skills. The way of thinking included creativity, critical thinking, problem solving, decision making and learning. The way of working included communication and collaboration. Tools for work included information and communication technology (ICT) and information literacy. Life skills included citizenship, life and career, and personal and social responsibility [11]. In implementing learning, 21st Century skills are needed to be trained on students. 21st century skills include critical thinking skills, problem solving skills, communication skills, collaboration and creation, information literacy skills and various other skills [12].

In terms of high-level thinking (HOTS) seen from all aspects of high-level thinking (HOTS) with indicators of analyzing, evaluating, solving problems, thinking logically, creatively and systematically [13], this study resulted in a significant increase in student HOTS. This was relevant to which stated that HOTS (High Order Thinking Skills) was a thinking ability that was tested at a higher level of ability, meaning that it did not only tested on aspects of memory or memorization, but also examined the aspects of analysis, synthesis, and evaluation [5]. Higher order thinking skills required a person to apply new information or knowledge he already had and manipulated information to reach possible answers in new situations [14]. The main advantage when using online-based learning was that it could reduce paper usage and could be more communicative. The use of videos could be directed to practice some elements of science process skills such as observing, classifying, inviting, predicting, and communicating. Besides that, it could also be used to develop several elements in critical thinking skills such as analyzing, evaluating, implementing, generating ideas, and expressing ideas [15-17].

4. Conclusion

Based on the analysis of the research data, it could be concluded that VLH (V-Learn HOTS) was declared valid in the good category and was effectively used in online lectures with an average n-gain value of 0.49 in the moderate category so that a red thread could be drawn that VLH was feasible online lectures to practice students' higher order thinking skills (HOTS) on the material of the RC Integrator Series.

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