Development of the Practicum Guide e-module Basic Physics for Practice Student Science Process Skills

Arka Yanitama, Prasetyo Listiaji
Universitas Negeri Semarang, Indonesia

Abstract
Practical guide is something important reference in lectures practice. Consequence from the ongoing COVID-19 pandemic more from two years, some media can be changed become a digital medium. E-module guide practice physics base developed during a pandemic with objective can be used by students who do practice independently at home each using virtual laboratory. In development, e-modules that are made are also addressed for practice students' science process skills. Development carried out use the ADDIE model and show results validation very valid expert. At stage implementation, then tested use test with containing questions indicator science process skills show 77.27% entry category moderate, 13.64% low, and 9.09% high. Result of implementation show part big valuable indicator_ Good is Skills base observing, measuring, and predicting.

Keywords: development, e-module, science process skills

PENDAHULUAN
Covid-19 pandemic has going on during two years and everyone already adapt with changes that occurred in Indonesia. Aspect education too succeed adapt with using online learning media and models or known with the term e-learning (Annisa, 2020). In learning physics foundation in college high, usually there is eye studying theory and practice implemented side by side. Courses practice will fulfill aspect psychomotor student in learn. In implementation online learning exists things in the end must aside, for one is activity practice, for example for eye studying practice. Usually activity practice This done in the laboratory or in the environment. Permendiknas no. 22 of 2006 concerning Standard Competency and Basic Competency of the Education Unit Level Curriculum, explained that Science relates with method understand natural in a manner systematic, so Science is not only limited mastery gathering knowledge (product knowledge) in the form facts, concepts, or principles course, but more as a discovery process.

Science process skills are one necessary literacy owned by students studying in the field of science. Skills This actually divided become two part, skills basic (Basic Science Process Skills) and skills integrated (Integrated Science Process Skills). Skills base covers observing, classifying, measuring and using numbers, create infer, predict, communicate, and use connection space and time. Whereas Skills integrated consists from interpret data, definitions operational, variable control, create hypothesis and experiment (Rezba, RJ, et al, 2007). Learning Physics at University level is required exists repetition and depth from ever material obtained when school medium. Very important For do repetition assessment as done physicist in experimenting and carrying out scientific processes, so student will formed science process skills (Jannah, 2018). From the second distribution science process skills, student more Lots control Skills base like ability observation or classification (Maison et al., 2019). Other research states that designing or do experiment be one indicator with mark lowest compared to other indicators (Hodosyova et al., 2015). In activity experiment, student must own adequate knowledge and information about practiced material. So from that, student need good science process skills (Supahar, 2015).

Implementation in develop Science process skills are also one of them necessary thing noticed,
added. Again, with circumstances, if must be held in a manner in network (online), because it, one method make it effective is using digital media or electronics. With the convenience of electronic media that is developed, students can also use direct e-module without demonstrated especially before (Lumbantoruan, 2019). With use technology cloud, the module that will be developed can be shared with easy in form link or QR code. Google with application its productivity (gdocs, gslides, gsheet) has excess like in documentation and safe storage (Utomo, 2015).

Based on experience in carry out lectures online practicum in previously, available modules is module for practice in a manner direct/stare face in the laboratory. The module No can used for online practicum because many changed aspects start from equipment, way work, practicum models, and data collection using virtual laboratory. So from it was developed A electronic module in title order more fit and aspect implementation practice can adjusted with existing conditions.

METHOD

Research conducted using research and development models (Research and Development). Subject study This were 22 semester 1 students of the Science Education study program, Semarang State University in the eye studying practice Basic Physics 1. The method used in study using the 5 stages of the ADDIE model (Analysis, Design, Develop, Implement, Evaluate) (Molenda, 2003). Developed product is A guide developed online practicum use google slides that can be accessed use the internet in various device. The schematic of the ADDIE model is shown in Figure 1.

Stage First in study This is analysis, activities carried out covers analysis eye appropriate course in science education, knowledge beginning student initial, availability device hardware and devices soft.

At stage second is e-module design guide online practicum for eye studying Practice Basic Physics 1. Developed modules has customized with Plan Semester Learning (RPS) where system learning used is learning online. Although online, activities practice still must be done, because that developed modules are also addressed. For online practicum and experiments simple as can be done at home each using equipment simple.

After through stage design, stage third is development. E-module created then validated by 4 experts so that get mark quality product. Experts give grades 1 to 4 on each quality indicator product. Results data validation analyzed use analysis descriptive quantitative with count the average score given by the validator. Instrument validation of the Practicum Guide e-module Basic Physics 1 in the form Likert scale. The rating score obtained then analyzed with use formula as following:

$$P = \frac{f}{n} \times 100\%$$
Description:

\[ P = \text{Percentage} \]
\[ f = \text{amount score obtained} \]
\[ n = \text{total number of scores maximum} \]

Highest score (%) = \( \frac{\text{Highest score}}{\text{Maximum score}} \times 100\% = \frac{4}{4} \times 100\% = 100\% \)

Highest score (%) = \( \frac{\text{Lowest score}}{\text{Maximum score}} \times 100\% = \frac{1}{4} \times 100\% = 25\% \)

Class interval (%) = \( \frac{\text{Highest score} (\%) - \text{Lowest score} (\%)}{\text{Maximum score} (\%)} \times 100\% = \frac{100\% - 25\%}{4} \times 100\% = 18.75\% \)

Score results percentage then changed become criteria evaluation validation as in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Criteria Evaluation Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
</tr>
<tr>
<td>81.25% &lt; N ≤ 100%</td>
</tr>
<tr>
<td>62.50% &lt; N ≤ 81.25%</td>
</tr>
<tr>
<td>43.75% &lt; N ≤ 62.50%</td>
</tr>
<tr>
<td>25.00% &lt; N ≤ 43.75%</td>
</tr>
</tbody>
</table>

Implementation

At stage Implementation, product tested in involving class of 22 students on the eye studying Practice Basic Physics I carried out online. After the e-module used in lectures are carried out measurement for practice using science process skills instrument knowledge with containing questions _ indicator science process skills. Result of test then categorized as become low, medium, and high, based on comparison with mark the middle. Category mark can be seen in Table 2.

<table>
<thead>
<tr>
<th>Table 2. Categories evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
</tr>
<tr>
<td>N &lt; M – SD</td>
</tr>
<tr>
<td>M – SD &lt; N &lt; M + SD</td>
</tr>
<tr>
<td>M + SD &lt; N</td>
</tr>
</tbody>
</table>

With N is mark test, M is mean score, and SD is standard deviation.

In part evaluation, all stages start from analysis seen return for consider suggestions and input related with product that has developed and used for repair.

RESULTS AND DISCUSSION

Product

Developed product in study this is guide Basic Physics online practicum I. This online practicum guide shaped e-books or web-based e-module using google slides. Consideration in develop e-books is web-based convenience in access and compatibility. At Semarang State University, Google become services provided by the parties campus for become facility support in activities on campus. Party campus provide service email accounts, storage cloud on google drive with capacity big, as well all applications will integrated with account google student. With so, students and lecturers as well easy can use a number of feature application productivity like google docs, google sheets, and google slides for work.

Inside the guide this online practice there are 8 chapters which also contain 8 titles practice for resolved in one semester. Based on plan semester learning, there are 16 meetings effective in one semester. Each title practice started with pre-test use application The he-exam was developed by UNNES with the aim of For see readiness student in do practicum. Practical guide designed for students can do practice in a manner independently at home with each internet help. 8 Titles conducted online practicum are (1) Measurement (2) Inclined Plane (3) Collision (4) Swing Mathematics (5) Viscosity Substance Liquid (6) Toricelli (7)
Validation Product

Product already developed. Then done validation to four experts on the result showed in Table 3. Average percentage from experts show the average score is 91.875% where including in Very Valid category. Based on results validation such, then developed e-module product can used for stage furthermore that is implementation. Although results very good validator rating, still any input suggestions For development of e-modules that have been made. A number of input among them is ensure No There is error writing (typo) in its entirety text, added reference, and tidying up table observation.

<table>
<thead>
<tr>
<th>Table 3, Validation results expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validators</td>
</tr>
<tr>
<td>Validators 1</td>
</tr>
<tr>
<td>Validators 2</td>
</tr>
<tr>
<td>Validators 3</td>
</tr>
<tr>
<td>Validators 4</td>
</tr>
<tr>
<td>Average</td>
</tr>
</tbody>
</table>

Science Process Skills

After product assessed and performed revision, then the e-module implemented in lectures practice physics basic 1. At the end of the semester, done test with instrument containing questions indicator science.
process skills. Good indicator Skills base nor indicator Skills integrated entered to in instrument questions totaling 35 questions. Result of test the displayed in Figure 3.

Figure 2. Test results

The mean score obtained is 54.67 with mark Standard Deviations of 10.10. Results Score obtained from subject study shows 77.27 % including in Medium category, 13.64% included in category low, and 9.09% included category high. Valuable integrated science process skills not enough is about indicator interpret data and create hypothesis. Most indicator Already fulfilled specifically For related matters with Skills base that is observing, measuring, and predicting. A number of reference from study previously also showed similar results with mark integrated science process skills more low compared to with Skills basically (Mutmainnah, 2019). E - module already validated by experts and obtained very valid criteria can be used in a manner real in learning in line with a number of study before (Irm et al., 2017).

CONCLUSION

E- module guide practice physics base has developed using the ADDIE model and done validation product by four media expert. Implementation of e- module the stated beneficial for student and enough For practice science process skills. Analysis results use containing questions indicator demonstrated science process skills part big including in category medium. Study can next For piloted to a number of class or compared to with class by year different teachings.

REFERENCES

M. Molenda, In search of the elusive ADDIE model, Performance improvement, 42(5), (2003) 34-37, URL:

S. Arikunto. 2010. Method Research, Rineka Create,


