Jurnal Penelitian Pendidikan
https://journal.unnes.ac.id/nju/index.php/JPP

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 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 fulfil 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 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 developed can 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 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

Figure 1. Skema model ADDIE

students, availability student internet network, analysis amount meeting, and analysis material given online practicum .

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 done , because That developed modules are also addressed For online practicum and experiments simple as can 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 :

$$P = \frac{f}{n} x\ 100\%$$

Description :
P = Percentage
f = amount score obtained _
n = total number of scores maximum
Highest score (%) = (Highest score) /(Maximum score) x 100% =4/4 x 100% = 100%
Highest score (%) = (Lowest score) /(Maximum score) x 100% = 1/4 x 100% = 25%
Class interval (%) = (Highest score (%)- Lowest score (%)) / (Maximum score (%)) x 100% = (100%-25%)/4 x 100% = 18.75%

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

Table 1. Criteria Evaluation Validation

Percentage	Criteria
81.25% <N≤ 100%	Very Valid
62.50% <N ≤ 81.25%	Valid
43.75% <N ≤ 62.50%	Valid Enough
25.00% < N ≤ 43.75%	Invalid

Implementation

At stage Implementation , product tested in involving class _ of 22 students on the eye studying Practice Basic Physics 1 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 the Then categorized as become low , medium , and high , based on comparison with mark the middle . Category mark can seen in Table 2.

Table 2. Categories evaluation

Formula	Category
N < M – SD	Tall
M – SD < N < M + SD	Currently
M + SD < N	Low

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 _ 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 e- 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)

Resonance (8) Temperature and Heat . cover and one content from the Online Practicum Guide e- module seen in Figure 2.

Figure 2. Cover and one of the pages in the e-module Basic Physics Online Practicum Guide 1

Validation Product

Product already _ developed Then done validation to four expert 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 3. Validation results expert

Validators	Percentage (%)	Criteria
Validators 1	95	Very Valid
Validators 2	87.5	Very Valid
Validators 3	90	Very Valid
Validators 4	95	Very Valid
Average	91,875	

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.

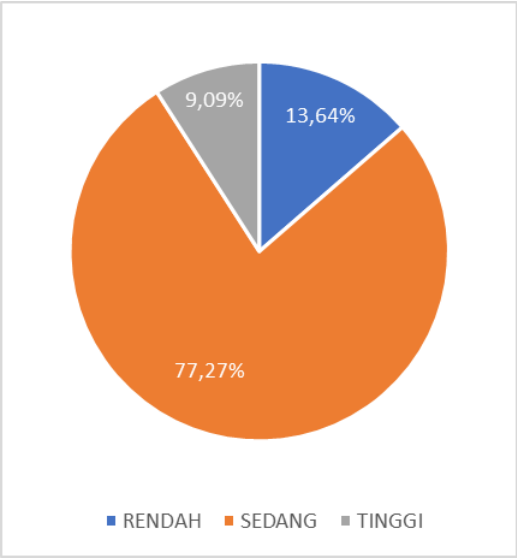

Figure 2. Test results

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

Annisa , Rifka, Syarfina Mahya Nadila , Syifa Andini Salsabila , Syora Alya Eka Putri, Hakiki Nurmajesti . 2020. E-learning as an Adaptation Strategy in Facing Covid-19 Pandemic: A Case study on the 2018 and 2019-generation students of Post Graduate Sociology Department, University of Indonesia. 6th International Conference on Social and Political Sciences (ICOSAPS 2020)

Utomo , WH, & Pormes , R. (2015). Analysis comparison of Cloud DOCUMENT on EYeOS and Google docs.Jurnal Computer Systems ,5(1), 19-22.

Rezba , RJ; McDonnough , J.T.; Matkins , JT; Sprague, C. 2007. Learning and Assessing Science Process Skills. Chicago: Kendall/Hunt Publishing Company,

Jannah, U, Prastowo SHB, Subiki . 2018. *Analysis integrated science process skills in learning physics in students SMA Negeri 5 Jember class x material temperature and heat* . Journal Learning Physics , Vol 7 (4)

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

http://www.damiantgordon.com/Courses/DT580/In-Search-of-Elusive -ADDIE. pdf

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

Lumbantoruan , A., Irawan , D., & Siregar , HR (2019). Deep Science Process Skills Practice Physics . COMPTON: Journal Physics Education Science , 6(2), 1-12.

Irmi , NM, Adlim , & Rahmayani , RFI 2017. Development guide practice chemistry base II based inquiry guided by the material reaction redox and electrochemistry . Journal Scientific Chemistry Education Student (JIMPK), 2(1):1-9.

Mutmainnah , SN, Padmawati , K., Puspitasari , N., & Prayitno , BA (2019). Profile Science Process Skills (KPS) for Biology Education Students Viewed From Ability Academic (Study Case at One University in Surakarta). *Didactics Biology : Journal Biology Educational Research* , *3* (1), 49-56.

Maison, M., Darmaji , D., Kurniawan, DA, Astalini , A., Dewi , UP, & Kartina , L. (2019). Analysis of science process skills in physics education students. Journal Educational Research And Evaluation , 23(2), 197-205.

Hodosyova , M., Útla , J., Vnukova , P., & Lapitkova , V. (2015). The development of science process skills in physics education. Procedia-Social and Behavioral Sciences, 186, 982-989.

Supahar , S., & Prasetyo , ZK (2015). Development instrument evaluation performance ability inquiry participant educate the eyes lesson high school physics . Journal Educational Research and Evaluation , 19(1), 96-108.