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Online Application of Science Practicum Video Based on Local Wisdom to Improve Student's Science Literacy

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Abstract: During the Covid-19 pandemic, all learning activities were carried out online, including practicum activities. To find out the success of practicum activities carried out online, this research was carried out. This study aims to develop a practicum learning video based on local wisdom to improve the scientific literacy of prospective elementary school teacher students. The development of learning videos based on local wisdom is a product produced by students while participating in online practicum activities. This research was conducted with a quasi-experimental method. The research subjects used were 20 fifth semester elementary school teacher education students who were selected by convenience sampling. The instrument developed in the form of multiplechoice questions as many as 20 questions that have been tested for validation and reliability and used for pretest and posttest. Data from students' pretest and posttest results were processed by stacking Rasch model analysis to determine changes in students' scientific literacy skills before and after participating in online practicum with videos based on local wisdom. Based on the results of the student's pretest and posttest analysis, data obtained from the logit value change from 1.2 to 3.2 and categorization was carried out based on the increase in scientific literacy skills, namely 20% low category, 65% moderate, and 15% high. Based on these results, online practicums with local wisdom-based learning videos are able to explore students' scientific literacy skills and can be applied to other practicums. In addition, students' technological literacy skills are also trained.

Keywords: Scientific Literacy; Online; Practicum; Video.

Introduction

Elementary school teacher education students (known with PGSD) are prospective teachers who are prepared to teach students at the elementary school level. School students are at the stage of concrete development so that in understanding each concept it must be clear and real. As a PGSD student who is a prospective elementary school teacher, the skill of conveying concepts in a concrete way is an obligation so that students can understand the concept well as a foundation for other broader concepts (Umbara & Suryadi, 2019). Currently, students memorize concepts more often than understand concepts, so when studying science students find it difficult to explain a phenomenon they encounter with their understanding of the concept (Sinatra & Lombardi, 2020).

When students take science lessons at school, they should already have an initial understanding that they get from the environment. So that when studying science at school students can relate the initial concepts to what they learn at school. In this way, finally students can get out of the habit of memorizing concepts and turning them into understanding concepts. After students can relate the concepts, they learn to the phenomena they encounter in the environment, the students' scientific literacy level also increases. Scientific literacy is one of the skills needed in the 21st century, with scientific literacy students can use their conceptual understanding to analyze, explain, and act on phenomena in the surrounding environment. The level of scientific literacy of students is measured by the OECD (Organization for Economic Cooperation and Development) (OECD, 2020). Based on the results of the

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2021 PISA test, Indonesia is ranked 62 out of 70 countries. This indicates that the level of scientific literacy of Indonesian students is still lacking. Learning scientific literacy is useful for elementary school students to increase the introduction of scientific vocabulary both oral and written used in communicating natural sciences, increase knowledge and methods of investigation or proof in natural sciences and increase understanding of the relationship between science, technology, and society (Hu et al. al. 2018).

Based on the 2013 curriculum, national learning at the elementary school level is carried out thematically or in other words all subjects are integrated in a theme. However, the content of education always appears to have a role in every education, one of which is science subjects. At the elementary school level, science education not only learns the ability of concepts and principles about nature, but also learns to create and solve problems, and be scientific (Simamora et al., 2018). Science education for elementary school students can familiarize the students' learning atmosphere by linking the education module with the students' real life every day with the method of carrying out practicum (Assunção Flores & Gago, 2020). Practical activities are carried out in order to convince a concept that is being studied. This activity is suitable for the cognitive growth of students at the lower school level so that they have an interest and intensity in doing practicum and lead to the learning outcomes obtained in the form of maximum behavior, knowledge, and expertise (Horntvedt et al., 2018).

As a prospective elementary school teacher, the ability to do practical work is a significant matter, as is the case with prospective elementary school teachers. At the time of the Covid-19 pandemic, which was still not over, students explored practicum educational activities that were not as common as usual. The practicum was tried online, this was tried to reduce the effect of the spread of Covid-19. The atmosphere in education during the Covid-19 pandemic with all its limitations hindered the space for science education which could initially be carried out either in theory or in the description of concepts and practicum so that it focused on solving only theoretical content or science education modules. In this regard, online learning raises inequality in the cognitive development of special students in science education (Domina et al., 2021). Therefore, a strategy for implementing elementary science practicum education is needed that can always generate student interest and intensity in learning. Moreover, the application of monotonous online education can lead to student boredom in learning.

One strategy for implementing elementary science practicum that is realistically implemented for PGSD students during the Covid-19 pandemic is the use of educational videos in conducting online science practicums as an alternative in carrying out practical activities during a pandemic. The bottom principle of education is a method of implementing the core concepts and principles of a discipline, facilitating students to investigate, solve problems, and other meaningful tasks, be student centered, and create real products (Barak & Yuan, 2021). This strategy is expected to be able to improve students' abilities both critical thinking, communication, collaboration, and creativity in accordance with the demands of 21st century education (MacLeod & van der Veen, 2020). Practical education trains prospective lower school teacher students to have science skills, but due to the pandemic period students cannot do it properly in the laboratory. For this reason, so that the student's skills are always trained for provisions in the field, it is very meaningful to try innovations in practical education that must be tried online.

A lot of research has been done previously in developing online practicums, including research on online practicum learning for prospective teacher students (Varea & González-Calvo, 2020), research on online practicum on prospective teachers by prioritizing cognitive aspects (König et al., 2020), research on how teachers in schools teach practicum online during the pandemic (Sepulveda-Escobar & Morrison, 2020), online practicum learning for early childhood students (Dong et al., 2020), besides that there is also practicum learning that uses virtual laboratories developed by researchers such as the use of virtual laboratories for mechanical engineering students (Grodotzki et al., 2018), and research on the use of virtual laboratories as a form of technology application in education (Stahre Wästberg et al., 2019). Some of the research that has been done has been successfully applied to online practicum learning.

In this study, researchers conducted a science practicum using a video practicum based on local wisdom. Local wisdom focuses on the potential that exists around the student environment, so that students can take advantage of nature and objects around the environment to be used as tools or materials for doing science research. The background of local wisdom that students use in practicum is expected to have a positive effect on students. In addition, students also understand better that the environment can be used as a source of learning and can improve students' scientific literacy.

Method

This research is quantitative using a quasi-experimental method with one group pretest and posttest design (Namey et al., 2020). In a study conducted to test the effectiveness of online practicum learning with videos based on local wisdom. In this study, students were given 10 multiple-choice pretest questions that had been tested for validation and reliability.

In this test the students involved were 20 PGSD students. The sample selection process was carried out using convenience sampling. Convenience sampling is sampling based on the availability of elements and the ease of obtaining them (Kissi et al., 2020). The selected sample has also signed a statement of willingness to be a research sample as part of the code of ethics in research and is willing to follow all stages of the study.

This study uses scientific literacy test questions in the form of multiple-choice questions as many as 10 questions. The subject of science developed is a food test practicum. The instrument developed in this study was in the form of a written test, besides that the questions had also gone through the assessment stage by the study program quality assurance team to ensure the suitability of the items with the topic (Daniels et al., 2019). The next validation is construct validation which is carried out to ensure that the item items used are in accordance with the criteria for the RASCH item items including:

1. Outfit Mean Square residual (MNSQ): 5 < y < 1,5;
2. Outfit Standardized Mean Square residual (ZSTD): -2 < Z < +2;
3. Point Measure (logit) Correlation (PTMAE CORR): 4 < x < 8

Items that match the RASCH model are questions that meet the criteria for at least one criterion, if none of the criteria are met then the item items cannot be used as shown in Table 5. The next instrument was revised based on input from experts and the results of construct analysis and then an empirical test was conducted. on 20 students to test the reliability and obtained the Cronbach Alpha value using the RASCH model (Adams et al., 2021) of 0.72 in Table 4 with a very good category according to Table 1.

Table 1. Rating Scale of Instrument Quality Criteria

Criterion	Poor	Fair	Good	Very Good	Excellent
Targeting	>2 errors	1-2 errors	<1 error	<.5 error	<.25 error
Item Model Fit Mean-Square Range Extremes	<.33->3.0	.34-2.9	.5-2.0	.71-1.4	.77-1.3
Person and Item Measurement Reliability	<67	67-80	81-90	91-94	>94
Person and Item Strata Separated	2 or less	2-3	3-4	4-5	>5
Ceiling effect: % maximum extreme scores	<5%	2-55	1-2%	0.5-1%	<0.5%
Floor effect: % maximum extreme scores	<5%	2-55	1-2%	0.5-1%	<0.5%
Varianve in data explained by measures	>50%	50-60%	60-70%	70-80%	>80%
Unexplained variance in contrasts 1-5 of PCA of residuals	>15%	10-15%	5-10%	3-5%	<3%

Analysis of test results conducted on students focused on student scientific literacy. Based on the data from the pretest and posttest results, students were processed using the stacking analysis of the Rasch model and the results were logit values. The logit value obtained was then grouped based on the standard deviation and 3 groups were obtained, namely students with a logit value of X<0.29 (Low Category), a logit value of 0.29<X<3.61 (Medium Category), and students with a logit value of X. >3.61 (High Category) as in Table 3 and the results are grouped in Table 7.

The data from the pretest and posttest results were analyzed using the RASCH model (Ling et al., 2018) which has the advantage of being able to explain the value of test results that cannot be explained using only raw scores. This method facilitates computational computation of linear items to describe students' scientific literacy skills. In the processing, Winstep 4.5.5 software is used using Stacking analysis, namely by analyzing the results of the pretest and posttest of students in one analysis and carried out in stacks so that each student has two lines of data, namely pretest data and posttest data (Sukmawati et al., 2021). The results of the stacking analysis resulted in a logit value (point measure) of 1 student during the pretest and posttest. Furthermore, the pretest and posttest logit values were compared to determine the changes.

$$P_{ni}=(x_{ni}=1|\beta_n,\delta_i) = \frac{e^{\beta n-\delta i}}{1+e^{\beta n-\delta i}} \quad (1)$$

Figure 1. Logit Value Formula Value (Sumintono, B., & Widhiarso, W. 2013).

If the posttest logit value shows an increase, then the online practicum treatment with video based on local wisdom can be said to be effective, but if the posttest value is the same as the pretest even if the pretest value is smaller than the pretest value, it can be said that the treatment is less effective or ineffective so that it is unable to achieve the desired goal. It is expected that Figure 1 and logit data are also categorized as in Table 2.

Table 2. Categorization Guidelines for Changes in Logit Value Based on STDEV

Value Logit	Category
X<0.29	Low
0.29<X<3.61	Medium
X>3.61	Height

Result and Discussion

The initial stage is to test the instrument validation that will be used. Based on Table 3, it shows the consistency value of student answers with a value of 0.47 and the quality of the items on the subject of incoming material has a value of 0.46 in the weak category but the Cronbach alpha value is good with a value of 0.72 so that it can be interpreted that the instrument developed has a coefficient value. excellent reliability.

Table 3. Reliability Values of Person, Item, and Cronbach Alpha

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	7.1	10.0	1.36	.93	.98	.14	.85	.13
SEM	.4	.0	.25	.03	.06	.13	.11	.13
P.SD	1.9	.0	1.30	.18	.34	.68	.61	.68
S.SD	1.9	.0	1.32	.18	.34	.69	.62	.69
MAX.	9.0	10.0	2.91	1.18	1.70	1.83	2.91	2.55
MIN.	2.0	10.0	-1.84	.73	.44	-.88	.16	-.77

REAL RMSE 1.01 TRUE SD .82 SEPARATION .82 PERSON RELIABILITY .40
MODEL RMSE .94 TRUE SD .89 SEPARATION .95 PERSON RELIABILITY .47
S.E. OF PERSON MEAN = .25

MAXIMUM EXTREME SCORE: 11 PERSON 27.5%

SUMMARY OF 40 MEASURED (EXTREME AND NON-EXTREME) PERSON

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	7.9	10.0	2.19	1.20				
SEM	.3	.0	.28	.08				
P.SD	2.1	.0	1.75	.47				
S.SD	2.1	.0	1.78	.47				
MAX.	10.0	10.0	4.40	1.92				
MIN.	2.0	10.0	-1.84	.73				

REAL RMSE 1.32 TRUE SD 1.15 SEPARATION .87 PERSON RELIABILITY .43
MODEL RMSE 1.29 TRUE SD 1.19 SEPARATION .92 PERSON RELIABILITY .46
S.E. OF PERSON MEAN = .28

PERSON RAW SCORE-TO-MEASURE CORRELATION = .98
CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .72 SEM = 1.08

The next stage, the questions were tested on 20 students, both pretest and posttest. Based on the results of item analysis based on student answers, it can be said that the 10 questions used have met the RASCH requirements so that the questions are feasible to use. Question analysis data can be seen in Table 4.

Table 4. Fit Order Items

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	JMLE MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	ITEM
4	18	40	2.88	.48	1.11	.54	1.53	.97	.65	.71	75.9	76.0	G
5	25	40	1.49	.43	1.01	.11	1.02	.15	.65	.65	79.3	73.0	H
2	30	40	.52	.46	1.29	1.25	1.12	.45	.49	.58	65.5	76.1	E
8	31	40	.31	.47	.78	-.97	.62	-1.02	.65	.56	82.8	77.0	K
7	33	40	-.15	.50	1.03	.21	1.30	.71	.48	.51	82.8	78.9	J
9	33	40	-.15	.50	.70	-1.25	.44	-1.27	.64	.51	75.9	78.9	L
10	33	40	-.15	.50	1.42	1.56	1.25	.64	.37	.51	69.0	78.9	M
1	37	40	-1.42	.67	.68	-.66	.31	-.64	.49	.37	93.1	90.3	D
6	37	40	-1.42	.67	.77	-.41	.37	-.51	.46	.37	93.1	90.3	I
3	38	40	-1.94	.78	1.15	.44	.53	.00	.30	.31	93.1	93.0	F
MEAN	31.5	40.0	.00	.54	.99	.1	.85	-.1			81.0	81.2	
P.SD	5.8	.0	1.37	.11	.24	.9	.42	.7			9.4	6.8	

The ten multiple choice questions used for the pretest and posttest are said to be feasible to be used to measure the level of student scientific literacy. After the questions were tested, the data from the pretest and posttest results were analyzed by stacking with the results in Table 4 with the student categorization guide table based on changes in the logit value in Table 5.

Table 5. Changes in Logit Pretest and Posttest Values

Student	Logit Value Pretest	Posttest	Difference	Categorization
1	1.09	1.83	0.74	Medium
2	2.91	4.40	1.49	Medium
3	-0.06	2.91	2.97	Medium
4	4.40	4.40	0.00	Low
5	-1.84	4.40	6.24	High
6	1.83	4.40	2.57	Medium
7	1.83	1.83	0.00	Low
8	0.48	4.40	3.92	High
9	-0.06	0.48	0.54	Low
10	-0.06	-0.06	0.00	Low
11	-0.06	1.83	1.89	Medium
12	2.91	4.40	1.49	Medium
13	1.83	4.40	2.57	Medium
14	1.09	2.91	1.82	Medium
15	-0.06	4.40	4.46	High
16	2.91	4.40	1.49	Medium
17	1.09	4.40	3.31	Medium
18	2.91	2.91	0.00	Low
19	1.83	2.91	1.08	Medium
20	-0.60	1.83	2.43	Medium
Average	1.22	3.17	1.95	Medium

Table 6. Guidelines for Categorizing Changes in Logit Value Based on STDEV

Category	Description	Quantity
Low	X < 0.29	4
Medium	0.29 < X < 3.61	13
High	X > 3.61	3

Changes that occur in the results of the pretest and posttest can also be visualized as shown in Figure 2. Most of the students who answered wrong greetings on the pretest, after the treatment could answer correctly. The online practicum learning process based on local wisdom is carried out using zoom media as shown in Figure 3. Each student displays the results of the practicum carried out and discussions and elaborations are carried out.

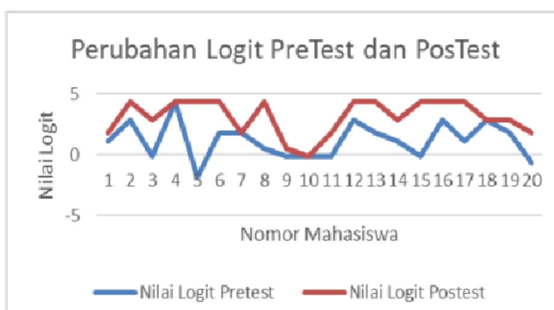

Figure 2. Graph of Changes in Logit Pretest and Posttest

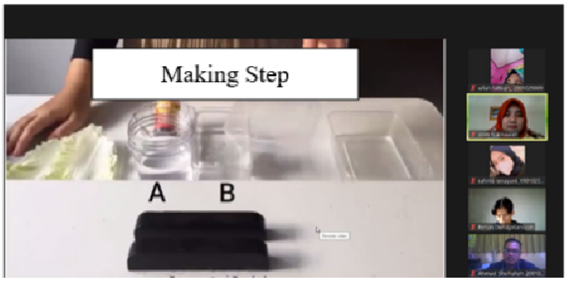

Figure 3. Discussion and Elaboration Stages in Practicum Activities

The items used for the student scientific literacy test meet the RASCH category and all items fit. Changes in the logit value of the pretest and posttest results produced by students varied greatly, besides that the development of students' understanding of scientific literacy also varied. Based on the results of analysis of the average logit value shown in Table 5, the average logit value of the pretest and posttest is different and has increased from 1.2 to 3.2 and the understanding of scientific literacy has also increased.

In Table 6 there are four students who did not change. The logit value (students number 4, 7, 10, 18). This phenomenon occurs due to several factors such as in the case of student number 4 who did not experience a change in the logit value because the student already understood the concept of the material completely so that by studying practicum with videos based on local wisdom, he added other skills that were not the focus of research (Wibowo & Ariyatun, 2010). 2020). At students number 7,10, and 18 also did not change the logit value. This happened because the three students did not work on the apperception questions and did not do the practicum as it should be given by the lecturer, so that the students had difficulty answering questions related to the food test practicum.

At the beginning of activity 1). the lecturer conveys the theme of the practicum and its objectives according to the RPS, 2) the lecturer directs what students should do, 3). students seek and choose practicums that will be carried out according to the theme, at this stage students are given the opportunity to explore their potential and seek the widest possible learning resources so that the level of student independence is also trained (Sofyan et al, 2019), 4). students do practicum with the theme given by the lecturer using tools and materials by utilizing local wisdom, each student has the right and is given the trust to choose the tools and materials they will use in this study so that the ability to make student decisions is trained, 5). students make a practicum video, each student makes a practicum video and then it is collected per group so that in one group produces a practicum theme using various tools and materials. 6). discussion and elaboration, at this stage each group presents the results of their practicum activities online with zoom media. Each student submits findings and there is an active discussion and elaboration conducted by students and accompanied by lecturers.

Based on the data obtained from this study, in addition to scientific literacy, technological literacy, students are also indirectly trained et al, 2020), so that these abilities can be a provision for students in producing other more interesting learning media to be given to students at school. The use of tools and materials in practicum activities based on local wisdom is very attached and close to students in daily life, giving a positive impact in carrying out practical activities at home. The use of tools and materials based on local wisdom in conducting online practicum can be used as an alternative so that it can be used as a policy in online practicum learning (Sukmawati et al., 2021).

One of the efforts that can be carried out in dealing with online learning is the strategy of implementing simple elementary science practicum lectures by utilizing media around the house with local wisdom. The application of this learning model is able to give an attractive impression to students in the midst of monotonous online learning. This strategy is expected to be a reference in elementary science practicum in the midst of limitations due to the Covid-19 pandemic for other practicums in universities. The practicum activities carried out by students show that elementary science practicum can still be carried out even though learning is carried out online(Barros-del Río et al., 2022; Becker et al., 2019). Nevertheless, elementary science practicum activities carried out by students are expected to be a provision as a form of learning innovation so that they are able to eliminate the boredom of online learning which seems monotonous. Therefore, planning for elementary science practicum in addition to using simple tools and materials is also expected to be close to the surrounding environment, one of which is by applying science learning based on local wisdom (Sibarani et al., 2021). Practical activities carried out by students are also expected to be applied in schools so that the learning process of students through practicum in elementary science learning is meaningful. Prior to the pandemic, practicum activities were carried out directly in the lab, in this study students were actively guided by lecturers to carry out practicums by utilizing materials that were at home with the local wisdom of each student's residence. Based on this method, students will still be trained in their scientific skills and are accustomed to using materials around them as learning media. The results of these practicum activities can be used by students when they teach in schools so that the benefits of this research activity can be useful.

Conclusion

Based on the results research that has been carried out by researchers, it can be concluded that the application of online practicum with local wisdom-based learning videos can improve student literacy skills. This can be seen from the pretest and posttest logit values increasing from 1.2 to 3.2 so that it shows an increase in students' mastery of concepts after participating in practicum activities.

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