PAPER NAME

06-7249.pdf

AUTHOR

Chandra Ertikanto

WORD COUNT

3999 Words

CHARACTER COUNT

22356 Characters

PAGE COUNT

6 Pages

FILE SIZE

726.3KB

SUBMISSION DATE

Jan 25, 2023 11:17 AM GMT+7

REPORT DATE

Jan 25, 2023 11:17 AM GMT+7

16% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

- 10% Internet database
- 11% Publications database
- Crossref database
- Crossref Posted Content database
- 13% Submitted Works database

Excluded from Similarity Report

- Bibliographic material
- Cited material
- Manually excluded sources
- Manually excluded text blocks

JPPIPA 8(2) (2022)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Implementation Of Macromedia Flash-Based Parabola Virtual Practicum Application in Growing Science Process Skills During the Covid-19 Pandemic

Eko Wiyanto[1], Agus Suyatna[1]*, Chandra Ertikanto[1]

[1] Physics Education, FKIP, University of Lampung, Lampung, Indonesia

DOI: 10.29303/jppipa.v8i2.1379

Article Info
Received: February 7, 2022
Revised: April 9, 2022
Accepted: April 21, 2022
Published: April 30, 2022

Abstract: This study aims to determine the effect of the implementation of a virtual parabolic motion practicum based on macromedia flash on the growth of students' science process skills. The research was carried out at SMA Negeri 2 Bandar Lampung, with a population of all students in class X MIPA, and a sample of class X MIPA 1 as many as 36 students with purposive sampling technique. By using a research design that is one group pretest-posttest. The data analysis technique used is the normality test, the two related sample test, and the N-Gain test. The results showed that there was a difference between the average pretest and posttest values of 7.00 with an N-Gain score of 0.2 with low criteria. Based on the results of the study, it can be concluded that the implementation of a virtual parabolic motion practicum based on macromedia flash has an effect on growing Science Process Skills in students.

Keywords: Virtual practicum; Parabolic motion; Macromedia flash; Science process skills.

Citation: Wiyanto, E., Suyatna, A., & Ertikanto, C. (2022). Implementation Of Macromedia Flash-Based Parabola Virtual Practicum Application in Growing Science Process Skills During the Covid-19 Pandemic. *Jurnal Penelitian Pendidikan IPA*, *8*(2), 718–723. https://doi.org/10.29303/jppipa.v8i2.1379

Introduction

Physics subject is a curricular program that aims to develop the attitude competence, knowledge competence, and skill competence of students in various choices of scientific disciplines (Kemendikbud, 2014). Thus, there are at least three competencies that must be achieved by students when studying physics subjects. Skill competence focuses on the abilities that students must achieve in the realm of observing, asking, trying, reasoning, presenting, and creating activities.

Science learning in schools should not only stick to what is already in the textbook but also learn how to get it (Maharani et al., 2020). In other words, students must integrate their skills, knowledge, and attitudes to get a good understanding of science concepts. Thus, teachers must focus on teaching science skills in the form of facts, concepts, and theories through scientific investigations of students (Zeidan & Jayosi, 2015).

Students not only understand physics subject matter in theory, but also its application. Next, in Permendikbud No. 66 of 2013 explained that educators assess skill competencies through performance assessments, namely assessments that require students to demonstrate a certain competency using practice tests, projects, and portfolio assessments (Kemendikbud, 2013). The availability of teaching media and teachers as facilitators in learning is very much needed by the right learning model to develop process skills (Arantika et al., 2019). So that one of the activities or media that can help improve the competence of students' skills is practicum activities.

Practicum is an activity that aims to equip students to understand the relationship between theory and practice, so that students not only have the ability to understand the material in theory, but also implement it or even formulate concepts through the practice. According to Zainuddin (2005) through practicum activities, many things can be obtained by students

* Corresponding Author: asuyatna@yahoo.com

including practicum activities can train skills, provide opportunities for students to apply and integrate their knowledge and skills in practice, prove something scientifically, do scientific research, inquiry, appreciate the knowledge and skills of inquiry. In addition, practical activities are able to illustrate concepts and principles in physics lessons.

This practicum activity basically has to be done indoors or in person. As an alternative to practical activities, you can also use a virtual laboratory. Virtual Laboratory is a practical simulation of the results of the visual representation of real traditional laboratory objects to confirm the results of the practicum and the theory being studied (Potkonjak et al., 2016). Virtual laboratories can also be interpreted as information and communication technology-based learning that is able to develop learning using practical methods (Hidayati and Masril, 2019). The use of virtual laboratories is not to replace the role of the actual laboratory, but as an alternative complementary solution to the lack of real physics laboratory equipment in schools (Yusuf et al., 2015). In addition, in a laboratory with a school physics laboratory scale, not all materials in physics lessons have practical equipment that can describe or practice the existing theory, such as the Parabolic Motion material.

At the end of December 2019, the world was hit by a major virus outbreak which was later named by the WHO as Covid-19. As of Sunday, February 21, 2021, the number of confirmed cases of this virus was 111 million, with 62.5 million recovered patients, and 2.46 million people died worldwide (Handayani, 2020). The Indonesian government has also issued a law on limiting social contact, namely in Article 59 of the Health Quarantine Law with the aim of preventing the spread of the virus. So that learning activities that were originally directly at school, become learning from home or online (Kepres, 2018).

The scientific spirit that should be able to make students more skilled in dealing with problems does not grow. To answer these problems, it is important to implement science process skills for students. According to Ozgelen, (2012) Science Process Skills are thinking skills used by scientists to build knowledge in order to solve a problem and formulate results. Science process skills help students to think critically and think scientifically (Gillies and Nichols, 2015). The need to instill science process skills in students so that students are able to solve a problem through scientific investigation, so that they can relate it to phenomena in everyday life (Yusra et al., 2021). As stated by Akamis and Ergin (2008), Science Process Skills are tools needed to create or use scientific information, to improve scientific research and solve problems. This is because science process skills emphasize knowledge seeking rather than knowledge transfer. So that students will be active in the learning process, not only as objects of learning, but as learning subjects who also play an active role in the learning process.

According to Ertikanto (2016) process skills need to be trained in science teaching because process skills have important roles including helping students learn to develop their minds, providing opportunities for students to make discoveries, improving memory, providing intrinsic satisfaction when children have succeeded. do something, and help students learn science concepts.

Students' self-science process skills can be identified by looking at several indicators that students must achieve. According to Ibrahim (2010), the indicators of science process skills measured through the test method are observing, formulating problems, formulating hypotheses, identifying variables, communicating data, and concluding data.

Method

This research was conducted in October 2021. The research method is a quasi-experimental conducted online. The research design used is One Group Pretest-Posttest Design.

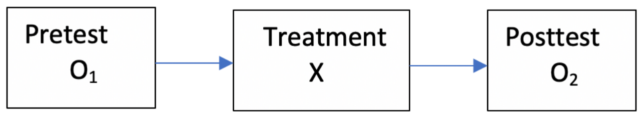

Figure 1. Research Design One Group Pretest Posttest Design

Description:
O_1 = Observation of pretest results before being given virtual practicum treatment
X = Practicum using a virtual lab.
O_2 = Observation of pretest results before being given virtual practicum treatment

The population in this study were all students of class X science at SMA Negeri 2 Bandar Lampung in the first semester of the 2021/2022 academic year, totaling 8 classes with 36 students in each class. The sampling technique in this study used the purposive sampling technique.

The data collection technique in this research is to provide pretest and posttest which have been integrated with indicators of science process skills. The data were analyzed using the normality test with the aim of knowing a research sample was normally distributed. In this study, the data were not normally distributed so that a two-related sample test was conducted.

In addition, an analysis was also carried out to determine the improvement of students' science process skills on each indicator using equation 1.

$$Score\ of\ each\ indicator = \frac{the\ score\ obtained}{total\ score} x100\% \ .... (1)$$

The improvement of students' science process skills on each indicator is seen using the scoring guide presented in Table 1.

Table 1. Score Interpretation Criteria

Percentage Criteria (%)	Interpretation
0 – 20	Not very good
21 – 40	Not good
41 – 60	Pretty good
61 – 80	Well
81 – 100	Very good

Riduwan, 2015)

Then, finally the N-gain test was conducted to determine the magnitude of the increase in students' science process skills with the following criteria.

$$N-Gain\ (g) = \frac{S_{post}-S_{pre}}{S_{max}-S_{pre}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Description:

N-Gain	:	Interpretation
0.7≤ *N-gain* ≤ 1	:	High
0.3 ≤ *N-gain*< 0.7.	:	Medium
N-gain < 0.3	:	Low

Table 2. N-Gain Interpretation Criteria

	N	Min	Max	Mean	Std. Dev.	N-gain
Pretest	36	39	89	64.19	8.678	0,2
Posttest	36	44	94	71.19	9.683	
Valid N (listwise)	36					

(Hake, 1991)

Results and Discussion

This research uses a virtual parabolic motion practicum application based on macromedia flash. In this application, students can experiment with two variations, namely by changing the angle and initial velocity of the cannon to the maximum distance (on the x and y axes) traveled by the cannonball.

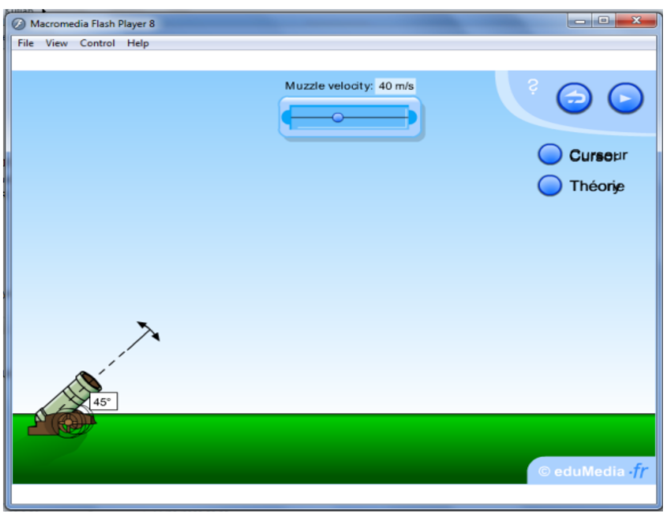

Figure 2. Display of Parabolic Motion Virtual Practicum Applications Based on Macromedia Flash

In practical activities, students are divided into six groups. Each group consists of six students. To make it easier to communicate, whatsapp and googlemeet applications are used. Before carrying out the practicum activities the teacher gave a pretest to the students. At the beginning of the practicum activity in the form of a simulation by giving an apperception of the parabolic motion material. Then, students carry out practical activities in groups by following the guidelines on the Student Worksheet. After carrying out practical activities, students are directed to fill out the posttest as an assessment material for improving science process skill.

The data from the pretest and posttest results that have been filled in by the students are then recapitulated by the researcher to be tested for analysis. The first analysis that was carried out after the collection of the two data was by conducting a descriptive analysis as presented in Table 3.

Table 3. Results of Descriptive Analysis

	N	Min	Max	Mean	Std. Dev.	N-gain
Pretest	36	39	89	64.19	8.678	0.20
Posttest	36	44	94	71.19	9.683	
Valid N (listwise)	36					

Next, the normality test was carried out with the test results presented in Table 4.

Table 4. Normality Test Results (One-Sample Kolmogorov-Smirnov Test)

		Pretest	Posttest
N		36	36
Normal Parameters[a,b]	Mean	64.19	71.19
	Std. Deviation	8.678	9.683
Most Extreme Differences	Absolute	0.234	0.245
	Positive	0.234	0.245
	Negative	-0.210	-0.166
Kolmogorov-Smirnov Z		1.406	1.468
Asymp. Sig. (2-tailed)		0.038	0.027

a. Test distribution is Normal.
b. Calculated from data.

From the normality test, the Asymp value was obtained. Sig. (2-tailed) or probability value 0.05, so it can be concluded that the data is not normally distributed (Suyatna, 2017). The amount of increase in each indicator is obtained from the summation of all student posttest scores on each indicator then calculates the percentage increase, then analyzed as shown in Figure 3.

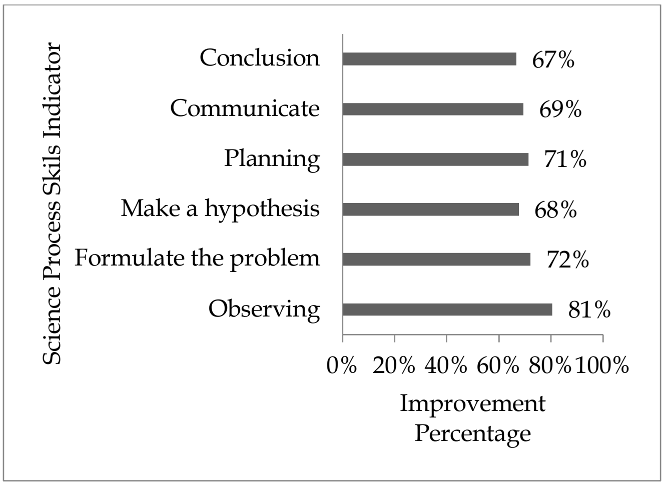

Figure 3. Graph of increasing science process skills on each indicator

The graph of improving science process skills above explains the improvement of students' science process skills on each indicator. In observing indicators, it reached the largest percentage, namely 81%. This shows that students already have excellent observing skills, especially when connecting the orientation presented by the questions with the possible problems that arise. These results are in line with research conducted by Zeidan and Jayosi (2015) which shows that observing skills are easier skills compared to other skills. Then on the indicator of formulating the problem, the percentage increase is 72%. This shows that students have good ability in formulating problems. The indicator formulating a hypothesis is 68% which shows that students have the ability to formulate good hypotheses. The planning indicator is 71% which shows the ability of students to plan a research is good. The communicating indicator is 69% which shows that students already have good abilities in communicating research data, which in this study are in the form of graphs.

The indicator for drawing conclusions reached the smallest percentage, namely 67%, which indicates that students have been able to conclude the results of practicum activities but are less thorough in drawing conclusions presented by the test instrument. So that between the problems in the problem and the conclusions drawn are not appropriate. The small percentage of indicators for drawing conclusions is caused by the experience of students in drawing conclusions based on untrained experiments. This is because practicum activities that should be a place to train science process skills, especially drawing conclusions, cannot be carried out due to online learning conditions. As stated by Baharuddin and Wahyuni (2015) which states that knowledge will become more meaningful through experience. With this scientific experience, students will gain knowledge of process skills.

If you add up the scores obtained and then look for the percentage, you will get the percentage increase in science process skills for all indicators of 71% with a good category. Based on the percentage of each indicator above, it can be concluded that the implementation of virtual parabolic motion practicum is able to improve students' science process skills, especially on the six indicators, namely observing, formulating problems, formulating hypotheses, planning, communicating, and drawing conclusions. This is also in line with research conducted by Yusuf and Widyaningsih (2018) that the use of a virtual laboratory (virtual practicum) can develop students' science process skills with a percentage score of 81.95% of the overall science process skills analysis score in the very good category.

Learning activities using animated media also provide a meaningful experience to students, because the use of this media makes it easier for students to understand an abstract concept to be more concrete and clear, for example in the listening process and the viewing process. Sub material that is considered a little difficult and requires a deeper understanding and explanation, but with the help of animation media students become easier to understand the process because it is equipped with images, audio and video (Salfina et al., 2021). Another factor that makes using a virtual lab more effective is that teachers can more easily explain to students the meaning and form of the learning provided (Maulina and Kustijono, 2017).

The effect of the application of the virtual parabolic motion practicum application based on macromedia flash on the improvement of students' science process skills can be seen through the two-related sample test.

Table 5. The results of the two related sample test

Test Statistics[a]	Posttest – Pretest
Z	-3.122[b]
Asymp. Sig. (2-tailed)	0.002

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

In the two related sample test, there is a difference between the pretest and posttest scores that the number of posttest > pretest scores is 21 students, posttest < pretest is 6 students, and posttest = pretest is 9 students. Then the statistical test results obtained the Asymp value. Sig (2-tailed) or a significance value of 0.002 < 0.05, then Ha is accepted. This shows that there is a significant effect on the difference in the treatment given to each variable. Thus, it can be concluded that there is an increase in the value of students' science process skills after the virtual practicum activity of parabolic motion based on macromedia flash.

This conclusion is in line with research by Elsunni and Abdelwahed (2014) that Lab-Virtual media is efficiently used in science lessons and can improve students' skills in conducting experiments. The magnitude of the increase in the value can be seen from the calculation of the average posttest and pretest scores, there is a fairly large difference, namely the posttest - pretest value = 71.19 - 64.19 = 7.00. Similar research was also carried out by Maulina and Kustijono (2017) by comparing two conditions of practicum activities, namely virtual labs and real labs. In virtual lab conditions, the increase in science process skills as seen from the difference between the students' average pretest and posttest scores was 3.05. Meanwhile, in real laboratory conditions, the increase in science process skills was 2.09. Thus, it can be seen that the findings have a larger difference in the increase in value.

The magnitude of the increase in science process skills was measured using the N-gain test and obtained a score of 0.2 in the low category. The low N-gain score was caused by a fairly large pretest value, besides that the increase after the posttest was not large so that the quotient of the N-gain score did not reach the high category. The condition of the research sample, namely class X MIPA 1 at SMA Negeri 2 Bandar Lampung is the superior class whose students are students who enter through the achievement path. In addition, some students also take tutoring outside of school independently. At the beginning of learning physics before doing the research, the tutor teacher provides a file of parabolic motion material so that students have a high initial understanding of the parabolic motion material.

Fatwa et al., (2018) conducted research related to students' initial understanding with the results showing that prior knowledge affects the success of students in interpreting what is observed. Initial knowledge of students will help identify the phenomena observed in demonstration and experimental activities. Thus, it can be concluded that the students' initial knowledge (understanding) of the parabolic motion material causes the pretest score to be high.

The research was conducted by testing the virtual practicum application of parabolic motion on the growth of students' science process skills showing a good improvement. In the process students are directed to observe to draw conclusions. As in the research of (Pradana, et al., 2020), namely Science process skills are special skills that can simplify the way of learning science starting from observing, determining problems, and making conclusions.

Conclusion

The conclusion based on the results of the research and discussion is that the virtual parabolic motion practicum based on macromedia flash has an effect on increasing the Science Process Skills of SMA Negeri 2 Bandar Lampung students significantly, which is shown from the results of the data analysis of the two related sample test with a significance value of 0.02 and the difference in the average value. The average posttest and pretest is 7.00. Each indicator of science process skills increased with the percentage of the six indicators above 65%, in the good and very good categories. The N-gain score obtained is 0.2 which indicates an increase in the low category.

References

Aktamis, H., & Ergin, O. (2008). *The effect of scientific process skills education on students' scientific creativity, science attitudes and academic achievements*. Paper presented at Asia-Pacific Forum on Science Learning and teaching.

Arantika, J., Saputro, S., & Mulyani, S. (2019). Effectiveness of guided inquiry-based module to improve science process skills. *Journal of Physics: Conference Series*, 1157, 42019. https://doi.org/10.1088/1742-6596/1157/4/042019

Baharuddin., & Wahyuni, N. (2015). *Teori belajar dan pembelajaran*. Yogyakarta: Ar-ruzz Media.

Elsunni, & Abdelwahed, H. (2014). Stakeholders Perspective on the Efficiency of the Virtual Laboratory in the Development of Students Scientific Research Skills in Science. *American International Journal of Social Science*. 3(2), 166-171.

Ertikanto, C. (2016). *Teori Belajar dan Pembelajaran*. Yogyakarta: Media Akademi

Fatwa, M., W., Harjono, A., & Jamaluddin. (2018). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Keterampilan Proses dan Penguasaan Konsep Sains Ditinjau dari Pengetahuan Awal Peserta Didik. *Jurnal Pendidikan Fisika dan Teknologi Unram* 4(1), 121-130 https://doi.org/10.29303/jpft.v4i1.572

Ghozali, I. (2018). *Aplikasi Analisis Multivariate dengan Program IBM SPSS*. 25. Badan Penerbit Universitas Diponegoro: Semarang

Gillies, R., & Nichols, K. (2014). How to Support Primary Teachers' Implementation of Inquiry: Teachers' Reflections on Teaching Cooperative Inquiry-Based Science. *Research in Science Education*, 45. https://doi.org/10.1007/s11165-014-9418-x

Hake, R.R. (1991). *Analyzing Change/Gain Scores*. USA: Indiana University

Handayani, D., Hadi, D.R., Isbaniah, F., Burhan, E., & Agustin, H. (2020). Penyakit Corona Virus 2019. *J Respir Indol*. 40(2), 119-129. https://doi.org/10.36497/jri.v40i2.101

Hidayati., & Masril. (2019). Penggunaan LKM untuk menunjang kegiatan laboratorium virtual fisikal inti. *Jurnal Penelitian Pendidikan IPA*, 5(2): 149-153. https://doi.org/10.29303/jppipa.v5i1.160

Ibrahim, M. (2010). *Dasar-Dasar Proses Belajar Mengajar*. Surabaya: UNESA University Press.

Kemendikbud. (2013). *Permendikbud No. 66 Tahun 2013 Tentang Standar Penilaian Pendidikan*. Jakarta.

Kemendikbud. (2014). *Permendikbud No 59 Tahun 2014 Tentang Kurikulum 2013 Sekolah Menengah Atas/Madrasah Aliyah*. Jakarta.

Kepres. (2018). *Undang-Undang Nomor 6 Tahun 2018 Pasal 59 Ayat 2 dan 3 tentang Kekarantinaan Kesehatan*. Jakarta.

Maharani, R.J.P., Taufik, M., Ayub, S., dan Rokhmat, J. (2020). Pengaruh Model Pembelajaran Inkuiri dengan Bantuan Media Tiga Dimensi Terhadap Keterampilan Proses Sains dan Hasil Belajar Fisika Peserta Didik. *Jurnal Penelitian Pendidikan IPA*. 6(1): 113-118. https://doi.org/10.29303/jppipa.v6i1.326

Maulina, R.N., & Kustijono, R. (2017). Efektifitas Pembelajaran Fisika Berbantuan Media Virtual Phet Disamping Pelaksanaan Lab Riil untuk Melatihkan Keterampilan Proses Sains. *Prosiding dari Seminar Nasional Fisika dengan tema Menghilirkan Penelitian-Penelitian Fisika dan Pembelajarannya,* Surabaya (Unesa): 65-69.

Ozgelen, S. (2012). Students' Science Process Skills within a Cognitive Domain Framework. *EURASIA Journal of Mathematics, Science & Technology Education*, 8, 283–292. https://doi.org/10.12973/eurasia.2012.846a

Potkonjak, V., Gardner, M., Callaghan, V., Mattila, P., Guetl, C., Petrovic, V.M., & Jovanonic. (2016). Virtual laboratories for education in science, technology, and engineering: A review. *Computers and Education.* 95, 309-327. https://doi.org/10.1016/j.compedu.2016.02.002

Pradana, D., Nur, M., & Supratno, N. (2020). Improving Critical Thinking Skill of Junior High School Students through Science Process Skills Based Learning. *Journal of Research in Science Education*, 6(2), 166-172. https://doi.org/10.29303/jppipa.v6i2.428

Riduwan. (2015). *Skala Pengukuran Variabel – Variabel Penelitian.* Bandung: Alfabeta

Salfina, Nurmaliah, C., Tenri, A.U., Hasanuddin, & Abdullah. (2021). Application of Problem Based Learning Model in Integrated Media Animation to Improve Students' Science Process Skills. *Jurnal Penelitian Pendidikan IPA*. 7(SpecialIssue). 266-271. https://doi.org/10.29303/jppipa.v7iSpecialIssue.1072

Suyatna, A. (2017). *Uji Statistik Berbantuan SPSS untuk Penelitian Pendidikan*. Yogyakarta : Media Akademi.

Yusra, Nurmaliah, C., & Ali, M. (2021). Application of Inquiry-Based Learning Module to Improve Science Process Skills and Student Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*. 6, 1-5. https://doi.org/10.29303/jppipa.v7iSpecialIssue.864

Yusuf, I., dan Widyaningsih, S., W. (2018). Implementasi Pembelajaran Fisika Berbasis Laboratorium Virtual Terhadap Keterampilan Proses Sains dan Persepsi Mahasiswa. *Berkala Ilmiah Pendidikan Fisika Universitas Papua*. 6(1), 18-28. http://dx.doi.org/10.20527/bipf.v6i1.4378

Yusuf, I., Widyaningsih, S., W., & Purwati, D. (2015). Pengembangan Perangkat Pembelajaran Fisika Modern Berbasis Media Laboratorium Virtual Berdasarkan Paradigma Pembelajaran Abad 21 dan Kurikulum 2013. *Jurnal UNEJ*.4 (2), 189-200. Retrieved from https://jurnal.unej.ac.id/index.php/pancaran/article/view/1563

Zainuddin, M. (2005). *Mengajar di Perguruan Tinggi: Praktikum, Jakarta: PAU-PPAI*, Universitas Terbuka.

Zeidan, H.A., & Jayosi, R.M. (2015). Science Process Skills and Attitudes Toward Science Among Palestinian Secondary School Students. *World Journal of Education*. 5(1), 13-14. http://dx.doi.org/10.5430/wje.v5n1p13

16% Overall Similarity

Top sources found in the following databases:

- 10% Internet database
- 11% Publications database
- Crossref database
- Crossref Posted Content database
- 13% Submitted Works database

TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

#	Source	Type	Match
1	Konsorsium Perguruan Tinggi Swasta Indonesia II on 2022-06-01	Submitted works	1%
2	media.neliti.com	Internet	<1%
3	researchgate.net	Internet	<1%
4	Syiah Kuala University on 2022-09-01	Submitted works	<1%
5	Syiah Kuala University on 2022-11-28	Submitted works	<1%
6	Chaerul Rochman, Diah Mulhayatiah, Indah Sari, Herni Yuniarti Suhendi...	Crossref	<1%
7	Universitas Mataram on 2021-07-09	Submitted works	<1%
8	University of Southampton on 2020-09-14	Submitted works	<1%

9	ejournal.unp.ac.id Internet	<1%
10	Mar'atuzzakiya Ahsani, Annisa Utami, Resi Febriyanti, Eny Enawaty. "T... Crossref	<1%
11	mafiadoc.com Internet	<1%
12	repository.poltekkes-tjk.ac.id Internet	<1%
13	Rusmansyah, N Hayati, A Winarti, Rahmi. "Train students' science proc... Crossref	<1%
14	Yayu Sri Rahayu, I. Made Astra, Iwan Sugihartono. "Development of so... Crossref	<1%
15	journal.unesa.ac.id Internet	<1%
16	Open University Malaysia on 2021-12-05 Submitted works	<1%
17	journal-center.litpam.com Internet	<1%
18	jurnalfkip.unram.ac.id Internet	<1%
19	refaad.com Internet	<1%
20	Ayu Sri Menda Br Sitepu, Karya Sinulingga, Eva Marlina Ginting. "Devel... Crossref	<1%

21	P Siahaan, A Suryani, I Kaniawati, E Suhendi, A Samsudin. "Improving S... Crossref	<1%
22	Richard Owino Ongowo, Francis Chisakwa Indoshi. "Science Process S... Crossref	<1%
23	Silmi Hidayatullah, Ratna Wulan. "Meta-analysis of the influence of 21s... Crossref	<1%
24	Universitas Negeri Surabaya The State University of Surabaya on 2021-... Submitted works	<1%
25	IAIN Bengkulu on 2022-12-12 Submitted works	<1%
26	N A Budiman, S Sukarmin, A Supriyanto. "Analiysis science process ski... Crossref	<1%
27	Putri Aulia Pertiwi. "The EFFECTIVENESS OF PROBLEM BASED LEARNI... Crossref	<1%
28	Universitas Negeri Surabaya The State University of Surabaya on 2020-... Submitted works	<1%
29	ejournal.undiksha.ac.id Internet	<1%
30	eudl.eu Internet	<1%
31	journal.trunojoyo.ac.id Internet	<1%
32	readkong.com Internet	<1%

33	I. Made Astra, Anderias Henukh, Martha Loupatty. "The analysis of cog... Crossref	<1%
34	Linawati Kuswanda, Anna Fitri Hindriana, Awis Hamid Dani, M.Firman I... Crossref	<1%
35	O W Indri, Sarwanto, F Nurosyid. "Development of testlet instruments t... Crossref	<1%
36	eprints.iain-surakarta.ac.id Internet	<1%
37	ojs3.unpatti.ac.id Internet	<1%
38	unars on 2023-01-05 Submitted works	<1%
39	journalfkipuniversitasbosowa.org Internet	<1%
40	Xavier University on 2016-02-18 Submitted works	<1%
41	Irma Dahlia Yuliskurniawati, Nurul Ika Noviyanti, Windy Rosyadah Mukt... Crossref	<1%
42	Maison, Retni Sulistioning Budiarti, Sofia Christine Samosir, Neng Ria ... Crossref	<1%
43	Universitas Negeri Jakarta on 2019-04-22 Submitted works	<1%
44	Universitas Samudra on 2023-01-13 Submitted works	<1%

Excluded from Similarity Report

- Bibliographic material
- Manually excluded sources
- Cited material
- Manually excluded text blocks

EXCLUDED SOURCES

Source	Type	Similarity
jppipa.unram.ac.id	Internet	11%
jppipa.unram.ac.id	Internet	9%
Syiah Kuala University on 2022-10-31	Submitted works	<1%
daten-quadrat.de	Internet	<1%

EXCLUDED TEXT BLOCKS

JPPIPA 8
Syiah Kuala University on 2022-12-25

IndonesiaDOI: 10.29303/jppipa
Universitas Pendidikan Ganesha on 2022-12-27

Copyright © 2022, Author et al.This open access article is distributed under a (CC-...
ipa-pasca.unpak.ac.id

Jurnal Penelitian Pendidikan IPA (JPPIPA
Syiah Kuala University on 2022-10-31

April
Universitas Islam Negeri Sumatera Utara on 2022-09-22

Figure 1. Research Design One Group Pretest PosttestDesign

www.journalijar.com

Table 1. Score Interpretation CriteriaPercentage

ejournal.undiksha.ac.id

1

www.scitepress.org

criteria. –

repository.lppm.unila.ac.id

10.3

dokumen.tips

descriptive analysis

dergipark.org.tr

NMin Max MeanStd. Dev

www.europeanproceedings.com

One-Sample Kolmogorov-Smirnov Test

Universitas Putera Batam on 2022-01-19

PretestPosttest

journal.ipts.ac.id

a. Test distribution is Normal.b. Calculated from data

University of Southampton on 2020-09-14

science process skills on

Irma Dahlia Yuliskurniawati, Nurul Ika Noviyanti, Windy Rosyadah Mukti, Susriyati Mahanal, Siti Zubaidah. "S...

the two-related

Liberty University on 2021-08-12

Z-3

www.scribd.com

Test StatisticsaPosttest - Pretest

Universitas Pendidikan Indonesia on 2017-06-05

The conclusion based on the results of the research

primary.ejournal.unri.ac.id