Edusaintek: Jurnal Pendidikan, Sains dan Teknologi
Volume 11 Issue 1 2024 Pages 31 - 46
p-ISSN: 1858-005X e-ISSN: 2655-3392 DOI: https://doi.org/10.47668/edusaintek.v11i1.961
website: https://journalstkippgrisitubondo.ac.id/index.php/EDUSAINTEK

APPLICATION OF WEBBED BASED WORKSHEET TO IMPROVE STUDENT SCIENCE PROCESS SKILLS

Sofi Novita Ramadhani[1], Enny Susiyawati[2*]
[1,2] Universitas Negeri Surabaya, Indonesia
e-mail: ennysusiyawati@unesa.ac.id

Abstract: This study aims to examine the applicatio of webbed based worksheet to improve student science process skills. This study used a one-group pretest and posttest pre-experimental research design. 26 students in class VIII-D participated in this study from 39 JHS in Surabaya. Datas were collected through teaching activity, science process skill pretest-posttest, and students' responses. The collected teaching activity was calculated using modus, the improvement of SPS was analyzed using n-gain value and students' responses will be shown by percentage. The result of study was shown an improvement in the observations of how the learning was being put into practice, with modus 3 in good categoty. The N-Gain result was 0.73 on high category to demonstrated students' science process skills development from the result pretest posttest. The webbed based worksheet on human skin health received a positive responses from students, with a percentage of 95% on very good category. The result indicated that the application on webbed based worksheet can improved students' science process skills on skin health theme.

Keywords: Webbed Type, Student Process Skills

INTRODUCTION

At this time, natural science-integrated learning has not been fully implemented. Integrated natural science learning in packaging and delivery of materials to the student participants is still partially carried on so that it is not reflected in the implementation process (K. Dewi et al., 2013). The impact of the implementation of natural science integrated learning that is not maximum is the difficulty in teaching the theme of subjects that are not the background of the teacher's education, such as natural science integrated teacher who is based on the discipline of biology is difficult to teach physical materials primarily related to the formulation of equations and the analysis of problems on phenomena of physics. Likewise, with teachers with a background in physics, there will be little difficulty in teaching biology or chemistry to learners (Harefa, 2022). This results in learning a significant influence on students' learning outcomes and creativity; as revealed by Insani (2016) barriers to background education are very likely to affect the level of mastery of teachers in teaching the content of a subject, so concerning the mastery ability of students. Therefore, guidance is needed to make natural science learning integrated. Teachers should make integrated natural science learning an exciting and

enjoyable lesson for students to improve the maximum learning outcome of students.

According to Depdiknas (2007) it is stated that the implementation of natural science learning is integrated with one of them by applying science process skills. In order to develop the skills they possess, learners can apply the skills of scientific processes with scientific methods (Ibrahim, 2010). This is according to the TIMSS (Trend International Mathematics and Science Study) data. TIMSS has three cognitive aspects: knowing, applying, and reasoning (Faizah & Murtiyasa, 2017). Those three aspects can be acquired by having a mastery of the skills of the scientific process during learning because the skill of the science process will support a person in achieving the mastering of the natural science concept and applying it correctly (Sukarno et al., 2013).

Based on the fact that natural science learning is integrated and the skills of science processes are not maximum, to solve the problem, it is necessary to apply the disciplined student worksheet of the sciences: biology, chemistry, and physics, which is able to support the learning process science skills of the students. In the study, implementing the Student Work Sheet natural science integrated using the webbed type. The webbed is a combination of the type creating worksheets for students where students are required to associate the theme of one with the other related to the phenomena around the environment. The characteristics used in this type are learning that is centered on the student participant by providing a direct experience (Prastowo, 2013). The connection of the webbed type with the science process skills is because students need to use scientific methods to develop science and the knowledge they possess. It is necessary To support student process skills by developing integrated learning. Natural science learning is developed as an integrated rather than a specialized discipline (Kemendikbud, 2016). In this study, the theme of "Human Skin Health" was used, taken from the material of the Excrete System. This topic of skin health is essential to be taught to students even since elementary school because it is close to students' everyday life. However, students still need help understanding concepts related to this theme (Cokkinides et al., 2006; Fonseca et al., 2015; LaBat et al., 2005). According to Labat et al (2005) it was found that learners' knowledge of skin-related risks can be the basis for targeted educational interventions that can encourage learners to adopt wiser and healthier behaviors.

The study aims to describe the extent to which the effectiveness of the application of student worksheet type webbed in improving scientific process on the theme of skin

health seen from the implementation of learning, student improvement of science process skills, and student responses.

METHODS

This type of research is pre-experimental research with one group pretest-posttest design. This research uses a pre-experimental method, where one class performs a pretest and posttest before being treated (Arikunto, 2010). The study was conducted at 39 junior high school Surabaya, East Java. The subjects of the study were students of class VIII D with a total of 26 students, with details of 15 male students and 11 female students. The instruments used in the research consist of an observation sheet of teaching activity, a test sheet for science process skills, and a question sheet to collect the responses. Data collection techniques in this study are observation sheets of teaching activity that carried out to observe the implementation process of learning by three observers, a test sheet of skills of the scientific method consisting of 15 questions of double choice pretest and posttest adapted from Purnamasari (2020) of TIPS II developed by Burns et al (1985), and a response sheet with 14 questions related to student worksheet. Data analysis techniques in research are as follows.

1. The analysis is carried out by calculating the modus and interpreting the data according to the completion of the observation sheet of the teaching activity by three observers and adjusted to the category of the assessment score as follows.

Table 1. The Observtion Categorys

Scores	Assessment category
0	Not Implemented
4	Excellent
3	Good
2	Enough
1	Bad

2. The results of the skills of the scientific process are obtained from the value of the pretest-posttest performed by the students. The data processing is carried out with the following steps:
   a. The analysis of the results of the scientific process skills is then continued with a normality test to find out whether it is distributed normally or not.

$$X^2 = \sum_{T=1}^{K} \frac{(Oi - Ei)}{Ei}$$

(Sudjana, 2005)

Notes:

$X^2 = Chi\ squared\ distribution$

Oi = Observational observation frequency

Ei = Theoretical/expected frequencies

K = The number of class intervals

b. The number of data samples taken in the pretest and posttest is 26 students, so the Shapiro-Wilk test determines the normal or not distributed data distribution. It is used for limited use, i.e., samples that are less than 50 samples, to produce accurate and accurate results. (Mohd Razali & Bee Wah, 2011). After the normality test is carried out, the decision to perform a parametric test is a paired t-test to determine if there is no difference between the value of the pretest and posttest using the type of study one group pretest-posttest design. The decision-making when the value (sig.) < 0,05, then H0 is rejected, or H1 has accepted means that there is a difference in the skills of the scientific process of the student after applying the science integrated student webbed based worksheets instead when the values (sig) ≥ 0,05, then the H0 has been accepted, or the H1 has been refused means there are no differences in the skill of the science process the student has applied the integrated science webbed based.

$$t = \frac{Md}{\sqrt{\frac{\sum x^2}{N\,(N-1)}}}$$

(Arikunto, 2010)

Notes:

$\sum x^2 d = Sum\ of\ squared\ deviations$

Xd = each deviation (d-Md)

Md = The mean of the difference between the pretest and posttest

N = The number of subjects in the sample

d.b = Determined with N -1

c. After that, an N-Gain analysis was performed to calculate the improvement of the learning process skills of the students.

$$<g> = \frac{\%\,(sf) - \%\,(si)}{\%\,(smaks) - \%(si)}$$

(Hake, 1999)

Keterangan :
g = score normalized gain
sf = score finale (posttest)
si = skor initian (pretest)
smaks = possible score

Table 2. Normalized N-Gain Value Category

Normalized N-Gain Value Category	Notes
g<30	Low
0,30≤g<0,70	Middle
g≥0,70	High

(Hake, 1999)

3. Analysis of the students' response to the application of the science integrated webbed based worksheet on the theme of human skin health is categorized according to the percentage. By calculating the percentage of questions that are categorized based on the response of the student. If a percentage result is obtained that the respondent has respond with positive or yes <61%, then the result indicates that all respondents agreed with the statement attached to the elevator. The scale used in this questionnaire sheet is “yes/no” which is attached to the following table.

Table 3. Rating Guttman Score

Answer	Score
Yes	1
No	0

Table 4. Guttman Scale Assessment

Average Percentage	Notes
0-20%	Worse
21-40%	Bad
41-60%	Enough
61-80%	Good
81-100%	Very good

(Riduwan, 2010)

RESULTS AND DISCUSSION

Result

Interpretation of the observed modus results according to the established category. At the preliminary activity in a meeting I, the modus obtained a score 3 with good category and experienced an improvement in meeting II to 4 with excellent category. At

the core activity in session I, the modus also earned a rating of 3 with good standards and experienced an improvement at meeting II to 4 with excellent category. At the closing activity in both meetings, the modus value remains the same as 3 with suitable category. Overall, the teaching activity which was calculated using modus, earned score 3 with good category for all activities.

Table 5. Teaching Activity Data

Observed Aspects		Modus	
		Meeting I	Meeting II
Preliminary activities	Regards	4	4
	Preparation	3	4
	Appreciation	3	4
	Motivation	3	4
	Objective	3	3
Preliminary Activity Modus		**3**	**4**
Core activities	Split groups	4	4
	Sharing LKPD	4	4
	reading phenomena	3	4
	Knowledge of problem formulation, hypotheses and variables	3	4
	Agree on the formulation of the problem	3	4
	Developing hypotheses	3	3
	Define variables	3	4
	Guiding research	3	3
	Carry out investigation	3	4
	Collaborate and discuss	4	4
	Analyze data	3	4
	Draw conclusions	3	3
Core Activity Modus		**3**	**4**
Closing Activities	Summing up together	3	3
	Reflection	3	3
	End learning	3	4
Closing Activity Modus		**3**	**3**
Overall Modus		**3**	
Category		**Good**	

After knowing the implementation of learning, they continued the calculation to see the improvement of the skills of the scientific process by performing normality tests and tests. After performing normality tests and parametric tests, a measure of the progress of the skills of the overall scientific process is carried out using normalized N-Gain analysis. Results of data improvement skills process science participants are shown in several categories as follows.

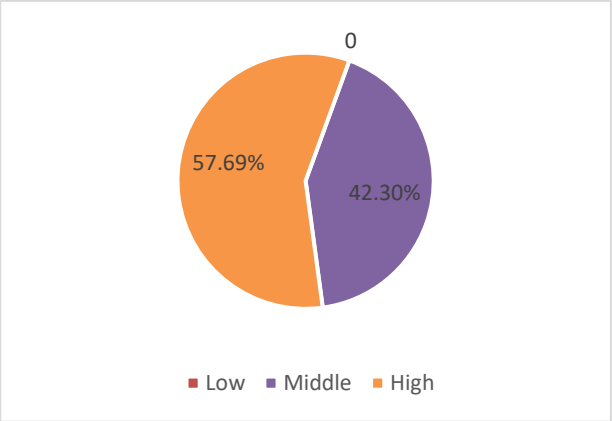
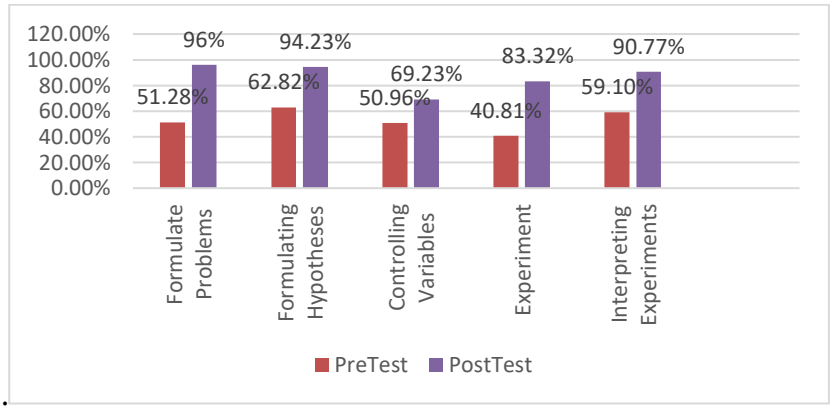


Figure 1. Percentage of n-Gain Score Meeting I KPS in Three categories

Based on the above data, it can be known that 15 Students with scientific process skills in the high category have a percentage of 57,69 or ranging from 58%. The rest are in the middle category, and there are no Students who have the skill in the science Process in the low class. The achievement of each aspect of the student's science process skills can be seen through data of pre-test and post-test values. This data is obtained by calculating the percentage of scores achieved by the learners by categorizing accuracy on each aspect of the skills of the scientific process. The results of this calculation provide an overview of the extent to which students of classes VIII-D achieved pre- and post-test values in science process skills. The results of this calculation are presented in Figure 2, which displays the analysis results on each aspect of the student's scientific process skills



.

Figure 2. Data Achievement Each Aspect of Learning Skills Process Science Participants

For all aspects, a higher post-test average percentage value than a pretest indicates a significant improvement in the learners' science process skills. As shown by the data presented in Figure 2. Approximately 96% of students were able to formulate problems

and 70% were capable of controlling variables on aspects formulating problems.

Data on the results of student responses were obtained from filling out the response questionnaires carried out by students. The recapitulation of student response questionnaire results can be seen in Figure 3 below.

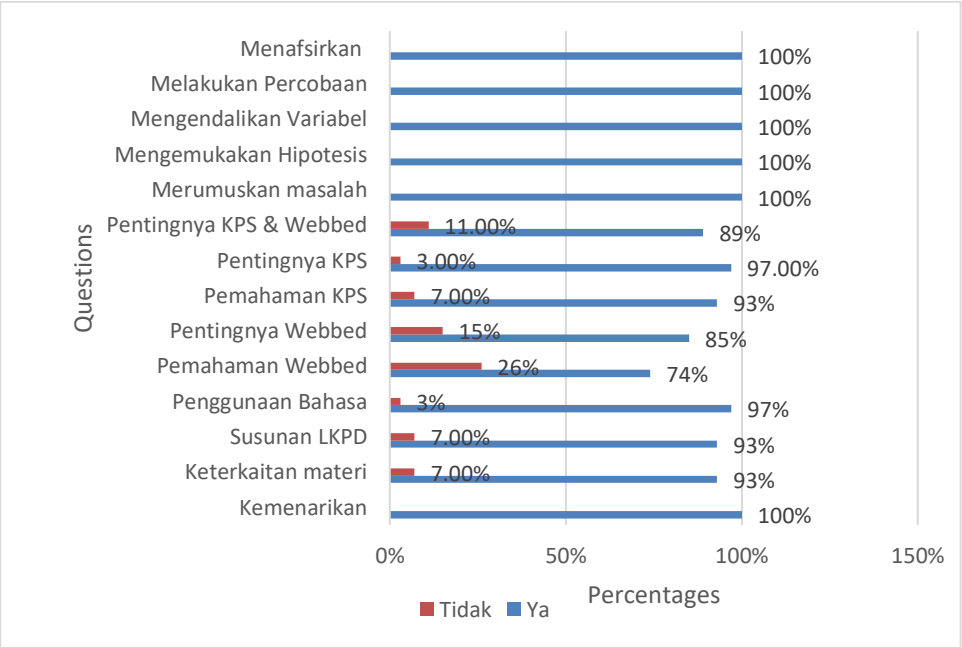


Figure 3. Collected Responses Data

Based on the summary of the results of the student response questionnaire shown in Figure 3, it can be concluded that the students gave a positive response. There is a tendency for the highest percentage in the responses of students to their impressions of student worksheet and the use of student worksheet to help them with science process skill aspects.

DISCUSSIONS

The teaching activity data depicted in Table 1 is going well. This is supported by similar research related to the application of integrated science webbed based worksheets, which get an implementation score in the same category (Dewi, 2017; Kusrini, 2019; Sari, 2017). Research conducted by Dewi (2017) regarding webbed based worksheets obtained an implementation score in the good category, and there was a positive increase at each meeting. In increasing the implementation of learning for each activity, the results were found to be not optimal, namely in the preliminary activities and closing activities at meeting I. The implementation of learning, which received a good category, was shown in research conducted by Kusrini (2019). In its implementation, it has not run optimally

in the very good category due to: 1.) the characteristics of the students; and 2.) inadequate school facilities and infrastructure.

In connection with the research that has been done, in the first meeting learning activities, there are obstacles related to the characteristics of students. In the preliminary activities, when the researcher directed students to ask questions, there were some students who asked questions, and there were some students who still felt shy to ask questions. In the core activities during outdoor investigations, students became less conducive for a moment. According to research by Purnamasari (2020), in the same situation related to outdoor investigations, it can be less conducive because students carry out investigations independently. Previously, the results of pre-research by a science teacher at 39 JHS Surabaya said that students had not received information regarding their science process skills and proper investigation procedures, especially regarding outdoor investigations. In acquiring student skills, the teacher's role is only to guide learning so that students are able to find their own meaning. The implementation of learning will increase if students are in the ZPD (Zone of Proximal Development), which can assist in carrying out investigations with the assistance of the teacher (Dewi, 2017). By connecting learning with everyday life, researchers continue to encourage students to ask questions and maintain discipline in the classroom. This action is in line with the classroom management skills that must be owned by a teacher to overcome problems that arise. The goal is to create and maintain a classroom atmosphere that supports the smooth running of learning programs effectively (Mahmudah, 2018). At the second meeting, there was an increase in the implementation of learning because all the obstacles that had occurred at the first meeting were able to be overcome. In learning activities, students are actively involved in the process of constructing their understanding through the application of a webbed based worksheets on the theme of human skin health. The use of student worksheets is very important in helping students understand the material and carry out experimental practices, both inside and outside the classroom as well as at home. The use of student worksheets in learning allows students to increase their understanding of learning material independently (Ariani & Meutiawati, 2020; Prianoto & Gulo, 2017). Through the webbed based worksheets, students learn in the form of teaching and learning activities that unify conceptually, both within and between fields of study (Fogarty, 1991). The results showed that the implementation of the webbed based worksheets in learning

had gone well and was able to support the improvement of students' science process skills.

Based on the results of the increase, there were no students who were in the low category, thus indicating that after implementing the webbed based worksheets, they were able to provide a good improvement. There is the same previous research by (Novianti & Fitriani, 2016; Yusuf & Wulan, 2016) that the good improvement results are due to the existence of student worksheets as a guide to learning science, which is very important to achieving expertise in the use of scientific procedures effectively. meaningful way to solve problems and apply scientific understanding in their daily lives. According to (Lang & Olson, 2000; Robertson et al., 2010; Sun & Looi, 2013), learning activities by developing learning resources that are analyzed contextually to produce integrated teaching materials using community-based integrated learning resources can develop high curiosity, critical thinking activities, and attitudes of students' responsibility in learning science.

Problem formulation skills have experienced an increase in N-Gain, indicating that students are able to ask questions related to what, why, know, or hypothetical backgrounds when carrying out learning activities. In Piaget's theory, it is known that JHS students are generally in a transition phase from concrete operations to formal operations (> 11 years), which means they are able to think logically when formulating problems. The skills of formulating problems, formulating hypotheses, and controlling variables are interrelated activities. However, in this study, it appears that the skill to control the variable experienced the lowest increase. The skill of controlling the variable gets a modusrate increase in N-Gain; this is in line with the results of pre-research by science teachers at 39 JHS Surabaya, which show that students have not obtained sufficient information about science process skills and proper investigation procedures. This is caused by students' difficulties in distinguishing the three types of variables, namely dependent variables, control variables, and response variables. This finding is also in line with previous research that showed an increase in the skill of controlling variables in the modusrate category (Fita & Sudibyo, 2018; Purnamasari, 2020; Zamrodah, 2016).

Science process skills in formulating problems and controlling variables are interrelated and integrated. This statement is also reinforced by Özgelen (2012) that integrated science process skills require higher knowledge. Students have just been introduced to the concept of formulating problems and controlling variables, which is

new knowledge for them. Previously, they had not obtained sufficient information about proper investigative procedures. Therefore, it is important to continue to train them in each learning session so that they can master these skills gradually and consistently. This is in accordance with the opinion of Bulent (2015) that science process skills in class will increase along with the frequency of using science process skills in learning.

The results of the analysis of student responses to the implementation of learning activities using webbed based worksheets on the theme of human skin health can be found in Figure 2. The majority of student responses showed positive responses, with a percentage of 95%. There are questions that get the lowest percentage, namely on understanding science process skills. This is in line with the results of an interview with a science teacher at 39 JHS Surabaya, who said that previously students had not been taught proper science process skills and research procedures, so this was their first experience. Even so, students get good improvement results after using webbed based worksheets.

According to Alfalobi (2010), problem solving in student process skills includes knowledge and skills; therefore, increasing science process skills with webbed integration has a positive impact on student learning outcomes. This finding is in line with student process skills as a whole, which is in the high category, and the improvement in every aspect without anything being in the low category. The application of webbed based worksheets in combination with the guided inquiry modusl allows students to find solutions to problems independently. This approach is consistent with Bruner's theory, which states that discovery-based learning involves students actively solving problems. Students with high science process skills tend to be more proficient in conducting investigations. A good ability to conduct investigations facilitates understanding of material and has an impact on cognitive achievement. The results of previous research also indicate that student process skills can affect cognitive learning outcomes, according to several studies by experts in the field. (Aktamis & Ömer, 2008; Brickman et al., 2008; Deta et al., 2013; Wahyudi & Supardi, 2013).

In addition, in terms of implementing learning activities, the teacher succeeded in carrying out learning using the webbed based worksheets properly so as to get a positive response from students. The positive responses obtained are in accordance with the function of student worksheets as study guides, making it easier for students and teachers

to carry out teaching and learning activities. Learning using student worksheets has proven effective in improving student learning outcomes, knowledge, attitudes, and skills (Ariani & Meutiawati, 2020; Rahayuningsih, 2018)

CONCLUSIONS

1. The implementation of teaching activity in improving students' science process skills obtained a modus value of 3 with good category. These results are supported by the results of observations obtained from the assessment of three observers, namely one science teacher at 39 junior high school in Surabaya and 2 Science Education students in last semester class of 2019, for two face-to-face meetings.
2. The increase in students' science process skills was calculated using n-Gain analysis as a whole indicated by the acquisition of a percentage of 57.69 or around 58% in the high improvement category and the rest in the medium category. The overall n-Gain average is in high category. The increase in science process skills for each aspect obtained the highest n-Gain value, namely formulating problems with high improvement category and for aspects identifying variables with modusrate improvement category. In addition, with the results of the paired t test, because 0.000 is less than <0.05, it can be concluded that the students' science process skills has increased significantly.
3. The results of the acquisition of student responses to learning show the acquisition of an average percentage of 95% in the very good category.

Based on the research that has been done regarding the application of webbed based worksheets to improve students' science process skills, the following is a suggestion from researchers to be reviewed in further research, namely choosing the right time allocation because learning takes a long time so that students are able to understand skill aspects precise scientific process.

REFERENCES

Afolabi, F. (2010). Analysis of Science Process Skills in West African Senior Secondary School Certificate Physics Practical Examinations in Nigeria. *Bulgarian Journal of Science and Education Policy*, *4*.

Aktamis, H., & Ömer, E. (2008). The effect of scientific process skills education on students' scientific creativity, science attitudes and academic achievements. *Asia-*

Pacific Forum on Science Learning and Teaching.

Ariani, D., & Meutiawati, I. (2020). Pengembangan Lembar Kerja Peserta Didik (Lkpd) Berbasis Discovery Learning Pada Materi Kalor Di Smp. *Jurnal Phi; Jurnal Pendidikan Fisika Dan Fisika Terapan*, *1*(1), 13. https://doi.org/10.22373/p-jpft.v1i1.6477

Arikunto. (2010). *Prosedur Penelitian: Suatu Pendekatan Praktek*. Rineka Cipta.

Aydoğdu, B. (2015). The investigation of science process skills of science teachers in terms of some variables. *Educational Research Review*, *10*, 582–594.

Brickman, P., Gormally, C., Armstrong, N., & Hallar, B. (2008). Effects of Inquiry-based Learning on Students' Science Literacy Skills and Confidence. *Int. J. Scholarship Teach. Learn*, *3*. https://doi.org/10.20429/ijsotl.2009.030216

Burns, J. C., Okey, J. R., & Wise, K. C. (1985). Development of an integrated process skill test: TIPS II. *Journal of Research in Science Teaching*, *22*(2), 169–177. https://doi.org/https://doi.org/10.1002/tea.3660220208

Cokkinides, V., Weinstock, M., Glanz, K., Albano, J., Ward, E., & Thun, M. (2006). Trends in sunburns, sun protection practices, and attitudes toward sun exposure protection and tanning among US adolescents, 1998-2004. *Pediatrics*, *118*(3), 853–864. https://doi.org/10.1542/peds.2005-3109

Depdiknas. (2007). Panduan Pengembangan Pembelajaran IPA Terpadu. Jakarta: Puskur, Balitbang Depdiknas. *Pengembangan Pembelajaran IPA Terpadu*.

Deta, U., Suparmi, S., & Widha, S. (2013). Pengaruh Metode Inkuiri Terbimbing Dan Proyek, Kreativitas, Serta Keterampilan Proses Sains Terhadap Prestasi Belajar Siswa. *Jurnal Pendidikan Fisika Indonesia*, *9*. https://doi.org/10.15294/jpfi.v9i1.2577

Dewi, I. Y. M. (2017). Pengembangan Perangkat Pembelajaran Terpadu Tipe Webbed Fokus Ipa Dengan Tema Œmasyarakat Taneyan Lanjhang Pada Sekolah Dasar Di Kabupaten Sumenep. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan Dan Hasil Penelitian, Vol. 3 No. 1 (2017): Vol. 3 No. 1 Januari 2017*, 364–371. https://journal.unesa.ac.id/index.php/PD/article/view/1652/1097

Dewi, K., Sadia, W., & Ristiati, N. P. (2013). Pengembangan Perangkat Pembelajaran IPA Terpadu Dengan Setting Inkuiri Terbimbing Untuk Meningkatkan Pemahaman

Konsep Dan Kinerja Ilmiah Siswa. *Jurnal Pendidikan IPA Ganesha*, *3*(1).

Dian Insani, M. (2016). Studi Pendahuluan Identifikasi Kesulitan Dalam Pembelajaran Pada Guru Ipa Smp Se-Kota Malang. In *Jurnal Pendidikan Biologi* (Vol. 7, Issue 2). https://e-resources.perpusnas.go.id:2119/publications/118747/studi-pendahuluan-identifikasi-kesulitan-dalam-pembelajaran-pada-guru-ipa-smp-se

Faizah, I. N., & Murtiyasa, B. (2017). Pemetaan Domain Isi dan Kognitif Soal Ujian Sekolah/Madrasah Matematika SD/MI Berdasarkan TIMSS. *Publikasi Ilmiah*, *Knpmp Ii*, 349–357. https://publikasiilmiah.ums.ac.id/handle/11617/8804

Fita, M. N. U. R., & Sudibyo, E. (2018). Keefektifan Lembar Kegiatan Siswa (Lks) Berorientasi Keterampilan Proses Sains pada Materi Tekanan Kelas VIII SMP. *Pensa: Jurnal Pendidikan Sains*, *6*(02).

Fonseca, M. S., Murakami, M., & Mainen, Z. F. (2015). Activation of dorsal raphe serotonergic neurons promotes waiting but is not reinforcing. *Current Biology : CB*, *25*(3), 306–315. https://doi.org/10.1016/j.cub.2014.12.002

Hake, R. R. (1999). *Analyzing Change/Gain Scores*. *American Education Research Association's Devision.D, Measurement and Reasearch Methodology*.

Harefa, E. B. (2022). *E*fektivitas Pembelajaran Daring Mata Kuliah Fisika Di Perguruan Tinggi. *Educativo: Jurnal Pendidikan, 1(1), 75–83. Https://Doi.Org/10.56248/Educativo.v1 I1.12*. https://doi.org/10.56248/educativo.v1%0Ai1.12

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

Kemendikbud. (2016). *Panduan Penilaian Untuk SD*. Kemendikbud.

Kusrini, K. (2019). The Analysis of Scientific Approach in Thematic Learning Using Webbed Modusl in Ambawang River State Elementary School. *JP2D (Jurnal Penelitian Pendidikan Dasar) UNTAN*, *2*(2), 46. https://doi.org/10.26418/jp2d.v2i2.69

LaBat, K., DeLong, M., & Gahring, S. A. (2005). A Longitudinal Study of Sun-Protective Attitudes and Behaviors. *Family and Consumer Sciences Research Journal*, *33*(3), 240–254. https://doi.org/https://doi.org/10.1177/1077727X04272367

Lang, M., & Olson, J. (2000). Integrated science teaching as a challenge for teachers to

develop new conceptual structures. *Research in Science Education*, *30*, 213–224. https://doi.org/10.1007/BF02461629

Mahmudah, M. (2018). Pengelolaan Kelas: Upaya Mengukur Keberhasilan Proses Pembelajaran. *Jurnal Kependidikan*, *6*(1), 53–70. https://doi.org/10.24090/jk.v6i1.1696

Mohd Razali, N., & Bee Wah, Y. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modusling and Analytics*, *2*(1), 13–14.

Novianti, N., & Fitriani, A. (2016). Penerapan Pembelajaran IPA Terpadu Tipe Webbed Dan Shared Untuk Meningkatkan Keterampilan Proses. *Edusains UIN Syarif Hidayatullah*, *8*(1), 74–82. https://doi.org/10.15408/es.v8i1.1765

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

Prastowo, A. (2013). Prastowo, Andi. 2013. Pengembangan Bahan Ajar Tematik. Jogjakarta: Diva Press. *Pengembangan Bahan Ajar Tematik*.

Prianoto, A. D., & Gulo, F. (2017). Interaktif Kimia Untuk Pembelajaran. *Jurnal Penelitian Pendidikan Kimia : Kajian Hasil Penelitian Pendidikan Kimia*, *4*(2), 88–96.

Purnamasari, S. (2020). Pengembangan Praktikum IPA Terpadu Tipe Webbed untuk Meningkatkan Keterampilan Proses Sains. *PSEJ (Pancasakti Science Education Journal)*, *5*(2), 8–15. https://doi.org/10.24905/psej.v5i2.20

Riduwan. (2010). *Skala Pengukuran Variabel-Variabel Penelitian*. Alfabeta.

Robertson, C., Cowell, B., & Olson, J. (2010). A case study of integration and destreaming: Teachers and students in an Ontario secondary school respond. *Journal of Curriculum Studies*, *30*, 691–717. https://doi.org/10.1080/002202798183396

Sari, A. D. I. (2017). Pengembangan Perangkat Pembelajaran Terpadu Tipe Webbed Kelas IV Sekolah Dasar Untuk Meningkatkan Kemampuan Memecahkan Masalah. *DIDAKTIKA*, *Vol 23 No 2 (2017)*, 99–103. http://journal.umg.ac.id/index.php/didaktika/article/view/13/6

Sudjana. (2005). *Metoda Statistika*. Tarsito.

Sukarno, Permanasari, A., & Hamidah, I. (2013). Science Teacher Understanding to Science Process Skills and Implications for Science Learning at Junior High School (Case Study in Jambi). *International Journal of Science and Research*, *2*(6), 2319–7064. www.ijsr.net

Sun, D., & Looi, C.-K. (2013). Designing a Web-based Science Learning Environment for Modusl-based Collaborative Inquiry. *Journal of Science Education and Technology*, *22*, 73–89.

Wahyudi, L., & Supardi, Z. A. I. (2013). Penerapan Modusl Pembelajaran Inkuiri Terbimbing Pada Pokok Bahasan Kalor Untuk Melatihkan Keterampilan Proses Sains Terhadap Hasil Belajar Di Sman 1 Sumenep. *Inovasi Pendidikan Fisika*, *2*.

Yusuf, M., & Wulan, A. R. (2016). Penerapan Modusl Discovery Learning Tipe Shared Dan Webbed Untuk Meningkatkan Penguasaan Konsep Dan Kps Siswa. *Edusains UIN Syarif Hidayatullah*, *8*(1), 48–56. https://doi.org/10.15408/es.v8i1.1730

Zamrodah, Y. (2016). *Peningkatan Keterampilan Proses Sains Siswa Dengan Menerapkan Modusl Pembelajaran Discovery Learning Pada Sub Materi Sifat – Sifat Cahaya*. *15*(2), 1–23.