JSER 2020, 4(2), 81-94

JSER

Journal of Science Education Research

Journal homepage: www.journal.uny.ac.id/jser

Development of Integrated Natural Science Module With Local Content in Wetland Environment to Train Science Process Skills For 8th Grade Students of SMP N 23 Banjarmasin

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Keywords:
Integrated Natural Science Module, Local Content, Wetland, Science Process Skills, Validity, Practicallity, Effectivity

ABSTRACT

The result of observation and interview with science teacher at SMPN 23 Banjarmasin shows that students do not use any books when learning at class. The learning progress run by teacher centered while the students just listening and take a notes from teacher explanation. Students also never doing experimental learning in laboratory or in the field. The aim of this research is to describe about valitidy, practicality, and effectivity of the integrated natural science module with local content in wetland environment as media development for science learning. Population of this research is 8th grades students of SMPN 23 Banjarmasin. The method of this research is Research and Development (RnD) method using development design plot by Tessmer. The research indicates that the integrated science module has 81.25 value of validity which is shows the module are valid to use for learning media. The practicality of the module is 91.75 which indicates the module are easy to use bothly the teacher and student. The effectivity of the module calculated with N-gain which get value 0.71, it means the module are effective as learning media to reach learning purposes. The module also gain value 59.41 of science process skills indicates the module can help students to learn about science process skills.

INTRODUCTION

Science is the knowledge which investigating the phenomenon of nature. Object of science is the universe which can be learn by investigating and scientist consideration results of experiment. Learning process will be meaningful for students if student learn science by inversigating and experimenting because student more active while learning (Wahyuni,2015).

The aim of science learning is student understand the concept of science and the natural phenomenon along with applying the knowledge in daily life (Rosa, 2015). The result of research by Solichah et.al (2013) shows the integrated learning of science can increase student learning performance.

Researcher doing an interview with Mr. Syahrani, S.Pd as science teacher at SMPN 23 Banjarmasin to know the issues and challenges that happen about science learning in the school. The interviewee said science learning in SMPN 23 still use speech method and just focus about knowledge that teacher explain in the class. This happen because most of students do not

have textbook. Learning process in the class just about theory delivered by teacher and students never doing experiment about it. Tacher also teach about biology and physics separately not integrated each other. SMPN 23 apply KTSP 2006 as curriculum system.

The aim of this article is describing about advantages and disadvantages of education nowadays and things needed to improve education quality so student can developing their own potential.

METHOD

This research using Research and Development (R&D) method to produce a product or develop product to test the effectivity. The research is conduct in 2nd semester of 2017/2018 academic year at SMPN 23 Banjarmasin. Subject of the research is 8th grades student of SMPN 23 Banjarmasin. Small Group Evaluation are tested to 10 student from 8th F class while Field Group Evaluation are tested to 31 students from 8th E class. The research procedure:

A. Prileminary

Observation of learning process and learning facility of SMPN 23 Banjarmasin.

Ask permission letter to conduct the research in the school from SMPN 23 Banjarmasin, faculty of the university, and education department of Banjarmasin. Research stuff such as assessment of academician, syllabus, lesson plan, academic test for student, and observation worksheet of students science process skills.

B. Research Phase

Research phases appropriate with Formative Evaluation Phase (Tessmer, 1993).

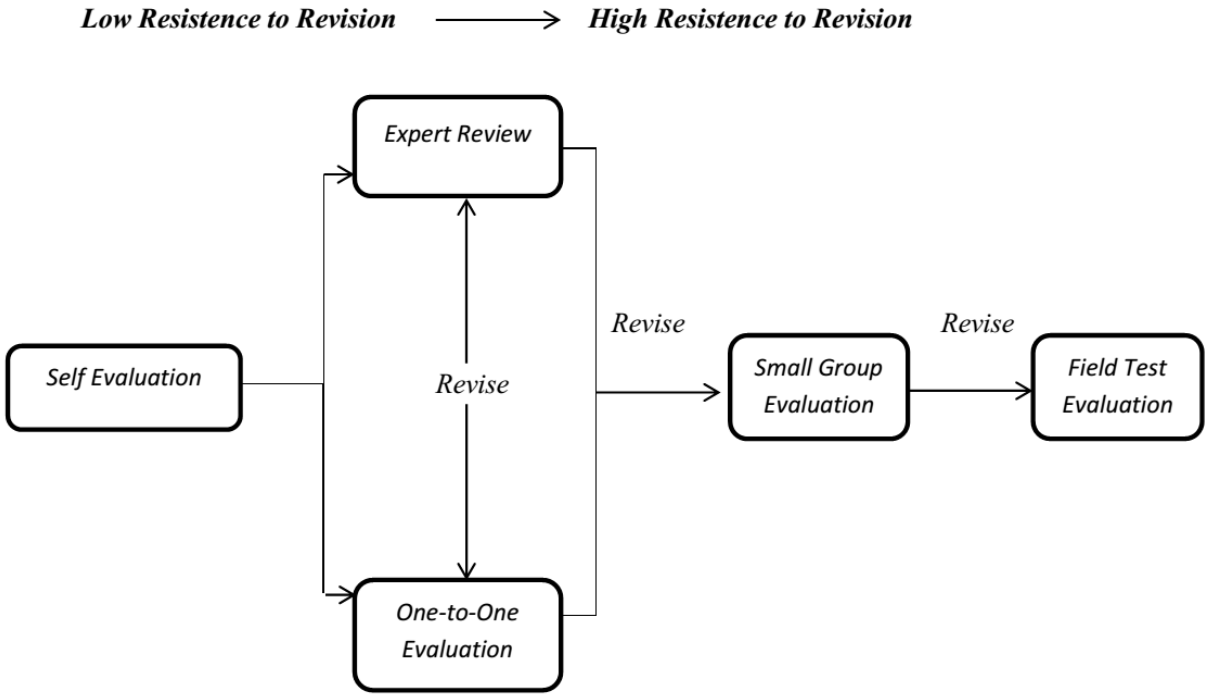

Figure 1. Formative Evaluation Phase (Tessmer., 1993.)

C. Data Analyze Techniques

1. Validity

Validity of science module could be calculate with descriptive analysis using the formula:

$$P = \frac{f}{N} x100$$

Table 1. Validity Criteria of Science Module

Criteria	Interval of Value
Extremely Valid	81.26 – 100.00
Valid	62.51 – 81.25

Rather Valid	43.76 – 62.50
Invalid	25.00 – 43.75

2. Practicallity

The result data from student responses questionnaire, teacher responses questionnaire, and quality of module when applied in the class will be analyzing with descriptive techniques. Practicallity can be calculate using formula :

$$The\ Results\ of\ Questionnaire = \frac{sum\ of\ positive\ score}{total\ score} x100$$

Table 2. Practicallity Criteria by Ridlo (2005)

Criteria	Value
Extremely not attain the criteria	< 50
Not attain the criteria	50-59
Less attain the criteria	60-69
Attain the criteria	70-84
Extremely attain the criteria	85-100

Researcher also asking student to give suggestion about developed science module so it can be fixed to be better.

3. Science Process Skills

Table 3. Science Process Skills Criteria

Interval of Value	Criteria
75 < score ≤ 100	Very Good
50 < score ≤ 75	Good
25 < score ≤ 50	Enough
≤25	Not Good

$$K = \frac{\Sigma ni}{N} x100$$

Where K is score of science process skills, Σni is sum of the score, N is maximum score.

4.Reliability

Reliability of validation result and test instrument calculated using formula :

$$r_{11} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\Sigma \sigma_i^2}{\sigma_t^2}\right)$$

RESULT AND DISSCUSSION

A. Expert Review

Module Validity

There are 6 aspects of module that researcher concern about science module.

Table 4. The Result of Science Module Assesment by Academician

Indicator	Statement Number	Validity Score	Criteria
Correctness of Concept	1	75.00	Valid
	2	91.67	Extremely Valid
	3	75.00	Valid
Practicallity	1	100.00	Extremely Valid
	2	83.33	Extremely Valid
	3	75.00	Valid
	4	100.00	Extremely Valid
	5	75.00	Valid

Standard Reading Level	1	83.33	Extremely Valid
	2	83.33	Extremely Valid
	3	75.00	Valid
	4	75.00	Valid
	5	75.00	Valid
Visualization and Experimental Procedure	1	75.00	Valid
	2	75.00	Valid
	3	66.67	Valid
	4	75.00	Valid
	5	91.67	Extremely Valid
Stimulating Student Curiosity	1	75.00	Valid
	2	91.67	Extremely Valid
	3	100.00	Extremely Valid
Learning Evaluation	1	83.33	Extremely Valid
	2	91.67	Extremely Valid
	3	75.00	Valid
Average validity Score of science module		81.94	Extremely Valid

The validation result of questionnaire instrument.

Table 5. Questionaire Validity

No	Indicator	Validity Score	Criteria
1	Instruction of questionnaire is understandably.	91.67	Extremely Valid
2	Questionnaire sentences are clear and understandable for students.	83.33	Extremely Valid
3	No confusing statements in questionnaire	83.33	Extremely Valid
4	The questionnaire can describe students feeling when learning with developed science module.	91.67	Extremely Valid
Average validity score of questionnaire		**87.50**	**Extremely Valid**

This is the validity result of lesson plan that use together with developed science module.

Table 6. Validity of Lesson Plan

No	Indicator	Validity Score	Criteria
1.	Standard competence in lesson plan agree with KTSP 2006 curriculum.	91.67	Extremely Valid
2.	Basic competence in lesson plan agree with KTSP 2006 curriculum.	91.67	Extremely Valid
3.	Learning indicator in lesson plan agree with KTSP 2006 curriculum.	91.67	Extremely Valid
4.	Learning goals in lesson	91.67	Extremely Valid

	plan agree with KTSP 2006 curriculum.		
5.	Learning materials in lesson plan agree with KTSP 2006 curriculum.	75.00	Valid
6.	Learning methods in lesson plan agree with KTSP 2006 curriculum.	91.67	Extremely Valid
7.	Test instrument in lesson plan agree with expected learning indicator and learning goals.	75.00	Valid
8.	Lesson plan assessment instrument can describe learning process occurred in the class when the lesson plan is applied.	75.00	Valid
Average validity score of lesson plan		**85.42**	**Extremely Valid**

The following table below is the validity result of test instrument.

Table 7. Validity of Test Instrument

No	Indicator	Validity Score	Criteria
1	Test instrument is agree with expected learning indicator and learning goals.	91.67	Valid
2	Test instrument is agree with learning materials in developed science module.	83.33	Extremely Valid
3	Scoring scheme of test instrument is clear and easy to understand.	75.00	Extremely Valid
4	Font types and sizes used can be readable for students.	75.00	Valid
5	The total number of test is agree with time allocation.	83.33	Extremely Valid
Average validity score of test instrument		**81.67**	**Extremely Valid**

Observation sheet is used as science process skills instrument.

Table 8. Validity of Science Process Skills Instrument

No	Indicator	Validity Score	Criteria
1	Instruction of science process skills instrument is understandably.	75.00	Valid
2	Science process skills instrument can describe the real condition when learning process is	83.33	Extremely Valid

	occupied.		
3	Assesment aspect in science process skills instrument can be observe.	91.67	Extremely Valid
4	Science process skills instrument is agree with developed science module and lesson plan.	75.00	Valid
5	Science process skills is easy to use.	83.33	Extremely Valid
Average validity score of science process skills instrument.		**81.67**	**Extremely Valid**

B. One to One Evaluation

One to one evaluation is the phase when developed module firstly tested to students. Developed module is applying to 3 students with different academic record by their daily test result. The challenge student faced in this phase is how to make a hypotheses and too many activity in one meeting. This result describing that module still needs modification before tested to large number of students.

C. Small Group Evaluation

1) Students Response

This is the results of students response in small group evaluation phase .

Table 9. The Results of Students Response in Small Group Evaluation

No	Indicator	Score	Criteria
1	Developed science module is interesting to use in learning process.	85.00	Very Good
2	Developed science module help student to concentration while learning.	85.00	Very Good
3	Experiment activity in developed science module enriching students knowledge and understanding of materials.	92.50	Very Good
4	Experiment activity in developed science module is give information about fact about science to students.	87.50	Very Good
5	Doing experiment systematically appropriate with experiment procedures in developed science module.	80.00	Good
6	Content of developed science module is	92.50	Very Good

	understandably.		
7	Questions in developed science module help students to build their own concept about materials with their prior of knowledge.	87.50	Very Good
Overall Average Score		**87.14**	**Very Good**

2) Practical Learning Activity Result

Practical learning activity result in small group evaluation phase can be seen at the following table below.

Table 10. Practical Learning Activity Result In Small Group Evaluation

Learning Phase	Score	Criteria
Engagement	81.94	Very Good
Exploration	87.50	Very Good
Explanation	83.33	Very Good
Elaboration	87.50	Very Good
Evaluation	85.00	Very Good
Overall Average Score	**85.05**	**Very Good**

3) Teacher Responses

The following table below shows the result of teacher response about developed science module.

Table 11. Teacher Response in Small Group Evaluation Phase

No	Statement	Score	Criteria
1	Developed science module help student to understand topic of energy.	100.00	Very Good
2	Developed science module help student doing experiment learning activity.	100.00	Very Good
3	Developed science module help student to achieve the learning goals.	75.00	Good
4	Goals of experiment learning formulated clearly in developed science module.	75.00	Good
5	Experiment procedure in developed science module is formulated systematically for student.	75.00	Good
6	Overall design of developed science module has interesting.	75.00	Good
7	Developed science module can train science process skills to student.	75.00	Good
8	Developed science module easy to use in learning activity.	75.00	Good
Average score		**81.25**	**Good**

B. Field Test Evaluation

1) Student Response

Recapt data of student response in field test evaluation can be seen in the table.

Table 12. The Result of Student Response in Field Test Evaluation

No	Indicator	Score	Criteria
1	Developed science module is interesting to use in learning process.	89.52	Very Good
2	Developed science module help student to concentration while learning.	85.48	Very Good
3	Experiment activity in developed science module enriching	89.52	Very Good

	students knowledge and understanding of materials.		
4	Experiment activity in developed science module is give information about fact about science to students.	86.29	Very Good
5	Doing experiment systematically appropriate with experiment procedures in developed science module.	86.29	Very Good
6	Content of developed science module is understandably.	85.48	Very Good
7	Questions in developed science module help students to build their own concept about materials with their prior of knowledge.	90.32	Very Good
Overall Average Score		**87.56**	**Very Good**

2) Practical Learning Activity Result

Practicallity of developed science module also contain how success learning activity with developed science module.

Table 13. Practical Learning Activity Result In Field Test Evaluation

Learning Phase	**Average Score**	**Criteria**
Engagement	88.89	Very Good
Exploration	94.44	Very Good
Explanation	93.75	Very Good
Elaboration	91.67	Very Good
Evaluation	90.00	Very Good
Overall Average Score	**91.75**	**Very Good**

3) Teacher Response

Data of teacher response about learning process with developed science module is shows below.

Table 14. The Result of Teacher Response In Field Test Evaluation

No	**Statement**	**Score**	**Criteria**
1	Developed science module help student to understand topic of energy.	100.00	Very Good
2	Developed science module help student doing experiment learning activity.	100.00	Very Good
3	Developed science module help student to achieve the learning goals.	75.00	Good
4	Goals of experiment learning formulated clearly in developed science module.	75.00	Good
5	Experiment procedure in developed science module is formulated systematically for student.	75.00	Good
6	Overall design of developed science module has interesting.	75.00	Good
7	Developed science module can help student and teacher to train science process skills.	75.00	Good
8	Developed science module easy to use in learning activity.	75.00	Good
Average Score		**81.25**	**Good**

EFFECTIVITY

A. Understanding The Concept

Pre-test and *post-test* are occupied in 8th E class at SMPN 23 Banjarmasin with 31 students as subject in field test evaluation of developed science module. The result is shown in table below.

Table 15. The Result of *N-gain* Calculation

	Total Students	**Average Score**	***N-gain Score***	**Criteria**
Pre-test	31	30.71		
Post-test	31	79.58	**0.71**	**High**

B. Science Process Skills

The aim of first experiment learning activity is to know about potential energy of things. Learning objective of second experiment is to know about energy changes using Ingenhousz experiment. The third experiment purpose is to understand about law of conservation energy with Sachs Experiment. The observation result of students science process skills shown in Figure 2.

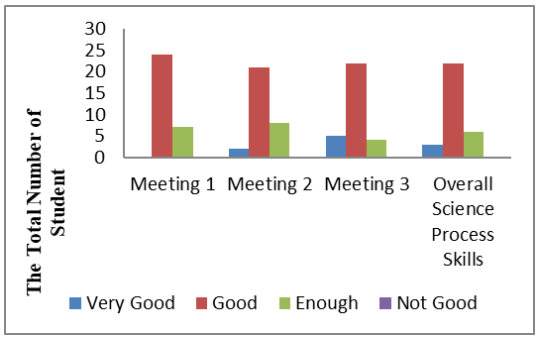

Figure 2. Student Science Process Skills In Field Test Evaluation

Students result of each aspects of science process skills observed is shown in diagram below.

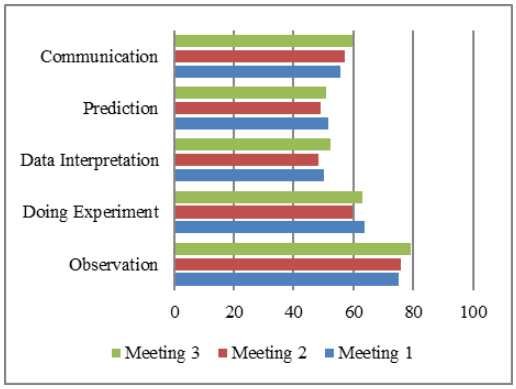

Figure 3. Student Science Process Skills In Observed

DISCUSSION

A. Expert Review

According to the table 4 there are 6 aspects validity of developed science module. Academician put the score about that aspects. Later, score from academician has analyzed with descriptive methods. Overall, academician agreed the developed module was extremely valid.

Academician gives appreciation for interesting content of developed module. Academician argue that is good to have local content as part of learning material. Local content can engage student curiosity to learn something that happen and seen everyday in their daily life. This is very important for science learning because many students seems boring learn science. Science is real not abstract and it is really near in our life. Academician have concern about design of developed science module. The design of the module can be more beautiful and interest proportionally especially the cover part of developed science module.

Research by Sudarmin & Samini (2015) reported that using integrated science module with local content or ethno-science in problem based learning gives opportunity to students can participate directly in learning activity and makes students learn science by experience. Same result had reported by Setiawan (2017), His result indicates students can contructing and relating their knowledge with their environment using local content based science module. Using local content in science learning provides science is not just about concept, formula, and math but also learn about our identity, humanity, and environment which is unique in every place (Parmin,2015).

Academician also appreciate about experiment learning activity. Developed science module provides simple experiment with familiar materials. *Hydrilla* is often seen in the wetland environment. First time student did not know about *Hydrilla* by its name. But after seeing the picture of *Hydrilla* all students familiar about that and almost everyday seen that thing.

After done checking validity of developed science module, researcher doing calculation about reliability using cronbach alpha formula and have result 0.71 which is reliable to use.

B. One to One Evaluation

Challenge faced in one to one evaluation is too much activity in one meeting. This implies to student performance because student do 2 worksheet and experiment at the same time. Student also got theoretical problems every meeting. Beside that the developed science module have trouble while printing so some font and picture is not clear. The challenge in this phase will be fixed before go to the next phase.

Practicallity

A. Small Group Evaluation

1) Students Response

Table 11 shown developed science module is attain good criteria with average score of 7 indicators is ≥ 85. It means the developed module is ready to apply in larger population in the next phase.

2) Practical Learning Activity

According to Table 12 overall practical learning activity at small group evaluation is good. Developed science module exploring prior of knowledge students and improve it with experiment activity. But at his phase, the developed science module just applied to 3 students with different educational skills based on daily test result.

3) Teacher Response

Tabel 13 shown teacher response about developed science module. Overall the teacher give positive response about developed science module. Teacher reminding the researcher about classroom management when experiment activity. In this phase teacher can easily control the class because there just 3 students but in field test evaluation there are a lot of number of students at least 31 students.

B. Field Test Evaluation

1) Students Response

Average score of student response about developed science module is 87.56 which is very good. Positive response from student describe that developed science module is easy to use by students. Student also more active participate in learning activity, previously student just sat and listen to teacher while learning in the class.

2) Practical Learning Activity

As shown in Table 14 practical learning activity in field test evaluation is very good especially at core activity such as *exploration, explanation,* and *elaboration* with score > 85. Exploration allow student to do their own experiment using procedures in developed science module. Student have possibility to find the reason and explain what they found by observation at explanation phase. At elaboration phase, student get similar problems they faced before to make sure their understanding about the materials.

Learning progress with developed science module is inquiry based with learning cycle 5E method.

Teacher Response

Referring to Table 15 teacher give very good response about developed science module. Most teacher have problem with classroom management when doing experiment activity. This happen because teacher must look forward to group of students and make sure there is no significant problems. Most students also getting confuse while experiment learning so this is the challenge the teacher faced when doing experiment learning.

B. Understanding the Concept

Developed science module contains concept about science which is connected with local contents in South Borneo that is wetlands. Developed science module allows student understand the concept effectively because context in the module is happen and exist nearly students daily life. Efectivity of developed science module can be seen if students can achieve learning goals that expected by curriculum (Daryanto, 2013).

C. Science Process Skills

Referring to Figure 2 shows that the highest science process skills of the student is observation and keep improve every meeting. This indicates student improve their focus about object spesifically. Communication aspect also incrase smoothly. This means students begin comfort to speak in front of class sharing their thoughts about the experiment. This activity can increase student confidence. The lowest acpest students get is data interpretation. It means student have trouble to relate what happen in experiment with theoretical knowledge. Student also have troubled if the same concept is applied to different problems.

Pratidina, et.al (2016) reported that experiment learning and making experiment report make student collaborative while learning in the class. Science process skills and laboratory skills have improvement if experiment learneing in applied in learning process (Baeti, et.al, 2015; Hidayah,2014;Jannah,2014).

Research Weakness

a. Developed science module not thoroughly yet adapt local content as learning materials because it must appropriate with related topic. Some topic cannot integrated with local content.
b. Developed science module in this research just contains one topic that is topic of energy.
c. Developed science module can effectively use if there is any supporting learning devices.

Technical Found

a) Developed science module is valid to use.
b) Developed science module is effective to use in learning activiy.
c) Students happy learn by experiment in laboratory.

CONCLUSION

According to the result of developing and implementing integrated science module with local

contents is significant. The developed module gives student chance to develop their prior of knowledge, active participating in learning activity, and doing experiment learning which enrich their learning experience and learning knowledge. It is also train students to confidant, curious, and team work. Teacher can develop their own learning materials based on their region. Indonesia have so many culture, humanity, diversity and environment. This unique identity may use to connect the science concept with their daily activity so education in Indonesia can make significant improvement and unique, different with education in other country.

REFERENCES

Abdi, A. (2014). The effect of inquiry-based learning method on students' academic achievement in science course. Universal Journal Of Educational Research, 2(1), 37-41.

Akbar, S. (2016). Instrumen perangkat pembelajaran. Bandung: PT. Remaja Rosdakarya.

Anderson, R. D. (2002). Reforming science teaching: what research says about inquiry. Journal Of Science Teacher Education, 13(1), 1-12.

ANNUR, S., Misbah, M., & Alifullah, M. N. (2020). Development Of Learning Materials On The Subject Of Static Fluid Assisted Flip Book Maker.

Arikunto, S. (2009). Dasar-dasar evaluasi pendidikan. Jakarta: Bumi Aksara.

Arikunto, S. (2012). Dasar-dasar evaluasi penilaian pendidikan edisi kedua . Jakarta: Bumi Aksara.

Ariningsih, I. (2014). Pengembangan modul IPA (biologi) berbasis inkuiri pada materi fotosintesis untuk peserta didik smp kelas VIII. JUPEMASI-PBIO, 1(1), 151-154.

Asih, T., Hartati, W., Corebima, A., & Suwono, H. (2015). Pengaruh pembelajaran inkuiri terstruktur dan siklus belajar 5E terhadap keterampilan proses sains dan hasil belajar kognitif siswa pada kemampuan akademik berbeda. Jurnal Pendidikan Sains, 3(1), 22-30.

Baeti, S., Binandja, A., & Susilaningsih, E. (2015). Pembelajaran berbasis praktikum bervisi sets untuk meningkatkan keterampilan laboratorium dan penguasaan kompetensi. Jurnal Inovasi Pendidikan Kimia, 8(1), 1260-1270.

Chabelengula, V. M. (2012). How pre-service teachers' understand and perform science process skills. Eurasia Journal Of Mathematics, Science & Technology Education, 8(3), 167-176.

Cohen, R., & Swerdlik. (2010). Psychological testing and assesment. New York: Mc Graw-Hill.

Darmiatun. (2013). Menyusun modul bahan ajar untuk persiapan guru dalam mengajar. Yogyakarta: Gava Media.

Daryanto. (2013). Menyusun modul bahan ajar untuk persiapan guru dalam mengajar. Malang: Gavamedia.

Dash, P., & Padhi, S. K. (2016). Science process skills : learning the process by doing the process. Journal of International Academic Research for Multidisciplinary, 4(1), 23-25.

Dewi, A. P. (2014). Pengembangan modul IPA terpadu untuk SMP/MTs berbasis eksperimen pada tema fotosintesis untuk memberdayaka keterampilan proses sains. Jurnal Inkuiri, 3(3), 30-40.

Dewi, N. R., Wibawa, I. C., & Devi, N. L. (2017). Kemampuan berpikir kritis dan keterampilan proses dalam pembelajaran siklus belajar 7E berbasis kearifan lokal. Jurnal Pendidikan Indonesia, 6(1), 125-133.

Dimyati, & Mudjiono. (2013). Belajar & pembelajaran. Jakarta: Rineka Cipta.

Dwijono, Sunarno, W., & Sugiyanto. (2013). Pembelajaran biologi dengan pendekatan starter eksperimen (PSE) melalui inkuiri terbimbing dan inkuiri bebas termodifikasi ditinjau dari keterampilan proses sains dan kreativitas siswa. Jurnal Inkuiri, 2(2), 124-133.

Hake, R. (2002). Assesment of physics teaching methods. Proceedings of The UNESCO Asian Physics Education Workshop on Active Learning in Physics. Sri Lanka: University of Peradeniya.

Hamdunah. (2015, November). Praktikalitas pengembangan modul konstruktivisme dan website pada materi lingkaran bola. LEMMA, 2(1), 35-42.

Hartini, S., Oktaviana, D., & Misbah. (2017). Pengembangan modul fisika berintegrasi kearifan lokal membuat minyak lala untuk melatih karakter sanggam. Jurnal Berkala Ilmiah Pendidikan Fisika, 5(3), 272-285.

Hidayah, F. (2014). karakteristik panduan praktikum kimia fisika bervisi sets untuk meningkatkan keterampilan proses sains. Jurnal Pendidikan Sains, 2(1), 20-25.

Hidayat, S., Prayogi, S., & Armansyah. (2013). Implementasi model pembelajaran 5E untuk meningkatkan hasil belajar dan kemampuan

berpikir kritis siswa. Jurnal Lensa Kependidikan Fisika, 1(1), 37-42.

Ibda, F. (2015). Perkembangan kognitif : teori Jean Piaget. Intelektualita, 3(1), 32-34.

Ibrohim, Sribekti, A., & Hidayat, A. (2016). Peningkatan keterampilan proses sains dan hasil belajar kognitif siswa kelas VII SMP Negeri 1 Selorejo menggunakan perangkat pembelajaran ekosistem berbasis inkuiri terbimbing dengan sumber belajar waduk lahor. Jurnal Pendidikan : Teori, Penelitian, dan Pengembangan, 1(8), 1575-1580.

Jannah, L., Nur, M., & Suyono. (2016). Desain bahan ajar materi gelombang dan bunyi model inkuiri terbimbing untuk melatihkan keterampilan proses sains siswa SMP. Pendidikan Sains Pascasarjana Universitas Negeri Surabaya , 6(1), 1196-1197.

Jannah, M. (2014). Penerapan pembelajaran IPA terpadu dengan pendekatan sets_edutainment tema baterai alami untuk meningkatkan keterampilan proses sains dan hasil belajar di SMPN 1 Gondang. Pendidikan Sains, 2(1).

Keil, Chris, & dkk. (2009). Improvements in student achievement and science process skills using environmental health science problem-based learning curricula. Electronic Journal Of Science Education, 13(1), 1-18.

Khoiri, A. (2016). Local wisdom PAUD to grow student's soft skills (study cash: development RKH on science learning). Indonesian Journal of Early Childhood Education Studies, 5(1), 14-17.

Khusna, N., Yamtinah, S., & Ashadi. (2016). Pengembangan subject spesific pedagogy (SSP) IPA terpadu kelas VIII SMP di Surakarta berbasis model inkuiri terbimbing untuk meningkatkan keterampilan proses sains (KPS) pada tema mata sebagai alat optik tahun pelajaran 2015/2016. Jurnal Pendidikan Kimia, 5(3), 59-67.

Kurniawati, A. A., Wahyuni, S., & Putra, P. D. (2017). Utilizing of comic and Jember's local wisdom as integrated science learning materials. International Journal of Social Science and Humanity, 7(1), 47-50.

Kusaeri, & Suprananto. (2012). Pengukuran dan penilaian pendidikan. Yogyakarta: Graha Ilmu.

Kusumastuti, W. (2009). Evaluasi lahan basah bervegetasi mangrove dalam mengurangi pencemaran lingkungan (studi kasus di desa kepetingan kabupaten sidoarjo) . Semarang: Thesis Program Studi Ilmu Lingkungan Universitas Diponegoro.

Maharani, M. U. (2013). Pengembangan petunjuk praktikum IPA terpadu tema fotosintesis berbasis learning cycle untuk siswa SMP. Semarang: Tidak dipublikasikan.

Majid, A. (2012). Perencanaan pembelajaran. Bandung: PT Remaja Rosdakarya.

Masithussyifa, R. K. (2012). Pengembangan lembar kegiatan siswa (LKS) berorientasi keterampilan proses pada pokok bahasan sistem pernapasan manusia. Unnes Biology Education Journal, 1(1), 7-10.

Maulida, R., Sahyar, & Bukit, N. (2015). Pengembangan bahan ajar fisika SMA berbasis investigasi pada materi fluida dinamis untuk meningkatkan hasil belajar siswa. Jurnal Tabularasa PPS UNIMED, 12(3), 285-293.

Muhafid, E. A. (2013). Pengembangan modul ipa terpadu berpendekatan keterampilan proses pada tema bunyi di SMP kelas VIII. Unnes Science Education Journal, 2(1), 141-142.

Nath, S., & Thomas, S. (2012). Enhanching science process skills and scientific attitude and analysing their interactions: An. International Journal Of Scientific Research, 1(1), 37-42.

Ngabekti, S., Ridlo, S., Peniati, & Martanto. (2017). Meta-Analysis of jelajah alam sekitar (JAS) approach implementation in learning process. Jurnal Pendidikan IPA Indonesia, 6(1), 153-164.

Nieveen, N., & Plomp, T. (2007). An introduction to educational design research. Netherland: Netherland institute for curriculum development.

Nisa, A., Sudarmin, & Samini. (2015). Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa. Unnes Science Education Journal, 4(3), 1049-1056.

Nisak, K., & Susasntini, E. (2013). Pengembangan perangkat pembelajaran IPA terpadu tipe connected pada materi pokok sistem ekskresi untuk kelas IX SMP. Jurnal Pendidikan Sains e-Pensa, 1(1), 81-84.

Nur, M. (2013). Berpikir kritis. Surabaya: Universitas Negeri Surabaya.

Nurbani, D., Gusrayani, D., & Jayadinata, A. (2016). Pengaruh model learning cycle terhadap keterampilan proses sains siswa SD kelas IV pada materi hubungan antara sifat bahan dengan kegunaannya. Jurnal Pena Ilmiah, 1(1), 211-220.

Özgelen, S. (2012). Students' science process skills within a cognitive domain framework. Eurasia Journal Of Mathematics, Science & Technology Education, 8(4), 283-284.

Palayaswati, I. (2015). Pengembangan modul IPA terpadu berbasis inkuiri terbimbing untuk meningkatkan keterampilan proses sains siswa SMP dengan tema air limbah rumah tangga. Jurnal Inkuiri, 4(3), 79-86.

Parmin, Sajidan, Ashadi, & Sutikno. (2015). Skill of prospective teacher in integrating the concept of science with local wisdom model. Jurnal Pendidikan IPA Indonesia, 4(2), 120-126.

Prastowo. (2013). Panduan kreatif membuat bohan ajar lnovatif. Yogyakarta: Diva Press.

Pratidina, F. R., Pamelasari, S. D., & Khusniati, M. (2016). Keefektifan penggunaan modul cahaya berbasis salingtemas terhadap keterampilan proses sains siswa. Unnes Science Education Journal, 5(2), 1235-1241.

Prawiradilaga, D. S. (2009). Prinsip desain pembelajaran. Jakarta: Kencana Prenada Media Group.

Putri, N., Hakim, A., & Junaedi, E. (2015). Pengaruh penerapan keterampilan proses sains pada materi pokok koloid terhadap hasil belajar kimia siswa kelas XI SMA Negeri 8 Mataram tahun ajaran 2013/2014. Jurnal Ilmiah Widiya Pustaka Pendidikan, 3(1), 82-89.

Rani, S., Wiyatmo, Y., & Kustanto, H. (2017). Concept attainment worksheet to enhance concept knowledge and science process skills in physics instruction. Jurnal Pendidikan IPA Indonesia, 6(2), 326-334.

Rauf, & Rose, A. A. (2013). Inculcation of science process skills in a science classroom. Canadian Center Of Science and Education, Asian Social Science, 9(8), 47-57.

Ridlo, S., & Rudyatmi, E. (2005). Evaluasi pembelajaran. Semarang: Universitas Negeri Semarang.

Rizqi, A., Parmin, P., & Nurhayati, S. (2013). Pengembangan modul IPA terpadu berkarakter tema pemanasan global untuk siswa SMP/MTs. Unnes Science Education Journal, 2(1), 203-208.

Rosa, F. O. (2015). Pengembangan Modul pembelajaran IPA SMP pada materi tekanan berbasis keterampilan proses sains. Jurnal Pendidikan Fisika, 3(1), 49-63.

Sajidan, S., Ashadi, A., & Sutikno, S. (2015). Skill of teacher candidates in integrating the concept of science with local wisdom. Jurnal Pendidikan IPA Indonesia, 4(2), 120-126.

Savitri, E., Wusqo, I., Ardhi, M., & Putra, P. (2017). Enhancement of science student's process skills through implementation of green learning method (GeLeM) with conservation-based inquiry approach. Jurnal Pendidikan IPA Indonesia, 6(2), 237-244.

Setiawan, B., Innatesari, D., Sabtiawan, W., & Sudarmin. (2017). The development of local wisdom-based natural science module to improve science literation of student's. Jurnal Pendidikan IPA Indonesia, 6(1), 49-54.

Sholakhuddin, M., Sutarto, & Subiki. (2016). Paket sumber belajar (PSB) dengan analisis foto kejadian fisika (AFKF) berbasis kearifan lokal pada pembelajaran fisika di SMK (kajian pengembangan pada pokok bahasan fluida untuk SMK jurusan perikanan kelautan). Jurnal Pembelajaran Fisika, 5(3), 253-260.

Sinambela, P. (2009, Desember). Artikel Sinambela. Dipetik Mei 23, 2018, dari Pardomuan Sinambela: https://pardomuansinambela.files.wordpress.com

Solichah, A., Parmin, P., & Nurhayati, S. (2013). Pengembangan lembar eksperimen IPA terpadu berbasis inkuiri dalam outdoor learning pada tema ekosistem. Unnes Science Education Jpurnal, 2(2), 337-343.

Sudarmin, S., & Samini, S. (2015). Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa. Unnes Science Education Journal, 4(3), 1049-1056.

Sudijono, A. (2011). Pengantar evaluasi pendidikan. Jakarta: PT Raja Grafindo Persada.

Sugiyono. (2012). Metode penelitian kuantitatif, kualitatif dan R&D. Bandung: Alfabeta.

Sukaesih, S., & Pukan, K. (2015). Active learning based on better teaching and learning (BTL) to improve process skill and students study result. Jurnal Pendidikan IPA Indonesia, 4(1), 90-96.

Sukiman. (2012). Pengembangan media. Yogyakarta: Pedagogia.

Suryani, Sunarno, W., & Soeparmi. (2014). Pengembangan modul IPA terpadu berbasis konflik kognitif tema peredaran darah di SMP Negeri 6 Wonogiri. Jurnal Inkuiri, 3(3), 19-29.

Suryawan, A., Binadja, A., & Sulistyorini, S. (2015). Pengembangan instrumen performance assessment praktikum bervisi sets untuk mengukur keterampilan proses sains. Journal of Primary Education, 4(1), 1-9.

Susilaningrum, D. F., Santosa, S., & Ariyanto, J. (2017). Studi komparasi antara penerapan model learning cycle 5E dan discovery learning terhadap capaian keterampilan proses sains dan hasil belajar kognitif pada

siswa kelas X SMA Negeri 3 Boyolali. Proceeding Biology Education Conference, 14(1), 331-339.

Susilowati, I., Iswari, R., & Sukaesih, S. (2013). Pengaruh pembelajaran berbasis proyek terhadap hasil belajar siswa materi sistem pencernaan manusia. Journal of Biology Education, 2(1), 83-90.

Tessmer, M. (1993). Planning and conducting formative evaluations. Philadelphia: Kogan Page.

Tim Penyusun. (2016). Pedoman penulisan karya ilmiah. Banjarmasin: FKIP Universitas Lambung Mangkurat.

Trianto. (2012). Model pembelajaran terpadu. Jakarta : Bumi Aksara.

Umah, S. K., Sudarmin, & Dewi, N. R. (2014). Pengembangan petunjuk praktikum ipa terpadu berbasis inkuiri terbimbing pada tema makanan dan kesehatan. Unnes Science Education Journal, 3(2), 511-518.

Uno, H., & Mohamad, N. (2014). Belajar dengan pendekatan PAILKEM. Jakarta: Bumi Aksara.

Usmeldi. (2016). The development of research-based physics learning model with scientific approach to develop student's scientific processing skill. Jurnal Pendidikan IPA Indonesia, 5(1), 134-139.

Wahyuni, S. (2015). Developing science learning instruments based on local wisdom to improve student's critical thinking skills. Jurnal Pendidikan Fisika Indonesia, 11(2), 156-161.

Wahyuni, S., Indrawati, Sudarti, & Suana, W. (2017). Developing science process skills and problem-solving abilities based on outdoor learning in junior high school. Jurnal Pendidikan IPA Indonesia, 6(1), 165-169.

Waluyo, M. E. (2014). Pengembangan panduan praktikum IPA terpadu berbasis inkuiri terbimbing tema fotosintesis untuk menumbuhkan keterampilan kerja ilmiah siswa SMP. Unnes Science Education Journal, 3(3), 677-684.

Wardah, A. (2016). Pengembangan perangkat pembelajaran IPA-biologi menggunakan model pembelajaran berdasarkan masalah di madrasah tsanawiyah. Jurnal Inovasi Pembelajaran, 2(1), 225-235.

Wardani, K., Sadia, I., & Suastra, I. (2016). Pengembangan perangkat pembelajaran IPA terpadu dengan setting inkuiri laboratorium bermuatan content local genius untuk meningkatkan pemahaman konsep dan keterampilan proses sains siswa SMP. Prosiding Seminar Nasional MIPA, 230-239.

Widoyoko, E. P. (2016). Penilaian hasil belajar di sekolah. Yogyakarta: Pustaka Pelajar.

Zaini, M., & Asnida, D. J. (2015). Pengembangan perangkat pembelajaran IPA-biologi berorientasi hutan mangrove untuk siswa SMP. Seminar Nasional XII Pendidikan Biologi FKIP UNS, 2(7), 134-141.