



## Development of Ethnosains Materials in 5E Cycle Learning Model Based on the Local Culture of Primary School Students

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### Abstract

This development research aims to develop valid and practical Ethnoscience Teaching Materials in the 5E Learning Cycle Model based on Local Wisdom of Elementary School Students. This type of research is Research and Development, adopting the Plomp development model which consists of three stages in developing, namely (1) preliminary research or preliminary analysis, (2) the prototyping phase or the design stage, and (3) the assessment phase. Data collection in research is interviews and questionnaires / questionnaires. The data analysis technique uses a Likert scale. The results showed that the media validation was classified as good with a percentage of 76.85%. The result of language validation is good with a percentage of 71.43%. The results of the material validation category were very good with a percentage of 91.25%. Overall the results of the analysis and calculation of the questionnaire value from the expert team, Ethnoscience Teaching Materials in the 5E Learning Cycle Model based on Local Wisdom of Elementary School Students are in the very good category with a percentage of 80.33% meaning Ethnoscience Teaching Materials in the 5E Learning Cycle Model are based on Local Wisdom Elementary school students are valid and practical to use.

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## INTRODUCTION

Learning is the process of transaction and communication between teacher and student where the teacher acts as the educator and student as learner. Ethnoscience teaching, ideally, could actively involve students in learning. Students should be involved in various concrete activities in order to help the students to build the knowledge concept that is relevant to what they have learnt. Besides, students are required to be active and able to develop their thinking skill in problem solving. This activity could train students to be able to think scientifically.

Baker, et al (2017: 143) stated that when science learning in schools neglect the students', they would consequently find it hard to comprehend the lesson or they only accept a part of the scientific concept taught during the learning. Cobern and Aikenhead (2016: 4) added that if the subculture of modern science is merged with the subculture of students' daily life, science learning could strengthen students' view on the universe that would lead to enculturation. When enculturation achieved, students scientific thinking in their daily life would improved.

Teaching material is a set of learning material that has been systematically arranged to be implemented in as well as to support the teaching and learning process. According to Prastowo (2013:16), teaching material is any kind of materials (information, tools, or text) that are systematically arranged and represent the whole image of the competence to be achieved by the students and utilized during the learning process to plan and examining the learning implementation. Considering the importance of teaching material, it is expected that teachers are able to design and construct teaching material well. However, based on the analysis conducted on science learning at elementary schools, teachers merely teaching Natural Science subject merely by delivering what's on a textbook that makes the learning tends to be teacher-centered.

Unfortunately, textbooks commonly do not provide the students adequate opportunities to figure out the concept they learn independently and directly explain the concept in paragraphs. Often times, students study by relying on memorizing the

material presented without knowing how to implement the knowledge in a different context. Whereas self-evaluation is important for students to identify their lackness and progress in learning, textbook also do not have the feature for students to evaluate themselves. As the consequence, the learning outcomes are lower than what is expected.

One of the solutions is by designing a teaching material using a suitable learning model. Trianto (2011:54) argued that "every learning model directs the teacher in designing a teaching in helping the students in a way that the goal of teaching is achieved". By conducting the five steps of the 5E Learning Cycle model can help in dealing with the issues happened so that it can built a teaching that can grow the interest and the curiosity of the students, giving chances to the students in performing an experiment, motivating the students in explaining the concept learned, helping the students in implementing the concept in a new situation and conducting self-evaluation to find out the strength and weakness in teaching. Eventually, the conduct of 5E Learning Cycle model is expected to be able to develop the attitude of activeness on the students in the learning process.

## METHOD

This research aimed to developed a Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E for Elementary School Students. Meanwhile, this research is using the Research and Development type which adopt the Plomp development. Plomp (in Plomp and Nieveen, 2013: 19) stated that there are three phases in conducting the development, that are (1) preliminary research or initial analysis, (2) prototyping phase or planning, and (3) assesment phase or scoring phase.

The Plomp model is chose because it has several strengths, those are (1) more accurate to be used in developing teaching material, (2) the description is complete and systematical, (3) before it tested, the teaching material is developed and self-revised and is consulted first by the experts, and (4) the presence of one to one evaluation and small group testing before the field experiment. In this research, the tested subject is the students of grade V in the Elementary School 58 of Lubuklinggau of

16 studentes in the Theme 8 of “Our Bestfriend: The Environment”, that is of second semester of 2019/2020.

The data collection gained from the use of questionnaires where the respondents give a tick (√) according to their answer score on the provided table. The questionnaire used Likert scale answer for every question, that are: very good (SB), good (B), adequate (C) and lacking (K). the data analysis used in the research is the scoring technique by calculating the total score on the questionnaire that is given and is described using the Likert scale in the form of checklist. The steps that will be done are the following:

- a. Gives the score from every point of question.
- b. Summing the score
- c. Change the score data (quantitative) into qualitative.

According to Partino (2009:21) in changing the quantitative score into qualitative score, there are several steps, those are:

- 1) Calculating the range of score using the formula of:

$$R = S_b - S_k$$

Note:

R = Range  
S<sub>b</sub> = Highest score  
S<sub>k</sub> = Lowest score

- 2) Determining the number of Category (T)
- 3) The calculation of interval length of every category, with the formula:

$$p = \frac{1}{T} R$$

Note:

P = Interval length  
T = Category  
R = Range

- 4) Determining the limitation of category
- 5) Gives name or quality of every category.
- 6) Counting the percentage, using the formula:

$$P = \frac{n}{N} \times 100\%$$

(Rohmad in Ali, 2013:2)

Note:

P = Score percentage(%)

n = Total score gained

N = Total of maximum score

The appropriateness that has been approved in this research with the minimum score of C or adequate, if the result given by the validators, teachers, and students gained the average score of adequate, then the Development of Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E for the Elementary School Students in Lubuklinggau city is announced to be appropriate for usage.

## RESULTS AND DISCUSSION

Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” of grade V that is developed by the researcher has gone through several phases that covers validation, evaluation and revision. The phases are taken so that the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” that is tested on the students of grade V in Elementary School 58 of Lubuklinggau City is valid and practical. Below, it will explained the phases done

1. The result of need analysis to identify the goal.

a. Need Analysis

Recently, the curriculum used in Elementary School 58 of Lubuklinggau City is Curriculum of 2013. Curriculum of 2013 used a theme-based approach. According to Rusman (2010:258) one of the characteristics of theme-based teaching in that it is student-centered. The teaching process that is expected is the students to be active in searching and discovering by themselves meanwhile the teachers act as the facilitators. By finding and discovering the lesson themselves, the students will see the meaningfulness in the lesson. However, based on the result of the observation, it is seen that the teaching process is still very teacher-centered. It is seen that there is a gap between the situation that is expected and the reality. The teacher of grade V mentioned that they experienced some difficulties in helping the students in achieving the learning goal. This is due to the materials in the coursebook of curriculum of 2013 has not explained detailly, some of the main discussion has not explained the core point briefly, so that the teacher still needs

other references as the supplementary material in the teaching.

Aside from the issues mentioned above, the next issue is related to the level of interest of the students in studying. The interest of the students in the learning activity is supported by the learning sources used by the students. The learning sources is ought to have an attractive display so that the students are curious in learning the materials taught.

#### b. The Analysis of Environmental Potential

The next thing to do is to analyze the environmental potential around the Elementary School 58 of Lubuklinggau City. Based on the analysis result, it is gained the fact that the environment around the school has rice field, ponds, and river. Besides, there is also economical activities such as trading and agriculture, so that the environment supports the development of Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E for the students of Elementary School 58 of Lubuklinggau City.

#### c. The Analysis of Curriculum and Material

The curriculum that has been applied in the learning process is the curriculum of 2013, so that the teaching approach used is the theme-based. The material of the second semester on theme 8 is "our bestfriend: the environment" that is mentioned in the Curriculum of 2013 on the Core Competence (KI) and the Basic Competence (KD), where the KD contains 5 teaching content that is Bahasa, Natural Science, Social Study, Civic Education, and SBdP. Every learning content in the KD require the students to achieve the KKM score set that is 70.

#### d. Analysis of Students

Students grade V of Elementary School 58 of Lubuklinggau City like the learning process that is done directly and is concrete. The students also want the Worksheet that is colorful and contain many pictures.

#### e. Identifying the Goal

The population in this research is grade V of Elementary School 58 of Lubuklinggau City with the number of 16 students. The gap in this research is seen that before using the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of "our bestfriend: the environment" the score of the students has not

achieved the KKM yet. This is influenced by the coursebook used is the only reference used without any supplementary source. The material presented in the coursebook has not show the local wisdom such as the custom and the culture around the students, so that the students need the supplementary books that contain the local wisdom so that it is easier in understanding the material given in the learning process. Thusm the author is interested in giving the solution for the issues by developing the supporting book that is the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E.

#### 2. Analysis of Teaching

According to Darmojo and Kaligis in Yunus (2015: 177), good teaching materials or worksheet must fulfill the requirement such as the didactive, construction and technical requirement. Based on the result of the analysis of Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E has fulfill the three requirement, yet on the technical requirement, the teaching material has not fulfill the third point that is related to the look of the learning material that is seen less attractive.

#### 3. The Analysis of Learner and Context

Students of grade V have high enthusiasm and curiosity. So that the writer stimulated the character of the student by giving chance for the students to work independently as well as in group or even small group discussion. The individual or independent activity develop the confidence of the students upon their own skill. Meanwhile, the group activity and discussion makes the students to be more active in cooperation.

#### 4. Writing the purpose of demonstration

The purpose is formulated in fulfilling the requirement of ABCD (Audience, Behavior, Condition and Degree). The teaching purpose are, a) students can identify various form of dance formation correctly and confidently, b) the students can explain the definition of dance formation correctly and confidently, c) students are able to demonstrate the dancing formation of creative traditional dance correctly and responsibly, d) students are able to explain the clean water availability accurately and responsibly, e) the students are able to create a poster about the implication of water cycle for life correctly and

confidently, f) students are able to identify types of business that is processed by oneself correctly and responsibly, g) students are able to identify the diversity type of business in their surrounding correctly and responsibly, h) students are able to present the result of type of business correctly and responsibly, i) students are able to identify the uniqueness of tradition in the social diversity of Indonesian society correctly and responsibly and j) students are able to identify events in reading correctly and responsibly.

#### 5. Developing the scoring instrument.

The scoring instrument in this research are the questions that mentioned in the product developed by the writer, that is Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment”.

#### 6. Development of teaching strategy.

The development of teaching strategy is needed in helping to achieve the accomplishment of the goal of teaching through the product development used. The teaching strategy used by the researcher is the local wisdom based approach.

#### 7. The Development and the selection of Teaching Material

The product developed by the researcher is supplementary book for teaching that is Ethno-science Teaching Material in the Learning Cycle 5E Model with Local Wisdom based under the theme of “our bestfriend: the environment”.

#### 8. Conducting the formative evaluation

##### a. Expert Validation

##### 1) Media Expert

Based on the validation from the media expert, the Ethno-science Teaching Material of the Learning Cycle 5E Model with Local Wisdom based is categorized as Good. the analysis result can be observed in the table below:

**Table 1.** Percentage of the scoring from media expert

Range	Percentage	Category
87.78 – 108	81.28 – 100	Very Good
67.52 – 87.77	62.52 – 81.27	Good
47.26 – 67.51	43.76 – 62.50	Adequate
27 – 47.25	25 – 43.75	Lacking

Based on the result, it can be observed that the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the

theme of “our bestfriend: the environment” is categorized as “Good” with the percentage of 76,85%.

##### 2) Language Expert

The language validation result from the validator can be observed in the calculation below:

**Table 2.** Percentage of score from the language expert

Range	Percentage	Category
45.8 – 56	81.78 – 100	Very Good
35.2 – 45.7	62.86 – 81.61	Good
24.6 – 35.1	43.93 – 62.68	Adequate
14 – 24.5	25 – 43.75	Lacking

Based on the result from the language expert, the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” is categorized as “Good” with the percentage of 71.43%.

##### 3) Content Expert

Here is the calculation of the validation score from the content expert.

**Table 3.** Percentage of score from the content expert

Range	Percentage	Category
68 – 83	85 – 100	Very Good
52 – 67	65 – 83.75	Good
36 – 51	45 – 63.75	Adequate
20 – 35	25 – 43.75	Lacking

The Result from the content expert on the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” is categorized as “Very Good”. The percentage score from the content expert is 91.25%.

Based on the scoring of the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the grade V students of SD Negeri 58 of Lubuklinggau City that is gained from the media, language and content expert can be seen as a whole in the following:

**Table 4.** Recapitulation of Percentage Score from the Experts

Range	Percentage	Category
198.28 – 244	81.26 – 100	Very Good
152.52 – 198.27	62.51 – 81.25	Good
106.76 – 152.51	43.75 – 62.50	Adequate
61 – 106.75	25 – 43.75	Lacking

The overall scoring of the components is categorized as “Very Good” with the percentage of 80.33%.

#### b. One to One Testing (Individual)

The result from the one to one testing on the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for grade V of SD Negeri 58 of Lubuklinggau City is done on four indicators that are ease of access, language, attractiveness, and content. based on the result of one to one testing done to three students, two of them stated that Teaching Material is adequately good meanwhile one of the students mentioned that there is a suggestion. Thus, through the one to one testing here, the Teaching Material must be revised to then later being tested on a small group. The percentage of the scoring from the questionnaire on the one to one testing can be observed in the table below:

**Table 5.** Percentage of the Scoring from the Students

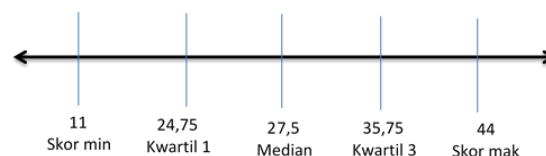
Range	Percentage	Category
35.78 – 44	81.32 – 100	Very Good
27.52 – 35.77	62.54 – 81.29	Good
19.26 – 27.51	43.77 – 62.52	Adequate
11 – 19.25	25 – 43.75	Lacking

Based on the percentage, the scoring result from the questionnaire on the one to one testing in the following:

**Table 6.** Result of Questionnaire for the One to One testing

No	Student's Code	Number of Statement											Total	Category
		1	2	3	4	5	6	7	8	9	10	11		
1	S1	3	2	3	3	3	3	3	3	3	3	3	32	Good
2	S2	3	3	4	4	3	4	3	3	4	3	4	38	Very Good
3	S3	3	3	2	2	3	2	2	3	3	2	2	27	Adequate
Total													97	

The scale that describes the minimum score, the quartile score 1, median, and the quartile score 3 as well as the maximum score is as follow:

**Table 7.** Percentage of the One to One Testing

Category	Range	Percentage
Very Good	35.75 – 44	81.25 – 100
Good	27.5 – 35	62.5 – 79,54
Adequate	24.75 – 27	56.25 – 61.36
Lacking	11 – 24	25 – 54.55

$$\text{Percentage} = \frac{\text{average score}}{\text{maximum score}} = \frac{32,33}{44} = 73,48$$

Based on the questionnaire scoring gained from conducting the one to one testing on the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” in grade V of SD Negeri 58 of Lubuklinggau City is categorized as “Good” with the percentage of 73.48%.

#### c. Small Group Evaluation

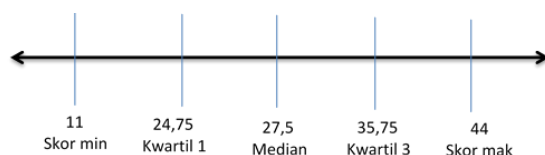
Small group evaluation is conducted on 2 May 2020. The small group evaluation is conducted to six students of grade V, by gathering the students in one group.

The scoring result of the questionnaire on the small group evaluation can be observed in the table below:

**Table 8.** Result of questionnaire for Small Group Evaluation

St 0 ud N ent	Number of Statement	Tot al	Ca teg ory
o Co de	1 2 3 4 5 6 7 8 9	1 1 0 1	
1 S1	4 3 4 4 3 4 4 4 4	3 4	41 Very Good
2 S2	2 3 3 4 3 3 4 3 4	4 3	36 Very Good
3 S3	3 2 4 4 4 3 4 4 3	4 4	39 Very Good
4 S4	4 4 3 4 3 4 4 4 3	3 4	36 Very Good
5 S5	4 3 4 4 3 4 4 3 3	4 3	39 Very Good
6 S6	3 2 4 4 3 3 4 4 4	4 4	38 Very Good
Total		229	

The scale that describes the minimum score, quartile score 1, median, and quartile score 3 as well as the maximum score is as follow:



**Table 9.** Percentage of the Small Group

Category	Range	Percentage
Very Good	35.75 – 44	81.25 – 100
Good	27.5 – 35	62.5 – 79.54
Adequate	24.75 – 27	56.25 – 61.36
Lacking	11 – 24	25 – 54.55
Percentage = $\frac{\text{average score}}{\text{maximum score}} = \frac{38.17}{44} = 86.75$		

The percentage gained is 87.75% with the category of “very good”. Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the grade V students of SD Negeri 58 of Lubuklinggau City is announced to be practical.

## 9. Revision

Revision is done according to the steps that is done before, where there are suggestion that will be used to revise the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the grade V students of SD Negeri 58 of Lubuklinggau City before this product is produced further. After the revision then this product can be used for the students.

The researcher conducted the need analysis started by the observation and interview that is done to the teacher and the students of grade V. Through the observation and the interview, the researcher discored that the curriculum used in grade V of SD Negeri 58 of Lubuklinggau City is the Curriculum 2013, so that the teaching process is in thematic method. The book used in the teaching process is the teacher and student handbook published by the Ministry of Education and Culture of Indonesia, revised edition of 2017. Based on the need analysis result, the researcher can develop the Local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the grade V students of SD Negeri 58 of Lubuklinggau City.

Before the researcher started to design the Teaching Material, the researcher find various sources that will be used as the references and as the example for the etaching kit. The researcher was also helped by the second researcher in designing this teacher kit. Besides, the researcher also received some criticisms and suggestion by the experts (validators) as the improvement in designing the teacher kit. Meanwhile, the cover design of the Teaching Material has a drawing of a hand holding the earth with the color variations. The picture chosen by the researcher that interprets it as earth and the humans live in harmony, plenty of advancement and damages on earth is due to the humans' doing. Therefore, humans and earth as the environment live in harmony. This picture is according to theme of environment is our bestfriend. Then the researcher designed the content part of the Teaching Material with full color concept so that it can improve the motivation of the student in studying.

The validation in the teaching material is done to find out the appropriateness of the teaching

materials from the perspective of three validators. The validators are experts in their field, the three validators are experts in design, language and content. based on the validation result that is done through questionnaire on the local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for grade V of SD Negeri 58 of Lubuklinggau City, the expert of media gave the score of 76.85% with the category of “good”. The expert of language gave the score of 71.43% with the category of “good”. Meanwhile, the expert of content gave the score of 91.25% with the category of “very good”. Through those scores, it is known that the local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” is valid and ready for further experiment.

The first experiment is done on the one to one testing. This testing is done to the three students of grade V with the different skill. Through the one to one testing, the researcher gained the overall score of 73.48% with the category of “good”. Then the researcher conduct some product revision beforehand prior to conduct a small group experiment. Small group testing gained the overall score of 86.75% with the category of “very good”. Through the one to one testing and the small group testing here, it is discovered that the local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the students grade V of SD Negeri 58 of Lubuklinggau is announced to be practical for use.

## CONCLUSION

Based on the result of research and the discussion, several conclusions can be drawn as follow:

Generally, the local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the students of elementary school and is supported with the potential from the existing environment around the SD Negeri 58 of Lubuklinggau City. Meanwhile, specifically, it can be concluded that:

1. The teaching material is designed with the attractive picture and full color so that it stimulate the motivation and the attractiveness of the students in following the teaching and learning activity.

2. local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” for the students of elementary school is designed by using two types of fonts that are Cooper Black, Curlz MT and Times New Roman. The Teaching Material is printed similar to a book in general, using A4 paper of 80 gram. The Teaching Material is also decorated with pictures that is according to the material and the theme of “our bestfriend: the environment”. The selection of colors with a good resolution, bright and full color motivates the students to participate in the teaching and learning excitedly.

3. Based on the validation result, it is known that the Teaching Material is categorized as very good with the percentage of 80.33%, so that the local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” is categorized as valid.

4. in the one to one testing, the researcher gained the overall score of 73.48% with the category of “good” and the small group testing gained the overall score of 86.75% with the category of “very good”. Therefore, local wisdom based teaching materials of Ethno-science in Learning Cycle 5E under the theme of “our bestfriend: the environment” is announced as practical for use in the grade V of Elementary School.

## REFERENCES

- Abdullah. (1998). Ilmu Alamiah Dasar. Jakarta: Bumi Aksara.
- Azhar Arsyad. (2006). Bahan Ajar Ilmu Pengetahuan Alam (IPA). Jakarta: Raja Grafindo Persada.
- Arif S. Sadiman, dkk. (2009). Media Pendidikan: Pengertian, Pengembangan, Dan Pemanfaatannya. Jakarta: PT. Raja Grafindo Persada.



- Asri Budiningsih, C. (2003). Belajar dan Pembelajaran. Jakarta: Rineka Cipta.
- Bruner, J.S. (1966). Toward a Theory of Instruction". Cambridge: Harvard University
- Depdiknas. (2006). Kurikulum Tingkat Satuan Pendidikan. Jakarta: Depdiknas.
- Cecep Kustandi dan Bambang Sutjipto. (2011). Bahan Pembelajaran: Manual dan Digital. Bogor: Ghalia Indonesia
- Mulyasa. (2006). Kurikulum Tingkat Satuan Pendidikan: Sebuah Panduan Praktis. Bandung: Remaja Rosdakarya.
- Hendro Darmodjo dan R. E Kaligis. (1993). Pendidikan IPA II. Jakarta: Dirjen Dikti.
- Nana Sudjana dan Ahmad Rivai. (2010). Media Pengajaran. Bandung: Sinar Baru Algensindo.
- Nana Syaodih Sukmadinata. (2005). Prosedur Penelitian Pendidikan. Bandung: PT. Remaja Rosdakarya Offset.
- Diana Mutiah. (2012). Psikologi Bermain Anak Usia Dini. Jakarta: Kencana Prenada Media Grup.
- Pujiriyanto. (2005). Desain Grafis Komputer. Yogyakarta: ANDI OFFSET.
- Rita Eka Izzaty dkk. (2008). Perkembangan Peserta Didik. Yogyakarta: UNY Press.
- Sri Sulistyorini. (2007). Model Pembelajaran IPA Sekolah Dasar dan Penerapannya Dalam KTSP. Yogyakarta: Tiara Wacana.
- Srini M. Iskandar. (1996). Pendidikan Ilmu Pengetahuan Alam. Jakarta: Depdikbud RI.
- Sugiyono. (2010). Metode Penelitian Pendidikan. Bandung: AlfaBeta.
- Suharsimi Arikunto. (1998). Prosedur Penelitian Suatu Pendekatan Praktik. Yogyakarta: Rineka Cipta.
- Sukardjo. (2008). Kumpulan Materi Evaluasi Pembelajaran. Prodi Teknologi Pembelajaran. PPS. UNY.
- Sukiman. (2012). Pengembangan Media Pembelajaran. Yogyakarta: Pedagogia.
- Usman Samatowa. (2006). Bagaimana Membelajarkan IPA di Sekolah Dasar. Jakarta: Depdiknas