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Integrated Vlog Media Development of Ethno-STEM to Equip Concervation Character and Chemistry Literacy

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Abstrak. Hydrocarbon material is a material that examines abstract concepts related to atoms and structures. However, Generation Z has characteristics that rely heavily on digital technology. Characteristics of materials and students who are different, of course, will hinder achieving the objectives of learning hydrocarbons. Chemistry learning will be effective if hydrocarbon material is integrated through the development of vlog media content that raises local wisdom or ethno-STEM (science, technology, engineering, and mathematics). So, will provide in-depth and comprehensive understanding of students into scientific knowledge. The research aims to produce an ethno-STEM integrated vlog media and its effect on the provision of conservation characters and chemistry literacy of students. The development of ethno-STEM integrated vlog media in research uses the 4D method, namely definition, design, development, and dissemination aimed at class XI science students who are studying hydrocarbon material at SMA Negeri 3 Batam. The data was obtained through observation and structured interviews with 1 chemistry teacher and 17 students. The results of the validity of the material (0,87), media (0,77), teacher practicality (0,79), student responses on the small-scale (0,79), large-scale (0,83). The vlog media (0,91), conservation character (0,63) and chemistry literacy correlation coefficient (0,54). The reliability of the question (0,58), discriminating power (0,22) and difficulty level of the item pre-test (0,76) and post test (0,93). So, it can be concluded that the vlog media developed is valid, practical, and effective as local wisdom content to equip conservation characters and chemistry literacy.

Key words: Vlog media; Ethno-STEM; Conservation character; Chemistry literacy

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INTRODUCTION

Hydrocarbons are compounds whose molecules consist of atoms (C) and atoms (H) [1], [2]. They are divided into four types, namely alkanes, alkenes, alkynes, and aromatics. Hydrocarbon material is a material that examines abstract concepts related to atoms and structures. Meanwhile, Generation Z has characteristics that are highly dependent on digital technology. Generation Z grows, develops, and relies on digital technology [3]. They spend more time with many people doing various activities at the same time. Characteristics of materials and students who are different, will certainly hinder the achievement of learning objectives of hydrocarbons.

The selection of the type of chemistry learning media sourced from local wisdom is the right step to convey chemistry learning to generation Z who were born between 1995 and 2010. The use of local wisdom as a source of chemistry learning through an ethno-STEM approach can increase students' motivation and interest in learning to study science [4]. Chemistry learning will be effective if hydrocarbon material is integrated through the development of vlog media content that raises local wisdom or ethno-STEM (science, technology, engineering, and mathematics) through 21st century learning experiences. Utilization of local wisdom as content and learning resources relevant to hydrocarbon material will provide an in-depth and comprehensive understanding of students who elevate the community's original knowledge into scientific knowledge. The ethno-STEM learning is carried out to help students complete learning activities that lead to problem solving skills through analysis and implementation of innovative and intelligent ideas to get a superior science product. This becomes important in preparing the younger generation to overcome the challenges facing society [5].

The 2018 National Program for International Student Assessment (PISA) report states that Indonesia's scientific achievement is still in the bottom 10 out of 79 countries [6]. This proves that the trend in science education policy in the 21st century emphasizes the importance of scientific

literacy, including chemistry literacy in science education as a transferable outcome [7], [8]. Students who implement ethno-STEM integrated chemistry literacy equipped with conservation character values will be able to control social science/chemistry issues [9]. So it is expected to be a change in the field of chemistry education to support conservation character values, in the aspect of caring for the environment and loving the environment. Vlog teaching media as a hydrocarbon learning medium will provide a learning experience that is able to change the paradigm of students who have difficulty accessing learning into learning without the limitations of space and time. The vlog media will display ethno-STEM videos with various and interactive vlog content so that students are more active in learning [10]. Based on the background of the problem and to understand further the development of vlog teaching media, the researchers formulated a research problem, namely "development of an ethno-STEM integrated vlog media to equip students with conservation characters and chemistry literacy". Students as the next generation must be able to collaborate 21st century skills with the repertoire of local wisdom. So that learning can be carried out comprehensively through digital-based learning.

METHODS

The integrated vlog media development of ethno-STEM in research uses the 4D method, namely definition, design, development, and dissemination to students of class XI science who are studying hydrocarbon material at Batam public high school 3. This vlog media was developed into the development of a hydrocarbon e-module which is also integrated with ethno-STEM. The vlog media and e-module contain elements of Melayu culture that are relevant to hydrocarbon material with STEM approach (science, technology, engineering and mathematics) and the *"sudarmin"* syntax learning model. It is consists of 8 activities to turn the original knowledge possessed by the community into knowledge scientific. So that it is expected that students are able to contribute to solving a problem and also to equip the conservation character and chemistry literacy of students.

The vlog media, which was developed into a hydrocarbon e-module, is presented based on the characteristics and needs of students and teachers. This is based on core competencies and basic competencies in hydrocarbon material through the approach of students' local wisdom, namely the wisdom of the Melayu community in Batam City. The development of vlog media is carried out through 4 stages, namely the definition stage, the design stage, the development stage, and the dissemination stage. At the definition stage, it consists of 5 activities, namely initial-final assessment, student analysis, task analysis, material analysis, and setting goal specifications. Data was obtained through observation and structured interviews with 1 chemistry teacher, 17 students, and several Melayu natives to obtain information on the characteristics of the Melayu community. So, that it is expected to be able to define and determine the requirements needed for the development of vlog media. At the design stage, it consists of 4 activities, namely the preparation of tests, media selection, format selection, and initial design. So, it is expected to obtain an overview of the vlog media design that was developed according to the needs or characteristics of students and teachers. Meanwhile, the development stage consists of 5 activities, namely validity testing by experts, small-scale testing, improvement of vlog media, large-scale testing, and finalization of vlog media consisting of 4 expert lecturers, 1 teacher and 23 students on a small-scale test. and 45 students on a large-scale test. So, that it is expected to produce an ethno-STEM integrated vlog media that is ready to be distributed. At the stage of distributing the vlog media that has been developed together with the hydrocarbon e-module, it is distributed which can be accessed by many users, including through youtube, academia.edu, bloggers, to seminars/workshops. The equation used to determine the validity of an instrument is the equation *kappa moment* as follows;

$$\left[kappa\ moment\ (k) = \frac{\rho - \rho e}{1 - \rho e} \right]$$

$$\left[\rho = \frac{total\ score}{\max score} \right]$$

$$\left[pe = \frac{\max score - total\ score}{\max\ score} \right]$$

Validity of material experts

The average validity obtained in the material expert validity test is 0.87 in the category *"very high"*. The assessment is carried out by 2 expert lecturers. The data that has been obtained, then calculated using the equation *kappa moment* which consists of 19 statements from 6 aspects consisting of content aspects, linguistic aspects, presentation aspects, ethno-STEM aspects, conservation character aspects and chemical literacy aspects as shown in Figure 01.

Validity of media experts

The average validity obtained in the media expert validity test is 0.77 in the category *"tall"*. The assessment is carried out by 3 expert lecturers. The data that has been obtained, then calculated using the equation *kappa moment* which consists of 15 statements from 4 aspects consisting of size aspect, cover design aspect, content illustration aspect, and content illustration design aspect as shown in Figure 02.

Validity of the teacher's practicality

The average validity obtained in the teacher's practical validity test is 0.79 in the category *"tall"*. The assessment was carried out by 1 teacher who was in charge of chemistry and teaching hydrocarbons. The data that has been obtained consists of 26 statements from 6 aspects consisting of content aspects, display aspects, linguistic aspects, presentation aspects, ethno-STEM aspects, conservation character aspects and chemical literacy aspects, then calculated using the equation *kappa moment* as shown in Figure 03.

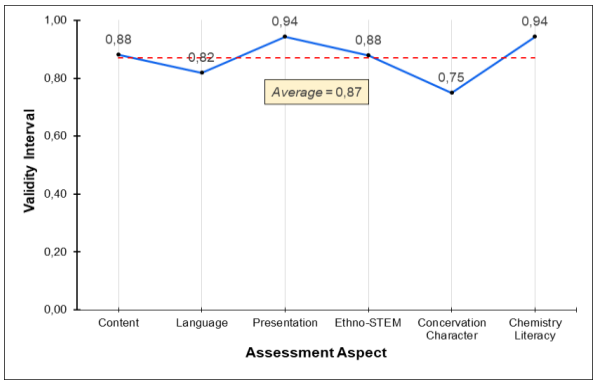

Figure 01. Material expert validity test

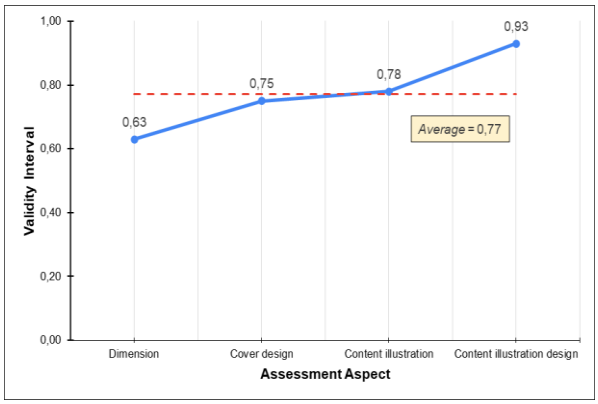

Figure 02. Media expert validity test

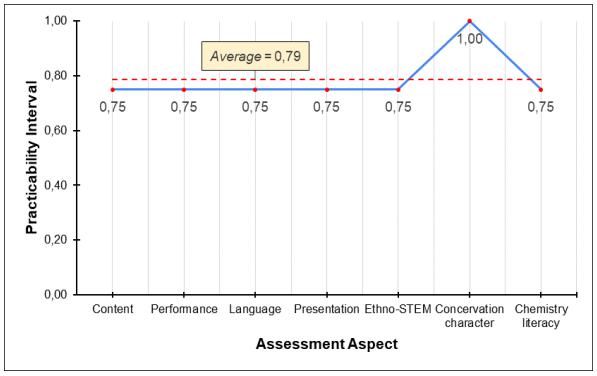

Figure 3. Test the validity of the teacher's practicality

RESULTS AND DISCUSSION

The effect of applying vlog media

Validity of student responses

The average validity obtained in the student response validity test is 0.81 in the category *"very high"* which consisw`wqsw`wq6w32qcc sts of 13 statements from 4 aspects, namely content quality aspects, display aspects, linguistic quality aspects, and usefulness aspects. The assessment was carried out on 45 large-scale test students and 23 small-scale test students who had obtained hydrocarbon material using vlog as a learning resource in the development of hydrocarbon e-modules. The results of the calculation of the data obtained using the equation *kappa moment*, which in the small-scale test obtained a validity of 0.79 in the category *"tall"* and on a large-scale test obtained a validity of 0.83 in the category *"very high"* as shown in Figure 04.

Validity of the vlog media

The average validity obtained in the vlog media validity test using the equation *kappa*

moment which consists of 16 statements from 4 aspects consisting of aspects of sound quality, music, narration, and overall video presentation of 0.91 or in the validity category *"very high"* as shown in Figure 05.

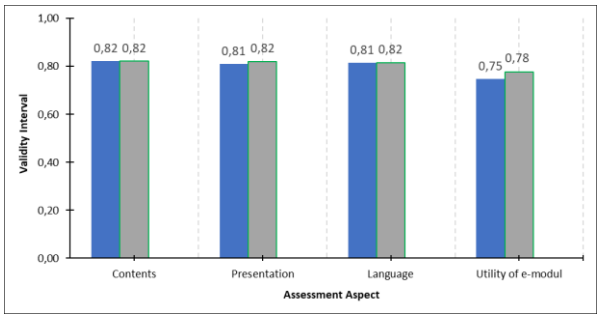

Figure 04. Test the validity of student responses

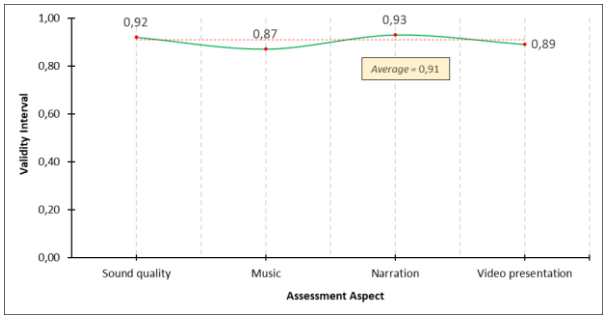

Figure 05. Test the validity of the vlog media

Validity of conservation characters

The mean validity obtained in the validity test of the conservation character using the equation *kappa moment* which consists of 39 statements of environmental care aspects of 0.61 and environmental love of 0.73 with an overall average of 0.66 or in the category of validity *"tall"*.

Validity of chemical literacy

Testing the validity of chemical literacy consists of 7 reasoned multiple-choice questions using the correlation equation from *Karl Pearson*, i.e., correlation product moment to 45 students. The average correlation coefficient obtained is 0.54 or at the correlation level *"enough"* as shown in Figure 06. Referring to the r-table with 45 students, the benchmark for the validity of the chemical literacy test items selected from the r-table with a value of 0.2429. Calculation of the validity of this chemical literacy problem uses the equation of *Karl Pearson*, i.e., correlation equation product momentas follows;

$$\left[xy = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{\{N\sum x^2 - (\sum x)^2\}}\sqrt{\{N\sum y^2 - (\sum y)^2\}}} \right]$$

The calculation results obtained an average correlation coefficient of 0.54 on the criteria *"enough"*. So, it was concluded that 6 questions were declared valid (86%) and 1 question was declared invalid (14%).

Question reliability

Reliability testing is carried out with the aim of measuring the level of confidence of a measurement if it is carried out on the same subject so that it will obtain relatively the same measurement results. Equality *Alpha Cronbachis* the equation used in testing the reliability of the question, which is as follows;

$$\left[r11 = \left(\frac{n}{n-1}\right)\left(1 - \frac{\sum Si^2}{St^2}\right) \right]$$

So that it can be seen the value of the reliability of the question, as follows;

$\sum Si^2$: 0,42

St^2 : 0,83

n : 7

so,

$$r11 = \left(\frac{7}{7-1}\right)\left(1 - \frac{0,42}{0,83}\right)$$

$r11 = 0,58$, with "medium" criteria

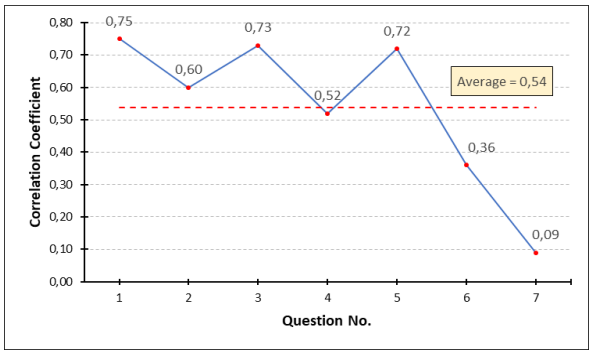

Figure 06. Test the validity of chemical literacy questions

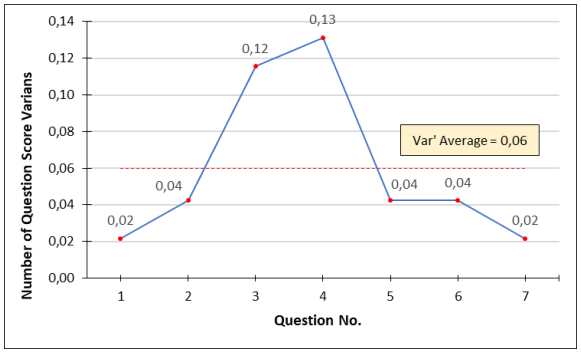

Figure 07. Variance of scores on chemical

literacy questions

Distinguishing questions

To distinguish students who have high ability with low ability to test chemical literacy questions, it can be known through the differentiating power of the question using the following equation;

$$\left[\text{Dp} = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A - P_B \right]$$

Obtaining test score data, then sorted from the largest to the smallest and then taken as much as 27% starting from the top as the top group and from the lowest order taken 27% as the bottom group. So, the number of participants in the upper group = participants in the lower group, namely Na = Nb = 12 students.

Thus, the known values are entered in the equation as shown in table 05. below;

Table 05. The results of calculating the discriminatory power of chemical literacy questions

N	45						
N*27%	12						
No. question	Ke-1	Ke-2	Ke-3	Ke-4	Ke-5	Ke-6	Ke-7
P_A	0.99	0.99	0.99	0.99	0.99	0.99	0.99
P_B	0.91	0.82	0.49	0.58	0.82	0.82	0.91
DP	0.08	0.16	0.49	0.41	0.16	0.16	0.08
Kriteria	Jelek	Jelek	Sangat Baik	Sangat Baik	Jelek	Jelek	Jelek

The results of the calculation of the discriminatory power of chemical literacy questions show that the value obtained is 0.22 or with a category *"enough"* as shown in figure 08.

Difficulty level pre-test and post-test

Comparison of the level of difficulty at the time pre-test and post-test aims to show the difficulty or ease of a chemical literacy question before or after learning is given to students. To show the difficulty of the problem, the equations used are as follows;

$$\left[\text{P} = \frac{B}{J_s} \right]$$

The result of calculating the current difficulty level pre-test and post-test shows that there is an increase in the chemical literacy ability of students from 0.76 (table 07.) to 0.93 (table 08.) which is included in the category *"easy"*. So that indicates that the development of vlog media in chemistry learning can be understood and understood by students which can be seen in Figure 09.

Table 07. Difficulty level calculation results pre-test

JS	45						
No. question	Ke-1	Ke-2	Ke-3	Ke-4	Ke-5	Ke-6	Ke-7
B	45	31	32	17	37	42	34
P	1,00	0,69	0,71	0,38	0,82	0,93	0,76
Criteria	Easy	Currently	Easy	Currently	Easy	Easy	Easy

Table 08. The results of the calculation of the level of difficulty post-test

JS	45						
No. question	Ke-1	Ke-2	Ke-3	Ke-4	Ke-5	Ke-6	Ke-7
B	44	43	39	38	43	43	44
P	0,98	0,96	0,87	0,84	0,96	0,96	0,98
Criteria	Easy	Easy	Easy	Easy	Easy	Easy	Easy

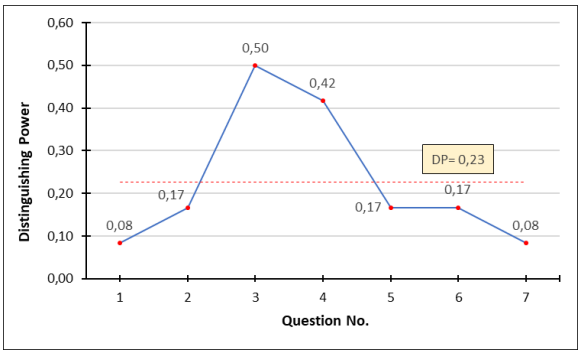

Figure 08. Distinguishing power of chemical literacy questions

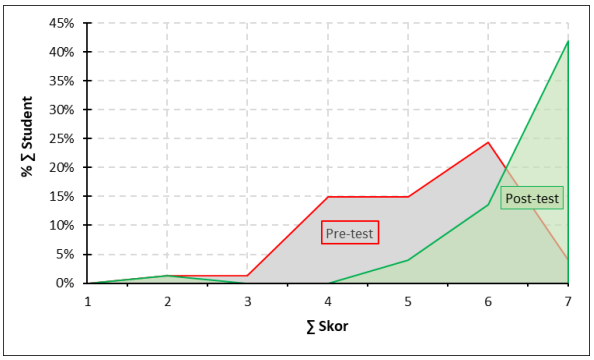

Figure 10. Obtaining chemical literacy scores

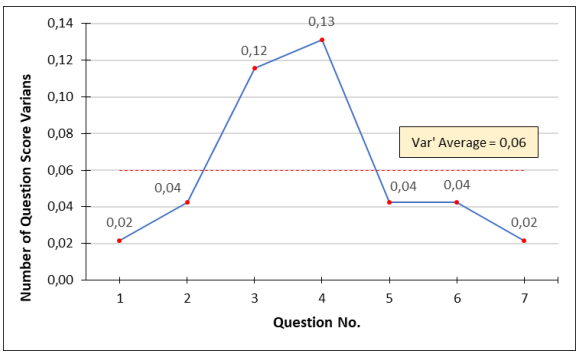

Figure 09. Comparison of current difficulty pre-test and post-test

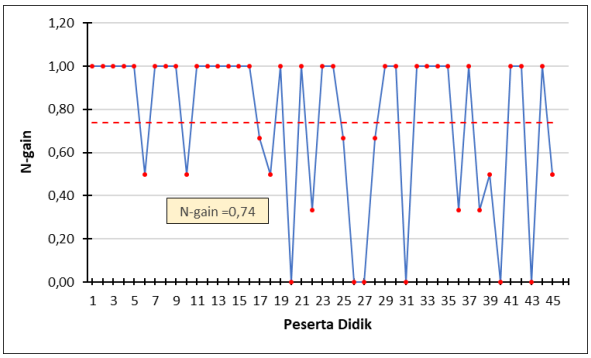

Figure 11. N-gain test on students

Chemical literacy score percentage pre-test and post-test

The results of the calculation of student's chemical literacy scores show an increase in the number of students who get high scores which are inversely proportional to when it is done pre-test, as shown in figure 10.

N-gain test

Calculations that need to be done after obtaining the entire chemical literacy score, then the gain normality test or N-gain test is carried out. The purpose of this test is to obtain the effectiveness of the treatment given to students using the Ngain equation according to Meltzeras follows;

$$\left[\text{N} - \text{gain} = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}} \right]$$

The calculation results show the average obtained by N-gain is 0.74 or in the category *"tall"* as shown in figure 11.

Analysis of society's science reconstruction

Learning using ethno-STEM integrated vlog media is learning that contains cultural elements relevant to hydrocarbon material with a STEM approach (science, technology, engineering and mathematics). So that students are expected to be able to contribute to a problem. Syntax"SUDARMIN"is a learning model used in this study, which consists of 8 activities carried out by students in order to turn the original knowledge possessed by the community into scientific knowledge. All of these activities are carried out by students in groups related to the peculiarities of Malay culture, such as food, drinks, and other products that are owned as specialties that are related to hydrocarbon materials. These activities are as follows;

Present problems or issues that require high-level thinking about products that are integrated with ethno-STEM

Show idea solutions, innovative and smart ideas
Discuss about the initial product
Analyze and decide best
Design a manufacturing schedule
Establish work schedules and product implementation
Implement product manufacturing
Value product advantages and limitations

Figure 12. Gulai Sembilang Vlog Media on Hydrocarbon Material
https://www.youtube.com/watch?v=9YytCat_H6c

CONCLUSION

The results of the research that have been obtained, then it can be concluded that the development of ethno-STEM integrated vlog media is able to equip the character of conservation and chemical literacy of students. This is based on the results of the validity of the research instrument consisting of validation of material experts, media experts, teacher practicality, and student responses to small-scale tests. Furthermore, on a largescale test of students, it also provides an assessment with categories *"tall"* on the provision of conservation character and chemical literacy in the category *"enough"* so as to obtain effectiveness in the category *"tall"*.

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REFERENCES

Jespersen, N. D., Hyslop, A., & Brady, J. E. (2015). Chemistry the Molecular Nature of Matter (7th ed.).

Petrucci, R. H., Harwood, W. S., Herring, G. E., & Madura, J. (2013). *General Chemistry: Principles & Modern Applications*. In Journal of Chemical Information and Modeling (Vol. 53, Issue 9).

Chou, H. P. (2012). *Gen Z Character. Cyber Smart Parenting*. Jakarta: PT Visi Anugerah Indonesia.

Sudarmin, & Pujiastuti, Rr. S. E. (2013). *Scientific Knowledge Based Culture and Local Wisdom in Karimunjawa for Growing Soft Skills Conservation*. In International Journal of Science and Research.

Nam, N. H., Quang, L. X., van Hien, N., van Bien, N., Trang, N. T. T., Minh, T. H., & Ngan, L. H. M. (2020). *Transformative perceptions of in-service teachers towards STEM education*: The vietnamese case study. Voprosy Obrazovaniya/Educational Studies Moscow.

Pusat Penilaian Pendidikan Balitbang Kemendikbud. (2019). *Pendidikan di Indonesia Belajar dari Hasil PISA 2018*. Jakarta: Puspendik Balitbang Kemendikbud.

Fives, H., Huebner, W., Birnbaum, A. S., & Nicolich, M. (2014). *Developing a Measure of Scientific Literacy for Middle School Students*. Science Education.

Rahayu, S. (2017). *Prosiding Seminar Nasional Kimia UNY 2017 Sinergi Penelitian dan Pembelajaran untuk Mendukung Pengembangan Literasi Kimia pada Era Global Ruang Seminar FMIPA UNY,* 14 Oktober

Sudarmin, & Sumarni, W. (2018). *Increasing character value and conservation behavior through integrated ethnoscience chemistry in chemistry learning: A Case Study in the Department of Science Universitas Negeri Semarang*. *IOP Conference Series*: Materials Science and Engineering.

Liana, Y. R., Ellianawati, & Hardyanto, W. (2019). *Pengembangan E-Modul Interaktif Berbasis Android Menggunakan Sigil Software pada Materi Listrik Dinamis*. Seminar Nasional Pascasarjana Universitas Negeri Semarang.