The Development of Biology Module Based on Local Wisdom of West Lampung: Study of Ecosystem Material

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Abstract. Education has a mission to develop the potential of students, develop their personality, and be able to foster a sense of responsibility. For this reason, teaching materials are needed. Module teaching materials based on local wisdom on ecosystem materials are not yet available as Teaching materials used by schools. For this reason, it was necessary to develop module teaching materials based on local wisdom in supporting the achievement of competencies and learning objectives. This study aimed to determine the development, feasibility and response of students and educators towards the Biology module based on local wisdom in West Lampung. This study used Research & Development (R&D) method with Borg & Gall procedure. Data collection techniques were using expert questionnaires (teaching modules, materials, languages), response questionnaires (students and educators), and documentation. Riduan modified Likert scale research data analysis techniques were used. The results showed the module was suitable for use in the learning process based on the module quality assessment by experts (teaching modules, material, and language) with overall criteria very feasible. Biology educator's response was very positive towards the teaching module products. It could be concluded that the module is suitable for use in the biology learning process.

1. Introduction

National education has a mission to develop the potential of students, so that they become human beings who believe in and devote to God Almighty, have good morality, be healthy, have knowledge, be capable, be creative, be independent and be democratic citizens, and responsible [1]. Education shapes humans so they continue to strive to develop their abilities to deal with all changes caused by the advancement of science and technology [2]. Meanwhile, to realize the mission of education, several components are needed in the administration of education. One of them is the learning material used, because the learning material will provide direction regarding the learning activities that are about to take place.

The fact is the learning materials used by teacher tend to focus only on the handbook and the textbook used from year to year. Thus, it can affect the process of students’ knowledge development. In addition, textbooks contain general material that is less related to students’ daily lives.

Besides, the situation has now waned the values of local wisdom that are developing in the community. The basic cultural values contained in local wisdom inherent in the community can be used as a study in learning, especially on related material. In accordance with the 2013 curriculum placing cultural excellence to be studied so as to create a sense of pride, and applied in the lives of
students to social interaction in society [3]. These students are introduced to local wisdom because local wisdom is part of culture [4].

Efforts to introduce and preserve local wisdom can be done by presenting it through one of the educational institutions, namely schools with the aim of improving the quality of learning [5]. The importance of cultural awareness must be implanted as deeply as possible into the soul of the community, and of course through education [6]. Each education unit can offer learning in accordance with the interests and talents of students, as well as local potential, cultural environment, economic conditions, and regional needs with competency standards and basic competencies that are self-developed so that the learning process is more meaningful [7]. The teacher can develop material based on local wisdom in interesting learning activities and are expected to develop the character of students such as the character of cooperation, tolerance, and caring attitude [8].

The linkages of the contents of biology learning with natural resources in West Lampung Regency can be inserted through ecosystem material. Ecosystem material is material that is easily understood by students. However, if the material that talks about nature and the interaction of its components is done in the classroom it will tend to be boring. With the teaching material that presents information on local culture, local ecosystems and the learning of field practice activities is expected to help students better understand the material, make the learning process more meaningful and be able to know the culture around them.

The learning process should use learning materials or supporting materials in the delivery of material, one of which is in the form of printed material, namely modules [9]. The use of module teaching materials will greatly help teacher when delivering biology material to students where the material in the module can be loaded according to the needs of students and students can learn independently [10].

Based on the needs and interview questionnaire data given to class X students of SMA Negeri 1 Sumber Jaya, West Lampung Regency in the learning process using only textbooks, this showed the lack of variety of learning resources owned by students so that it could affect the motivation of students to learn and achieve competence learning and the development of students’ knowledge as well as their learning outcomes.

The results of the pre-research by conducting interviews and giving questionnaires to teacher showed that the learning process of biology that connected the conditions of the school environment and place of residence as well as the socio-cultural of students had never been done, even though the existence of learning that adjusted the environmental conditions of students could support students in understanding learning material.

The results of the research that are relevant to this research conducted by Farida Nur Kumala and concerned Sulistyowati, with the title development of science instructional materials based local wisdom. Shows that the results of validation in terms of material, appearance and language are 81.25%, 87.5%, 91.7%. Thus, the science teaching materials based on local wisdom used to improving students learning outcomes and activities [11]. Furthermore, the research of Heriyadi Slamet, Kamalia Fikri and Arif Fatahillah, with the title integration of local wisdom values in environmental-based science learning material in kalibaru coffee plantation areas schools. Shows the results of integrated local wisdom packaged in the form of instructional materials, this strategy is effective in providing intellectual and emotional apperception material so that it is not verbal with the nature [12].

The design of learning module as an alternative teaching material developed differences with previous studies. Previous research developed a teaching module as an alternative teaching material, but it has not been accompanied by a practice sheet that makes the surrounding environment as an object of field practice in learning activities. The advantage of learning modules as an alternative teaching material that is developed is that besides being to be more interesting it is also adapted to the development of the times so as to increase students’ knowledge in the cognitive domain and motivate students in learning activities.

Sourced from the background of the problems that have been described, the need to develop a biology module based on local wisdom of West Lampung in biology, namely ecosystem material.
2. Research Methods
This study used research and development (R&D) procedures according to Borg & Gall in education include ten stages [13]. However, in this study, the researcher limited the research to seven stages, namely operational product revision because of the time, budget and capabilities of the researcher [14]. Researchers, especially in writing thesis or dissertation limited to step seven only because of limited funds [15]. Then the research stage was simplified without reducing the value of research and development itself [16]. Furthermore, the steps of research in Research and Development (R&D) can be seen in Figure 1 [17].

![Figure 1. Research Steps](image)

The instruments that were used in this study included: Questionnaire validation of teaching module experts, material experts, linguists, teacher and student responses questionnaire. The validation questionnaire and the questionnaire responses were analyzed using a Likert scale using a score of 1-4 with positive and negative statements.

The level of measurement in this study was intervals. Interval data were analyzed by calculating the presentation of questionnaire answers in each item through the formula [18]:

\[ Ps = \frac{S}{N} \times 100\% \]

Description:
- \( Ps \) : Percentage score
- \( S \) : Score obtained
- \( N \) : Maximum score

While to calculate the average percentage score the following questionnaire formula was used

\[ P = \frac{\sum P}{n} \]

Description:
- \( P \) : Average percentage
- \( \Sigma P \) : Number of percentages
- \( N \) : Number of items in the questionnaire
The Percentage of eligibility obtained was then interpreted into the eligibility category based on the following table [19]:

Table 1. Eligibility Criteria

| Score Average (%) | Category    |
|-------------------|-------------|
| 0-25              | Not worth   |
| >25-50            | Less decent |
| >50-75            | decent      |
| >75-100           | Very decent |

Then, using the same formula to analyze the feasibility percentage obtained on the results of student responses and the results were then interpreted into the attractiveness category based on the following table 2 [20]:

Table 2. Withdrawal Criteria

| Average Score | Category     |
|---------------|--------------|
| ≤39%          | Prohibited Use |
| 40%-59%       | Cannot be used |
| 60%-80%       | Interesting  |
| 81%-100%      | Very Interesting |

3. Results and Discussion

Validation was carried out by providing an assessment sheet to two teaching module expert, material expert and linguist. The aspects assessed by teaching module experts were physical strength of teaching materials, the content of teaching materials, readability of teaching materials, and the quality of printed teaching materials. Material experts assessed the aspects of the content component, the presentation component, and the suitability of West Lampung’s local wisdom with the material. Linguists assessed aspects of inclination, communicative, dialogic and interactive, conformity with the level of student development, wrinkling and integration of thought lines, and the use of terms, symbols or icons.

The purpose of this research was to know how to develop biology learning modules based on local wisdom, knowing the feasibility of biology learning modules based on local wisdom by expert judgment, and knowing the attractiveness of biology learning modules based on local wisdom on ecosystem material.

3.1 Teaching module expert validation

The results of the validation by the teaching module expert on the initial product and after revision are presented in graphical form as follows:
Figure 2 is the result of the validation from two teaching module experts, the product at the initial validation stage for all aspects of teaching module 1 experts obtained 68.18% from teaching module 2 obtained 65.90% with feasible criteria. Furthermore, an average score obtained from the two experts was 67.04% with decent criteria. Then after the revision the results obtained from the expert module 1 teaching that was 90.27% and the teaching module 2 obtained 85.22% results with very decent criteria. Then after the revision, it was obtained an average score from the two experts namely 88.63% with very decent criteria.

Based on the results of the validation, there are some suggestions to improve this product so that the product was better than the initial product. Suggestions for improvement are as follows:

1. Improve the module cover image to make it more interesting.
2. Repair binding paper that still uses paper that is easily damaged or torn.
3. Include the module making specifications on the theoretical basis.

### 3.2 Material expert validation

The results of validation by material expert regarding the initial product and after revision is presented in the following figure:
Figure 3 is the result of validation from two material experts, the product at the initial validation stage for all aspects of material expert 1 was obtained 72.72% of the material experts 2 obtained 68.18% with reasonable criteria. Furthermore, an average score of two experts was obtained, namely 70.45% with feasible criteria. Then after the revision the results obtained from expert material 1 namely 88.63% and expert material 2 obtained 84.09% results with very decent criteria. Then after the revision it was obtained an average score from the two experts that was 86.36% with very decent criteria.

Based on the results of the validation of the teaching module experts obtained suggestions for improving this product so that the product was better than the initial product. Suggestions for improvement are as follows:

1. Refine the concept of completeness of material, the correctness of the material, and include the source of reference material in the module in the form of middle notte.
2. Improved the way of laying pictures in clarifying material.
3. Improving the placement of tables should be adjusted and improve the form of writing that is not appropriate.

3.3 Linguists' Validation

The results of validation by using linguists regarding the initial product and after revision are presented in graphical form below:
Figure 4 is the result of validation from two linguists, the product at the initial validation stage for all aspects of the linguist 1 was 67.70% of the linguists 2 obtained 68.75% with decent criteria. Furthermore, the average score obtained from the two experts was 68.23% with feasible criteria. Then after the revision, the result of linguist 1 was 93.75% and linguist 2 was 86.54% with very decent criteria. Then after the revision it was obtained an average score from the two experts namely 90.1% with very decent criteria.

Based on the results of the validation of the teaching module experts obtained suggestions for improving this product so that the product is better than the initial product. Suggestions for improvement are as follows:

1. Correct writing errors such as using conjunctions that are not properly placed.
2. Correct punctuation that isn't right yet.
3. Improve writing words that are still typo.
4. Correcting sentences has not been effective, and the use of diction so that the language used is easy for students to understand.

3.4 Teacher's Response
The teacher's response was given to one teacher from SMA Negeri 1 Kebun Tebu, SMA Negeri 1 Sumber Jaya, and SMA Negeri 01 Way Tenong, West Lampung. The aspects assessed include the goal formulation component, the graphic component, the material component, the language component, and the local wisdom component. The results of teachers' responses are presented in the following table:

| Results of Teachers of SMA N 1 | Teachers of SMA N 2 | Teachers of SMA N 3 |
|-------------------------------|---------------------|---------------------|
| Average Percentage (%)        | 80.32%              | 85.86%              | 75%     |
| Average Percentage Total Criteria | 80.39%               |                     | Very Eligible |

![Figure 4. Graphs of Linguists Rating](chart.png)
Table 3 is the result of the responses of the three teachers. From teacher in SMA N 1 obtained 80.32%, from SMA N 2 obtained 85.86% and from teacher in SMAN 3 was 75%. From the assessment of the three teachers obtained an average percentage results of 80.39% with very interesting criteria.

3.5 Students response
The results of the student trials in three school can be seen the following graph:

| Total Score | 749 |
|-------------|-----|
| Maximum Score | 960 |
| Percentage | 78.02% |
| Criteria | Very Interesting |

Based on table 4 preliminary or limited trial results from SMA N 1 Kebun Lampung Barat with a total of 10 students, the overall result obtained on the feasibility aspect of 78.02% with interesting criteria.

| Total Score | 2422 |
|-------------|-----|
| Maximum Score | 2976 |
| Percentage | 81.38% |
| Criteria | Very Interesting |

Based on table 5 wider field trial results conducted at SMA Negeri 1 Sumber Jaya Lampung Barat with a total of 30 students, the result of the feasibility aspect was 81.38% with interesting criteria.

| Total Score | 2734 |
|-------------|-----|
| Maximum Score | 3264 |
| Percentage | 83.78% |
| Criteria | Very Interesting |

Based on table 6 wider field trial results that was conducted at SMA Negeri 1 Way Tenong West Lampung with 30 students, the result of the feasibility aspect was 83.78% with interesting criteria.
4. Conclusions and Recommendations

4.1 Conclusions
Based on the result of the validation, the eligibility of this product from the teaching module expert was 88.63%, from the material expert at 86.36%, and the linguist by 90.1% with very decent criteria. Students gave positive responses to the biology learning module based on local wisdom of West Lampung with the acquisition of a percentage of 78.02% with interesting criteria in preliminary or limited trials and percentage acquisition of 83.78% and 81.38% with very interesting criteria when testing more broadly. Then the teacher responses obtained by 80.39% with very interesting criteria. So it can be conclude that this product is eligible to use.

4.2 Recommendations
The learning module can provide insights on local wisdom that can foster environmental attitudes, the availability of practical activities in the module and the existence of examples of ecosystems that exist in the environment around students is expected to facilitate students in deepening the concept of ecosystem materials and motivating students in learning. And For further researchers, they are able to develop further module teaching materials on biology material by being more interesting and reviewing the local wisdom of other regions, then testing the responses of different teachers and
students and conducted at the step dissemination.

References

[1] Ramayulis 2013 *Ilmu Pendidikan Islam* (Jakarta: Kalam Mulia) 71
[2] Anggoro B S, Handoko A dan Andriyani I 2017 Pengaruh Metode Quantum Learning Terhadap Minat Belajar Siswa dan Penguasaan Konsep Biologi Kelas VIII SMP Negeri 11 Bandar Lampung *BIOSFER J. Tadris Pendidik. Biologi* 8 2
[3] Widyastono H 2014 *Pengembangan Kurikulum di Era Otonomi Daerah dari Kurikulum 2004, 2006, ke Kurikulum 2013* (Jakarta: Bumi Aksara) 133
[4] Wagiran 2011 Pengembangan Model Pendidikan Kearifan Lokal dalam Mendukung Visi Pembangunan Provinsi Daerah Istimewa Yogyakarta 2020 (Tahun Kedua) *J. Penelit. dan Pengembangan* 3 29
[5] Nadlir 2014 Urgensi Pembelajaran Berbasis Kearifan Lokal *J. Pendidik. Agama Islam* 2 299
[6] Diana N Managemen Pendidikan Berbasis Budaya Lokal Lampung (Analisis Eksploratif Mencari Basis Filosofis) Analisis 12 185
[7] BSNP 2006 Permendiknas RI No 22 Tahun 2006 *Tentang Standar Isi untuk Satuan Pendidikan Dasar Menengah* (Jakarta: Badan Standar Nasional Pendidikan) 7
[8] Khusniati M 2014 Model Pembelajaran Sains Berbasis Kearifan Lokal dalam Menumbuhkan Karakter Konservasi *IJC* 3 70
[9] Prastowo A 2014 *Pengembangan Bahan Ajar Tematik Tinjauan Teoritis dan Praktik* (Jakarta: Prenada Media Group) 181
[10] Munadi Y 2013 *Media Pembelajaran* (Jakarta: GP Press Group) 99
[11] Kumala N F dan Sulistyowati P, 2016 Pengembangan Bahan Ajar IPA Berbasis Kearifal Lokal *J. Inspirasi Pendidikan* 6 3
[12] Hariyadi S, Fikri K dan Fatahillah A 2016 Integrasi Nilai-Nilai Kearifan Lokal pada Pembelajaran IPA Berbasis Lingkungan di Sekolah-Sekolah Wilayah Perkebunan Kopi Kalibaru *Proc Seminar Nasional Biologi* 5 20
[13] Gall M D, Gall J P dan Borg W R 2003 *Educational Research* (London: Longman Group) 569
[14] Masykur R, Nofrizal dan Syazali M 2017 Pengembangan Media Pembelajaran Matematika dengan Macromedia Flash *J. Pendidik. Matematika* 8 177-186
[15] Hasyim A 2016 *Penelitian dan Pengembangan di Sekolah* (Yogyakarta: Media Akademi) 89
[16] Haka N B dan Suhanda 2018 Pengembangan Komik Manga Biologi Berbasis Android untuk Peserta Didik Kelas XI Ditingkat SMA/MA *J. of Biology Educ* 1 25.
[17] Sugiyono 2015 *Metode Penelitian dan Pengembangan Research and Development* (Bandung: Alfabeta) 37
[18] Winarni, Suparmi, dan Sarwanto 2014 Pengembangan Modul Berbasis Inkuiri Terbimbing pada Pokok Bahasan Kalor untuk SMA/MA Kelas X *J. Program Studi Pendidik. Sains* 3 5
[19] Riduwan 2011 *Dasar-Dasar Statistika* (Bandung: Alfabeta) 40-41
[20] Hutama F S 2017 Pengembangan Bahan Ajar IPS Berbasis Nilai Budaya Asing untuk Siswa Sekolah Dasar *J. Pendidik. Indonesia* 5 199