Desain, Development, and Evaluation of Biology E-Modules Website Based on Local Wisdom of the Baduy Tribe: Strengthening Pancasila Student Profiles on Ecosystem Material

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Abstract. Integrating local wisdom in biology learning can help shape the character of students. This research uses a development design by Borg and Gall with nine stages. The e-module was developed in the form of a website based on local wisdom of the Baduy tribe to train the content of the Pancasila Student Profile, which is integrated into class X ecosystem material in Senior High School and, then assessed for feasibility by media experts, material experts, language experts through questionnaires. The response to the use of e-modules was assessed through teacher and student questionnaires. The website e-module was implemented in a class of 43 students to assess the Pancasila Student Profile. The evaluation results show that the e-module website based on local wisdom has 90% accurate material concepts, 84% is very accessible, and 83% has very decent language quality. 91% of teachers responded very well, and 83% of students on the limited scale test and 83% of students on the broad scale test responded very well. In the E-module local wisdom of the Baduy tribe integrated the cultural values of Ngaseuk, Pikukuh, Kawalu Traditional Ceremonies on ecosystem materials, training the Pancasila Student Profile, the use of e-modules is very flexible can be accessed via smartphones and personal computers. The results showed that the e-module website based on local wisdom of the Baduy Tribe is very feasible to be used in biology learning and received a positive response from teachers and students.

1 Introduction

According to the Big Dictionary Indonesian, local wisdom can be interpreted as limited or certain local wisdom for an event, event, production, growth, or life [1]. Based on the English Indonesian Dictionary by John M. Echols and Hassan Syadily, the term "local wisdom" is defined as the combination of "local," indicating a sense of locality, and "wisdom," which refers to insightful and valuable knowledge. In essence, "local wisdom" can be understood as the set of wise, valuable, and deeply ingrained ideas practiced and embraced by members of a community [2]. Truths that have become customary or persistent in a particular region are called local wisdom. Local wisdom has many living values that must be explored,
developed, maintained, and preserved continuously. The local community's essential foundation lies in its adherence to local wisdom because it is the result of the culture of the past that continues to develop. Although its values are local, local wisdom has high and universal values. Learning is basically not just about gaining knowledge, since learning involves an individual's cognitive engagement with their surroundings, it leads to the generation of positive changes in behavior [1]. In biology learning, students are required to be active in expressing the main concepts of biological material both through observation, experimentation, image media, graphic media, table media, and communicating the results to others. For meaningful learning, not only effective learning approaches and strategies are needed, but also learning materials that contain material concepts that encourage students to develop mental activity, increase knowledge, and change behavior.

The primary goal of the National Education System is to nurture students' capabilities to evolve into individuals with faith in God Almighty, possessing noble character, good health, knowledge, creativity, independence, and the qualities of being democratic and responsible citizens [3]. In order for the goals of national education to be realized, components are needed to support the achievement of these goals such as the use of media as stated by Rusydi Ananda that learning media is a means used by teachers to deliver learning materials so that they can support the learning process by achieving goals, effective, efficient and attractive [4].

Utilizing educational media allows students to directly comprehend the lessons presented by the teacher, making the learning process more engaging [5]. However, the facts in the field found that the use of learning media in the form of modules did not make students interested in using modules as learning media because the content was general, and had too much writing with few illustrations. It is not much different from books in general which have many sheets and cannot be practiced directly by students, and the teaching material modules used do not integrate the character profile of Pancasila students such as faith, devotion to God Almighty and Noble Morals, Global Diversity, Mutual Cooperation, and Creativity.

In addition, the flow of globalisation can make the values of local wisdom fade. When viewed from the principle of life of local tribes, it has a very valuable meaning, which is like maintaining the balance of nature. The value of local culture is actually worthy of being used in learning to improve the quality of education. In line with Ogawa's opinion that each culture has its own knowledge and is related to the existence of that culture, it is said to be "Indigenous sciences" [6]. This shows the urgency of introducing local wisdom into the educational process. Because the values contained in local wisdom can help students understand the concepts of existing material, so that the provisions obtained are not only limited to knowledge, but direct practice outside school [7].

Introducing the value of local wisdom through learning is very in accordance with the dimensions of global diversity and mutual cooperation, namely maintaining culture, locality, and identity as well as care, one of which is caring for nature, because nature is God's entrustment so it needs to be maintained [8]. In harmony with Ibrahim Abdul Matin that we must guard, protect and manage all his gifts in a sustainable manner [9]. In this case, local wisdom has an abundance of nature and really needs to be introduced into learning such as through extracurricular or other student activities to make the nation's generation love local wisdom in maintaining the ecosystem [10].

Local wisdom now receives special attention from many stakeholders ranging from policies that have been issued by provinces and sub-districts which are then implemented through schools such as the authority of the Provincial Government in accordance with PP Number 25 of 2000 regarding curriculum development that aims to explore the potential in certain regions optimally [11]. The introduction of the value of local wisdom in learning in the independent curriculum is a government step to realize superior human resources and the character of the Pancasila student profile [12]. The profile of Pancasila students is a competency developed in educational units through intracurricular and extracurricular
activities [13]. The profile in question is having faith in fear of God Almighty, and having a noble character, independent, critical reasoning, global diversity, cooperation, and creativity [14].

From the description above, research and development of biology e-modules grounded in the local wisdom of the Baduy Tribe was carried out to strengthen the profile of Pancasila students in grade X students of SMAN 1 Rangkasbitung. Because the values of local wisdom have the potential to be used in biology learning [15]. Not only that, in relevant previous research, the development of learning media based on local wisdom of the Baduy tribe has been carried out on chemistry subjects with significant results affecting learning [16]. So, that the product developed has never been done by other researchers and has the advantage of integrating incorporating the local wisdom of the Baduy Tribe into the biology e-module on ecosystem materials, the existence of hadith, material explanatory interpretation, and a project to strengthen the profile of Pancasila students to support the strengthening of the profile of Pancasila students of grade X students.

2 Research Methods

This study adopts a research and development approach using Borg and Gall's model, which comprises ten stages: preliminary research and data gathering, planning, initial product development, preliminary field trials, revising based on initial trial results, conducting extensive product trials, revising the product based on extensive trial results, feasibility testing, and making final improvements to the product [17]. However, researchers only conducted up to stage nine, namely feasibility testing.

![Figure 1. Stages of Research and Development (R&D) [18]](image)

This research was carried out at SMAN 1 Rangkasbitung with development research respondents, specifically, students in the tenth grade at SMAN 1 Rangkasbitung during the academic year 2022/2023, in the even semester with a total of 43 students. In this research data collection techniques used interview methods, questionnaire instruments for examining material experts, media, and language to determine the feasibility of the e-modules developed, questionnaires of student and educator responses to test the practicality of products and also P5 questionnaires (Strengthening the Pancasila Student Profile Project) to test the effectiveness of the products used based on questionnaires adjusted to the P5 dimensions used, namely Faith, devotion to God Almighty & noble character, global diversity, mutual cooperation, and creativity. Observable in Table 1.
Table 1. Pancasila Student Profile Indicators

<table>
<thead>
<tr>
<th>No</th>
<th>Pancasila Student Profile Dimensions</th>
<th>Indicator</th>
<th>Question Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have faith, be devote to God Almighty &amp; have noble character</td>
<td>Religious, Morals to Nature, Morals to Man, Personal Morals</td>
<td>1,2,3,4,15,16,18,19</td>
</tr>
<tr>
<td>2</td>
<td>Global Diversity</td>
<td>Know the Culture, Respect Local Culture, Social Justice</td>
<td>5,6,7,8,21,22,23,24</td>
</tr>
<tr>
<td>3</td>
<td>Worked Together</td>
<td>Cooperate, Social Coordination, Care</td>
<td>9,10,11,12,25,26,28,29</td>
</tr>
<tr>
<td>4</td>
<td>Creative</td>
<td>Creating Original Works, Producing Original Works</td>
<td>13,14,27,30</td>
</tr>
</tbody>
</table>

The data used to measure the effectiveness of strengthening the profile of Pancasila students is seen from the average score obtained. The observation data and assessment questionnaire sheets provided to expert validators to provide assessments are analysed descriptively qualitatively, then the data from the questionnaire assessment results in the form of numbers with Likert-scale answer criteria are analysed descriptively quantitatively [19]. The data from the expert validation questionnaire were analysed using the formula below [20]:

Eligibility Percentage Formula

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

Where the description of 'p' is the percentage score sought, S is the value obtained, and N is the maximum value. The percentage values of validation results obtained are then interpreted according to Table 2 [21]

Table 2. Eligibility Criteria

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;21%</td>
<td>Not Eligible</td>
</tr>
<tr>
<td>21% - 40%</td>
<td>Less Eligible</td>
</tr>
<tr>
<td>41% - 60%</td>
<td>Decent Enough</td>
</tr>
<tr>
<td>61% - 80%</td>
<td>Eligible</td>
</tr>
<tr>
<td>81% - 100%</td>
<td>Very Worthy</td>
</tr>
</tbody>
</table>

E-modules of biology based on local wisdom are declared theoretically feasible if the percentage of feasibility is more than 61% [22]. Then use the same formula to calculate the results of student and teacher responses, which are then interpreted into the attractiveness criteria in Table 3 below. A product is said to be attractive if the percentage of value is more than 70% [23].

Table 3. Attractiveness Criteria

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% - 100%</td>
<td>Excellent</td>
</tr>
<tr>
<td>70% - 84%</td>
<td>Good</td>
</tr>
<tr>
<td>55% - 69%</td>
<td>Good Enough</td>
</tr>
<tr>
<td>40% - 54%</td>
<td>Not Good</td>
</tr>
<tr>
<td>25% - 39%</td>
<td>Bad</td>
</tr>
</tbody>
</table>
The e-module website, grounded in the local wisdom of the Baduy Tribe, serves as an educational platform for students to study ecosystem materials. It incorporates the Baduy Tribe's local wisdom, aiming to enhance the profile of Pancasila students through materials, projects, videos, and assessments. This e-module aims to strengthen the profile of students' Pancasila students. After users open the website link via the link (https://sites.google.com/view/emodul-ekosistem-sukubaduy-mfp/home), they will be directed to the welcome page (Figure 2A) and asked to tap the start button and will be directed to the prayer before learning page (Figure 2B). After that, it will be directed to the main menu display and students tap the available menu according to the command (Figure 2C).

![Website Display of Biology Rooted in The Indigenous Wisdom of The Baduy Tribe](image)

**Fig. 2.** Website Display of Biology Rooted in The Indigenous Wisdom of The Baduy Tribe

### 3 Results and Discussion

The design of the e-module website is created by incorporating the local wisdom of the Baduy Tribe, with the aim of reinforcing the character of Pancasila students, ecosystem material is compiled using Coreldraw X7 software and then compiled into the google site. This e-module is equipped with very complete and detailed features. As in ecosystem material consisting of learning outcomes, learning objectives, concept maps, Quranic verses, Hadiths, and tafsir which are about several materials such as the water cycle and concepts to protect the environment, assessments, videos, glossaries, and developer profiles.

Furthermore, the biology e-module website Emphasizing the enhancement of Pancasila students' characteristics, the design draws inspiration from the local wisdom of the Baduy Tribe.

#### 3.1 Research and Information Collecting

The initial investigation conducted by the researchers involves gathering information and identifying issues in the field, particularly concerning e-module learning media rooted in the
local wisdom of the Baduy Tribe, with the goal of reinforcing the profile of Pancasila students. Preliminary studies were conducted by disseminating student needs questionnaires and educator needs questionnaires, teacher interviews, student interviews. It is known that the use of learning media in the form of modules does not make students interested in using modules as learning media because the content is general and has a lot of writing with few illustrations is not much different from books in general which have many sheets and cannot be practiced directly by students. Not only that, the introduction of local wisdom values into learning has not been carried out to strengthen the profile of Pancasila students. 80% of the students of class X population do not know the local wisdom of the Baduy Tribe. Literature studies conducted from various relevant past studies show that local wisdom-based e-module products are feasible to be developed, easy to use, practical and effective, therefore researchers are interested in developing an e-module website grounded in the local wisdom of the Baduy Tribe, aiming to enhance the profile of Pancasila students.

3.2 Planning

The second step of this development stage is planning enveloping planning, materials, media, language. The material planning stage by collecting references from various general biology books, general science books, Quran science books, hadiths and tafsir adapted to the material, adjusting the values of local wisdom of the Baduy Tribe raised in the product. In line with Andes Safarandes Asmara, et al stated that, good teaching materials are the substance of material collected from competency standards or core skills given in the curriculum, easy to understand, have attractiveness, and easy to read.[24, p. 314] Then the design of The design of the e-module is inspired by the local wisdom of the Baduy Tribe using Corel Draw X7 which was compiled into the google site. Background selection of "Leuit Baduy" and "Sulah Nyanda" or baduy house. Color selection is adjusted to the characteristics of the material raised to make it more commensurate. Furthermore, language planning, in order to use language that is easily understood by students and other users that is adjusted to the correct writing rules.

3.3 Develop Preliminary Form of Product

The biology e-module website grounded in the local wisdom of the Baduy Tribe, aiming to enhance the profile of Pancasila students has material that is adjusted to learning outcomes, learning objectives. This e-module is integrated between biological sciences of ecosystem materials with local wisdom of the Baduy Tribe, the Quran, Hadith and Tafsir to be able to improve the profile of Pancasila students. Not only that, this product is equipped with assessments, videos, glossaries and task projects that must be done. Then presented other menus and also the profile of the e-module website developer. For more details, you can see the initial development of e-module website products based on local wisdom of the Baduy Tribe in the following picture.
Figure 3 shows the appearance of an e-module website that has various menus. The menu of learning outcomes and learning objectives (CP & TP) contains learning outcomes and learning objectives that must be achieved in the ecosystem material. In the material menu, there is an integration of material with the indigenous knowledge of the Baduy Tribe, the Quran, Hadith, and Tafsirnya. The LKPD menu is a student worksheet that must be done during learning. Not only that, there is a video and assessment menu to increase students' insight and test their understanding. Then the last menu has a developer profile. Not only that, the materials developed have been integrated with the local wisdom of the Baduy Tribe.

3.4 Preliminary Form a Product

The e-module website product that has been successfully developed is then validated to material expert validators, media experts and linguists using validation questionnaires that have been validated to expert lecturers. The results of material, media, and language expert validation involving two expert lecturers in their fields with two validation stages.
The outcomes of the initial expert validation (Stage 1) indicate a material expert approval rate of 76% (feasible), and in the subsequent stage (Stage 2), it reached 90% (very feasible). Similarly, the media expert validation yielded a percentage of 74% (feasible) in Stage 1 and 84% (very feasible) in Stage 2. Finally, the linguistic validation in Stage 1 resulted in a 66% approval rate (feasible), while in Stage 2, it reached 83% (very feasible) [21].

### 3.5 Main Product Revision

The revision made by the material expert to the product involves including a reference source for each used image, and place the image in a symmetrical center position, then provide input related to the hierarchy of concept maps that are still not suitable so that they can be improved, and also the addition of material to fit the concept. From the media expert lecturers, they provided several inputs, namely to provide reference sources in the prayer section before learning, vary the images on student worksheets to make them more interesting, and there are improvements for the back color on the concept map that is not cohesive. Input from linguist lecturers is errors in writing words, appropriateness in the use of hyphens, use of punctuation, waste of words or *pleonasms*, and the use of mismatched word diction in the instructions for using e-modules.

### 3.6 Main Field Testing

In this phase, the researchers carry out product trials to assess the reactions of both students and teachers towards the developed products. The small-scale test included 10 students from class X, and the extensive test encompassed 33 students from the same class. Data from the questionnaire of student responses were then analyzed to see the attractiveness on a limited and broad scale contained in Figure 5.
Fig. 5. Outcomes from surveys gauging student feedback on a small and large scale.

Apart from the questionnaire data regarding student responses, there is a biology teacher response questionnaire to assess the feasibility and attractiveness of the products that have been developed. The percentage of teacher responses was 91%. So that the product can be said to be very good and attractive.

3.7 Operational Product Revision

In this stage, researchers make adjustments according to the findings from both small-scale and extensive product trials to teachers and students that have been carried out. Improvements at the product trial stage based on student response questionnaires are easy to use, attractive, and so that they can be disseminated to be known by many people regarding e-module products. The result of the teacher's response is that the integration of local wisdom into the material is very good and can be used in the learning process.

3.8 Operational Field Testing

After the product is revised, the product is tested to students in learning to test the effectiveness of the product that has been developed to strengthen the Pancasila student profile in the results per Pancasila student profile indicator in the figure below.
Based on the average results of believers, devotion to God Almighty & noble morals obtained an average percentage of 88.5%, indicators with a global perspective with a percentage of 84.27%, indicators of mutual cooperation with an average percentage of 87.91% and creative indicators an average percentage of 79.79% with an average of 85.12% of the overall Pancasila student profile indicators so that the e-modules developed can strengthen the profile of Pancasila students participants educate.

3.9 Final Product Revision

After the Borg and Gall research stage was carried out and improved, it was obtained from the validation results of lecturers, material experts, media experts, and linguists, questionnaires of teacher and student responses. That the products that have been developed have good feasibility and can strengthen the pancasila students profile by proving the average results of the Pancasila student profile questionnaire obtained a value of 85.12% so that it is suitable for use in learning.

Pancasila learners are designed to respond to questions about the outcomes of the national education system.[25] The Pancasila Student Profile focuses on character building to improve the quality of education.[26] Character education has a major impact on how children survive and grow to be ready for the future.[27] Student profiles that are pancasila can combine several factors, including studying material related to social, environmental, health, and others so that students know the issues that are now important. To achieve the Pancasila student profile indicator, namely global diversity, local wisdom is applied in an independent curriculum. Students are expected to be able to maintain their own culture and not be eroded by other cultures and be able to filter foreign cultures that are useful and useful for the development of their capacity as students.[28] The following is the final product that has been developed, and can be accessed via the link (https://sites.google.com/view/emodul-ekosistem-sukubaduy-mfp/home)

![Average Score of Pancasila Student Profile Indicator](image)

**Fig. 6. Average Score of Pancasila Student Profile Indicator**
Conclusion and Advice

4.1 Conclusion

Drawing from the findings of the aforementioned research, it can be inferred that the biology e-module grounded in the local wisdom of the Baduy Tribe, aimed at enhancing the profile of Pancasila students, is deemed suitable for utilization. This is based on the suitability of the material feasibility component of 90% with the very feasible category. Eligibility in terms of media is 84% with the category very feasible. Language feasibility is 83% with a very decent category. Based on the results of student and teacher response questionnaires, the percentage of attractiveness scores was 83% in limited-scale student trials, 82% in wide-scale student trials, and 91% of the results of teacher response questionnaires with very feasible attractiveness criteria. The products developed can strengthen the profile of Pancasila students with an average result of 85.12%. So that the e-modules that have been developed can be used in learning and also become one of the reinforcements of the Pancasila student profile.

4.2 Saran

This research suggestion is that the e-module that has been developed is suitable for use by high school biology teachers as teaching material for topics related to natural phenomena and ecosystems. This aims to strengthen the profile of Pancasila students.
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