

Integration of Local Wisdom and Problem Based Learning Model in the Innovation of Biology Teaching Materials for Senior High School Students in Aceh - Indonesia

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Abstract: In this 21st century, Indonesia is increasingly serious in responding to issues related to the culture and knowledge of students. The solution offered to respond to these problems through education. One innovation in education is the innovation of teaching materials. This study aims to determine the validity of integrating local wisdom and the problem based learning model in teaching materials. This research is research and development adopting the Borg and Gall model. The data in this study were obtained from the results of validation by material experts (6 validators), expert learning models (3 validators), teacher responses (4 biology teachers), and student responses (12 students) from four high schools in West Aceh. Data collection instruments used in this study were expert validation sheets, teacher response sheets, and student response sheets using a scale of 1 to 4. Determination of samples was carried out using purposive sampling technique. Data analysis techniques use percentage descriptive statistics formula. The results of the study showed that (1) validation of the experts in the material with validity with an average value of 94.16% included the integration of materials of local wisdom of 93.75% and integration of material in PBL models as large as 94.04%, and (2) the validation of the expert learning model was valid with a value of 91.67%, and (3) the teacher response was very good (90.31%) and the response of students was very good (97.4%).

Keywords: Local Wisdom, Problem Based Learning, Biology Teaching Materials

1. INTRODUCTION

The issue of culture and knowledge is the subject of sharp discussion among today's society. The discussion was discussed in various writings both in print media, interviews and dialogues in electronic media. Various alternative solutions were proposed, one of which was widely raised to overcome, at least reduce the cultural problems or local wisdom and knowledge discussed through education, namely formal education in schools. Formal education is a learning process carried out in schools in a structured way aimed at transferring knowledge and providing a good example in shaping students who have affective, psychomotor, and cognitive values. The success of education at school is largely determined by the competencies possessed by a teacher, both pedagogic knowledge competencies and pedagogic competencies. Because what students learn depends on how students are taught by their teacher and however good an official curriculum is (National Research Council, 1996). Silaban (2015) stated, that the quality of learning is low when educators are only fixated on conventional teaching materials without creativity to develop the teaching material in an innovative way.

Good teaching materials are teaching materials that are developed in accordance with the needs of their use or the characteristics of students, curriculum, and the purpose of learning itself. Speaking of the suitability of teaching materials with its users can not be separated from the activities or activities carried out by students in community life. These habits are called local wisdom. Local wisdom refers to knowledge derived from community experience and is an accumulation of local knowledge (Didied, 2012). The application of local wisdom values in learning can provide a real learning process and can save the knowledge of local wisdom itself. Local culture and potential require strategic

functions for character formation and identity. The use of local wisdom in learning also ascertains that learning science does not merely understand the concepts, but also strengthen Indonesia's identity with its various cultures (Parmin., et al. 2015). Teaching science by connecting cultural value and modern science has a good relationship especially when teaching science for students from indigenous communities (Cobern and Loving, 2000).

Materials that are appropriate for a particular class need to have an underlying instructional philosophy, approach, method and technique which is suited for students and their needs (Kitao & Kitao, 1997). Whereas in terms of learning objectives, biology which is part of science should be taught using a scientific approach, one of the learning models of the scientific approach is the model of problem based learning. Problem Based Learning (PBL) is a learning model that can help students to improve the skills needed in this globalization era. Li, Huichun (2018) stated that PBL can still show its strengths in fostering skill development in terms of interdisciplinary learning, self-directed learning, problem solving skills, creative thinking, communication, as well as enhancing knowledge retention. Merits of PBL can be confirmed somehow across different national and cultural background, but the process and the result may differ significantly (Frambach et al, 2014). Zhou, Kolmos and Nielsen (2012) find that compared to traditional education method, PBL can serve as a useful way to develop students' creative thinking skills. PBL does contribute to an integration of learning (Becker, S., et al., 2003).

Along with the development of the curriculum, the utilization of teaching materials must be improved in quality. Teaching materials that present teaching materials in accordance with the demands of the curriculum, which follows the development of science and technology (Science and Technology), and can bridge learning so that the established competencies can be achieved are quality teaching materials. Therefore, the integration of local wisdom and problem based learning learning models need to be integrated into biology teaching materials. So that the availability of good quality biology teaching materials.

2. RESEARCH METHODS

2.1. Approach and Type of Research

The research approach used in this study is mixed methods, which is a combination of qualitative and quantitative approaches. The type of research used is research and development research by adopting a model developed by Borg and Gall, including: (1) preliminary study; (2) Product design; (3) Validation of product design; (4) Revision of product design; (4) Product testing; (5) Product Revision; (6) usage test; (7) Revision of product design; and (8) final product report. This research was only carried out at the trial stage in the small group.

2.2. Research Procedure

This research was carried out in stages (1) conducting observations and interviews related to the use of teaching materials with biology teachers in several high schools in the district of West Aceh, Aceh Province, (2) determining the teaching material by considering inputs from the observed and interviewed teachers. , (3) analyzing the material and compiling the material., (4) analyzing the local wisdom of the people of West Aceh according to the material that has been determined., (5) analyzing the problem based learning model syntax., (6) integrating the value of local wisdom and syntax of problem based learning models into teaching materials., and (7) validation and small group testing.

2.3. Instruments and Sample Research

Data collection instruments used in this study were expert validation sheets, teacher response sheets, student response sheets in scales 1 to 4. Expert validation was validated by material experts (6 validators), expert learning models (3 validators). Teacher response was validated by 4 teachers consisting of four high schools in West Aceh. While the student response was filled by 12 students consisting of four high schools in western Aceh, each of which contributed 4 students.

2.4. Data and Data Analysis Techniques

The data in this study are the results of the validity of integrating the value of local wisdom, character values and problem based learning models. Data analysis techniques to determine the integrity level

of integration are performed using statistical formulas from descriptive percentages. The data obtained from the analysis results are then interpreted in descriptive form as follows:

Table1. *Validity Rate of Integration*

Percentages (%)	Validation Criteria
76-100	Valid (no revisions needed)
56-75	Valid enough (no revisions needed)
40-55	Less Valid (need to be revised)
0-39	Invalid (need to be revised)

3. RESULTS AND DISCUSSION

3.1. Result

Validation results show that integrating local wisdom and problem based learning models in teaching materials is valid with an average score of 94.16%, which includes local wisdom with a score of 93.75% and the PBL model with a score of 94.04%.

Table2. *Validation Results of Material Integration Based on Local Wisdom and Problem Based Learning*

No	Aspects Assessed	Validators						Score (%)	Criteria
		1	2	3	4	5	6		
1	Integration of local wisdom	100	100	100	100	87,5	75	93,75	Valid
2	Integration of PBL Model	87,5	100	91,67	95,83	95,83	100	95,14	Valid
Average in Overall								94,16	Valid

3.1.1. Local Wisdom Integration

Validation of the integration of materials based on local wisdom in teaching materials is known that the average score is 93.75% with valid criteria which include an appreciation of Indonesia's potential wealth (91.67%) and concrete examples of local environment (95.83%).

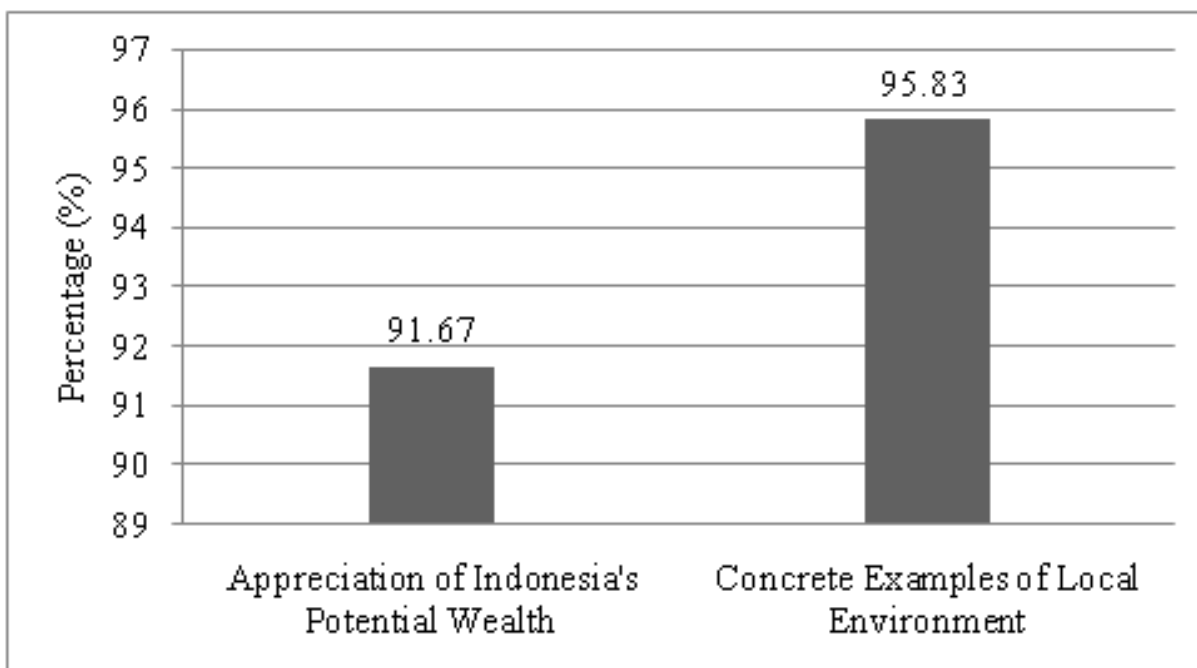


Figure1. *Feasibility Results of integration of materials based on local wisdom in teaching materials by material experts.*

3.1.2. Material Integration in PBL Models

Validation of the integration of material based on the problem based learning model in the teaching material is known that the integration is valid with an average score of 95.14% which includes the material at the problem identification stage of 95.83%, the material at the problem formulation stage is 100%, the material the hypothesis formulation stage is 91.67%, the material in the data collection is

95.83%, the material at the hypothesis testing stage is 87.50%, and the material at the data presentation stage is 100%.

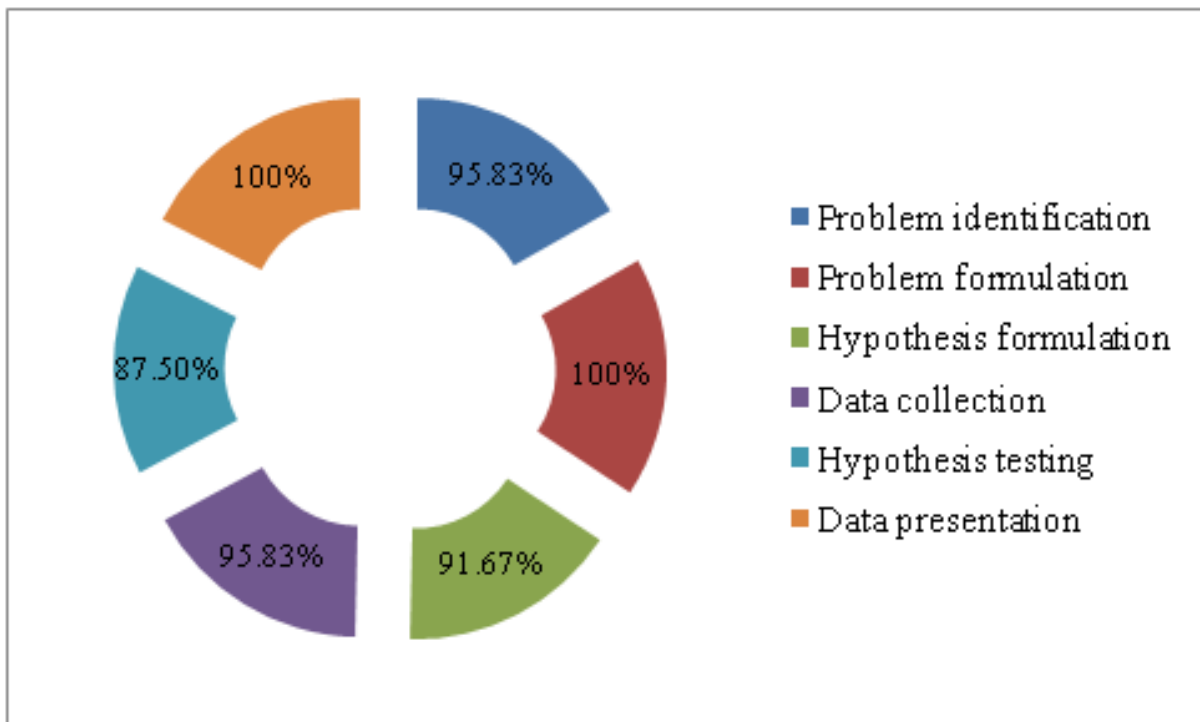


Figure2. Feasibility results of material integration based on model pbl in teaching materials by material experts

3.1.3. Integration of PBL Model Syntax in Teaching Materials

Validation of learning model experts on the integration of the problem based learning model in teaching materials shows valid results with an average score of 91.67% which includes the integration of the PBL model with a value of 83.33% and the presentation of the PBL model syntax with a value of 100%.

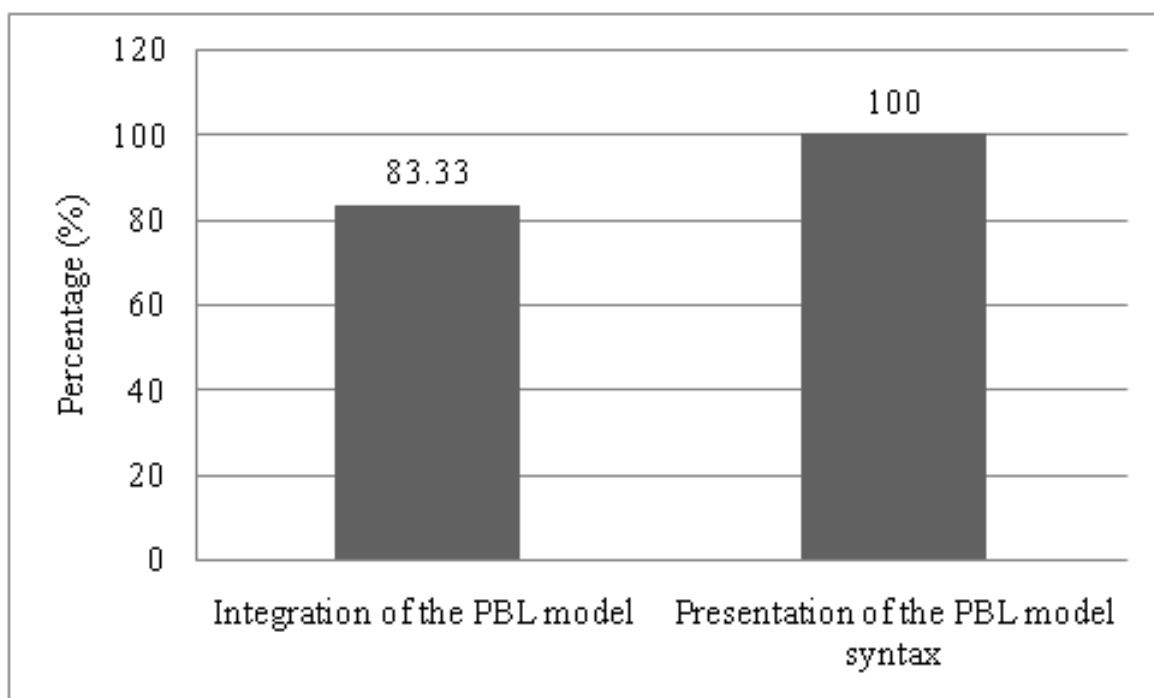


Figure3. Feasibility results of integrating PBL models in biological teaching materials by learning model experts

3.1.4. Teacher's Response

Teacher's response to the integration of materials based on local wisdom, character education, and PBL models in teaching materials showed that the criteria were valid with an average score of 90.31% which included the integration of materials based on Local Wisdom (93.75%) and PBL model (86.86%).

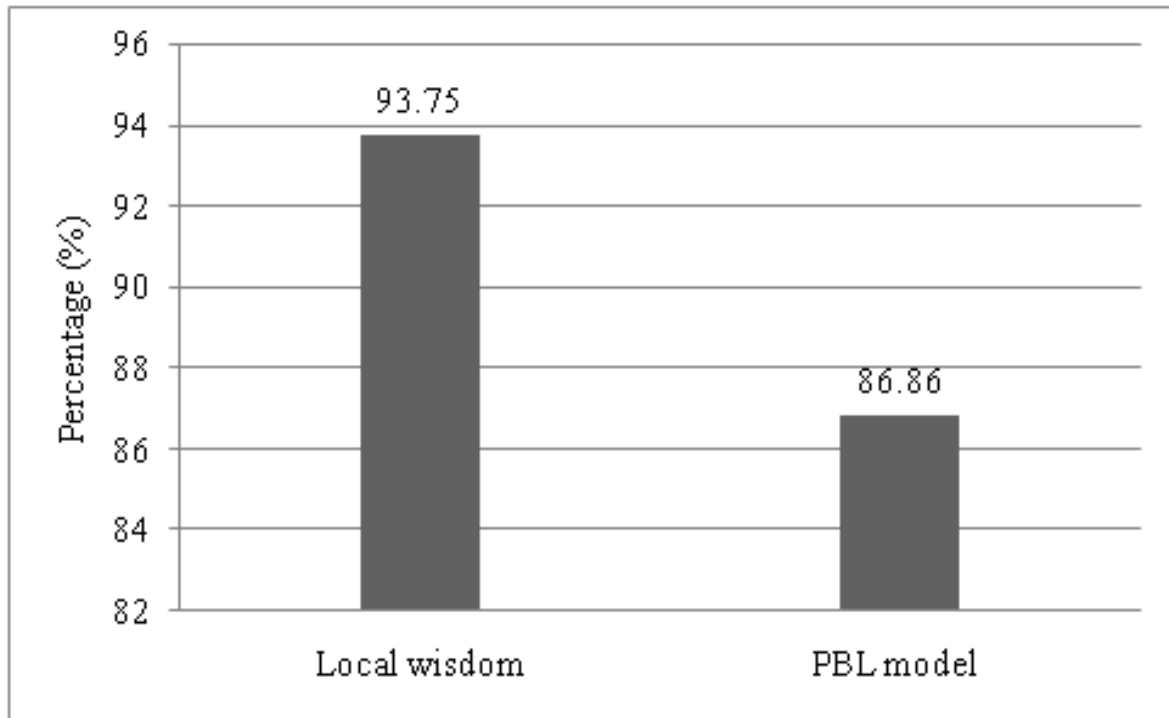


Figure4. Teacher response to the feasibility of integration of materials based on local wisdom and PBL models in teaching materials

3.1.5. Student's Response

Student responses to the integration of local wisdom, character education, and PBL models in teaching materials show valid criteria integration with an average score of 97.4% covering material according to the student environment (97.92%), appreciation of local wisdom (95.83%), pleasant learning (95.83%), and encouraging high-level thinking (100%).

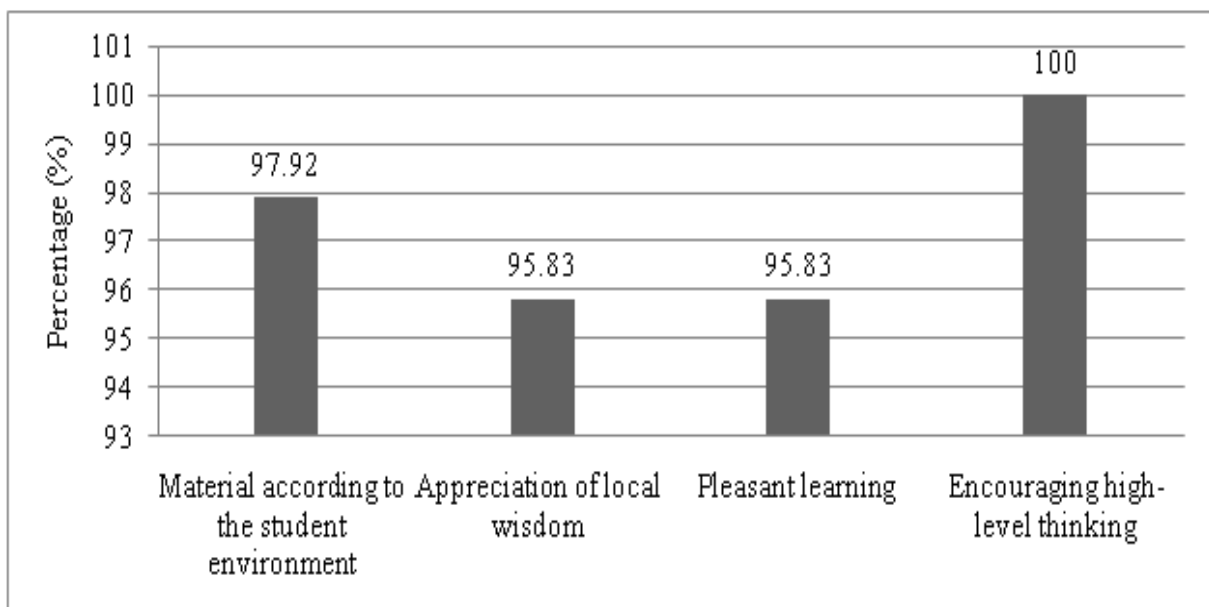


Figure5. Student Response to biology teaching materials based on local wisdom and PBL models

3.2. Discussion

Improving the quality of teaching materials can be done by conducting innovations in the development of teaching materials. Innovation in education is often associated with renewal that comes from the results of creative thinking, findings and modifications that contain ideas and methods used to overcome an educational problem. Innovation in the development of teaching materials serves to produce new teaching materials as the goal of achieving effective, efficient and efficient learning. These innovations can take the form of utilizing local knowledge and the application of learning models in the development of teaching materials. The implemented character education should be synergized to the local wisdom of each region because it has its own cultural values which could be guidances toward the attitude.

Development of biology teaching materials will give a new nuance in the process of learning biology. Where students not only have the ability to think, but students also have good character without leaving the values of local wisdom. Some advantages in the application of learning by linking science, technology, environment and society include making students better, namely the attitude of students more concerned about the environment (Kim & Roth, 2008).

The development of this teaching material was developed by integrating the values of local wisdom and the problem based learning model syntax into teaching materials that were developed through several stages, namely: (a) Analysis of material content., (B) Analysis of Acehnese local wisdom West., and (C) integrating PBL syntax.

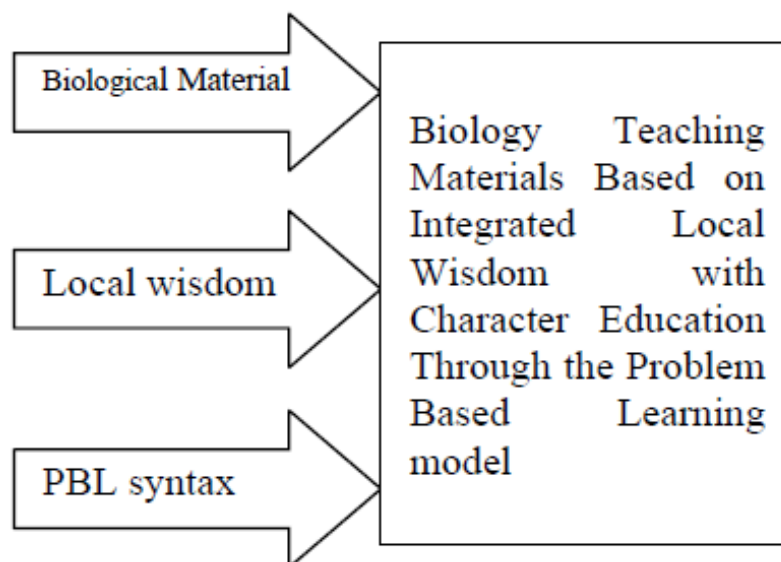


Figure6. *Development of teaching materials based on integrated local wisdom and PBL models.*

3.2.1. Analysis of Material Requirements

The results of interviews with Biology teachers in high schools throughout West Aceh District can be concluded that the material of biodiversity is an appropriate material used as teaching material in the developed teaching materials. In the learning process the teacher only uses textbooks without applying material that is real in accordance with the daily conditions of students. If observed, West Aceh is one of the districts in Aceh province that is rich in biodiversity. This is supported by its geographical location which consists of the sea, land and mountains and includes the leaser ecosystem area.

High school students in Aceh Barat in general have not been able to contribute to environmental preservation, including biodiversity. This was identified by the lack of participation of high school students in West Aceh in biodiversity issues. From the results of material needs analysis, a syllabus is then prepared that includes core competencies, basic competencies, subject matter, indicators, learning objectives, learning models, and assessment.

The results data obtained at the preliminary study stage become the basis for determining the product planning that will be developed along with the specifications and studies that will appear on the

learning device, then the study is explained in more detail with learning planning that begins with the formulation of competency standards, basic competencies, indicators learning, learning objectives, learning models, learning methods, and concept analysis of the study, so that the products developed are expected to be the basis for systematic learning planning and combine human elements, materials, facilities, equipment, and procedures that influence each other in achieving learning goals (Carol and Leslie, 2010).

3.2.2. Local Wisdom Integration

Each region has different local wisdom values. Local wisdom arises because of the knowledge, behavior, and effort carried out by the community somewhere in the relationship between humans and human relations with the environment. Biology as part of science learning, needs to learn the facts that are appropriate to the lives of students everyday. Science facts in everyday life that develop in society, so students can "literate" a science (OECD, 2009).

Local wisdom-based education is an educational praxis that has high relevance to life development skills, based on the empowerment of skills and local potential in each region. Implementation of local wisdom in the learning process can be done by integrating local wisdom values in the learning process. Local material can be sourced from all conditions and real life and the phenomena that exist in the environment around students. Furthermore, the local material developed is adapted to the core competencies and basic competencies and syllabus in accordance with the applicable curriculum.

Integrating local wisdom of the people of West Aceh is integrated into each chapter of teaching material. Local wisdom integrated includes (1) animals and plants that are often found in the West Aceh community; (2) the West Aceh Qanun concerning protecting the environment; (3) The current condition of West Aceh and natural disasters that have been experienced by the Aceh Bara Community; (4) The values / customs of the Acehnese people for environmental conservation; (5) Value of deliberation to get a collective agreement; (6) Acehnese plant and animal icons; (7) Mount Leuser biodiversity; and (8) Conditions of traders in the meulaboh market in West Aceh.

3.2.3. Integration of Problem Based Learning Models

The education recommended in each unit of education is education that is able to develop the potential of students so that those concerned are able to face and solve the problems of life they face. Problem based learning is a learner-centered learning model where students can observe, integrate theory and practice, and application or application of knowledge, skills development.

The learning process by using the PBL model of the teacher's task must focus on helping students, achieving self-directed skills. The teacher in this model acts as the presenter of the problem, asks questions, holds dialogues, helps find problems, and provides learning facilities. PBL learning process is a Student centered learning process that will be able to develop students' scientific thinking. Therefore, the PBL model is very suitable for use in the biology learning process.

In the instructional materials the results of this development are carried out by adopting the PBL Integration model syntax integrated into student performance activities, because the learning model is used when students do activities. The integration of the Problem Based Learning (PBL) model includes: (1) being aware of the problem, carried out by presenting real problems in the form of narratives and images in accordance with the material discussed. Problem information is prepared by containing information in the form of statements and problems presented indirectly; (2) the formulation of the problem, carried out by inviting students to formulate the problem formulation of the problems obtained from the information conveyed in each of the activities in the form of narratives and drawings. (3) formulation of the hypothesis, is carried out by inviting students to suspect the cause of the problem that arises before the data collection; (4) data collection, carried out by inviting students to collect data according to the problems presented in the form of observations, looking for references from books, the internet, and based on learners' experiences; (5) testing hypotheses, carried out by inviting students to answer the problems that have been formulated; and (6) presentation of data or formulating conclusions, carried out by inviting students to report on activities and communicate results in groups in front of the class. The use of the syntax or steps of the PBL learning model in the preparation of teaching materials aims to encourage students' high-level thinking skills (Hadi, K. 2017).

4. CONCLUSION

The results of this study indicate that the integration of the value of local wisdom and the problem based learning model syntax that are (1) validation of expert material with validity material with an average value of 94.16% which includes the integration of local wisdom material of 93.75% and the integration of material in the PBL model was 94.04%., and (2) the expert validation of the learning model was valid with a value of 91.67%, and (3) Teacher response and response of students are very good with grades of 90.31% and 97.4% respectively.

The value of local wisdom can be integrated into the teaching material in each chapter according to the instructional material developed. While the PBL model, teaching materials based on local wisdom are integrated into the PBL model syntax at the performance stage or student activities contained in the teaching material. This study still needs to test the effectiveness of the product.

ACKNOWLEDGMENTS

With humility the author expresses his gratitude and highest appreciation to the Directorate General of Research and Development of the Ministry of Research, Technology and Higher Education of the Republic of Indonesia who has been willing to finance this research in 2018.

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Citation: *Khairil Hadi, et.al. "Integration of Local Wisdom and Problem Based Learning Model in the Innovation of Biology Teaching Materials for Senior High School Students in Aceh – Indonesia " International Journal of Humanities Social Sciences and Education (IJHSSE), vol 6, no. 1, 2019, pp. 52-60. doi: <http://dx.doi.org/10.20431/2349-0381.0601006>.*

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