

Developing of Physics Learning Material Based on Floating Market Local Wisdom

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Abstract: We have researched the developing of physics learning material based on floating market local wisdom. The purpose of this research is to produce feasible physics learning material based on: (1) the validity of the learning material, (2) the practicality of the learning material, (3) the effectiveness of the learning material, and (4) the achievement of kayuh baimbai characters. This research is a research and development using 4D model. The instruments of this research are learning material validation sheet, questionnaire, learning outcomes test and character assessment sheet. Subject of the study were 40 students of class XI IPA 1 of SMA PGRI 6 Banjarmasin. The result of the research showed that: (1) the validity of learning material was adequately valid, (2) the practicality was categorized as very practical, (3) the effectiveness of the learning material was very effective, and (4) the achievement of kayuh baimbai character was good. Based on the results of the research physics learning material is feasible to use in learning process.

Index terms- Learning Material, Local Wisdom, Floating Market

I. INTRODUCTION

Education is a process of a nation preparing young people to live a life and meet the life goal effectively. Law of the Republic of Indonesia (RI) No. 20 year 2003 on National Education System Chapter 1 section (1) defines education as a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing their potential to have spiritual power, self-control, personality, intelligence, noble character, and skill that is needed for them, and society of their nation. A social phenomenon that is often found today is the decreasing of mutual respect and appreciation among human being. This is due to the rapid flow of globalization, while current education is not capable of being a filter for it. Developing of values and norms that is only learned on the subject Citizenship Education (Civics) and Religious Education is not enough, especially the abolition of the local content in schools. Therefore, the learning content about cultural and environmental is needed, not only in Civics and religious education subjects but also other subjects such as natural sciences, especially physics. The cultural background of the learners brought a greater effect in the educational process than the effect provided by the instructors, in this case teachers .

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Local wisdom is essential element incorporated into learning process .Local wisdom is something that is obtained by the society after a longtime. Local wisdom is a very valuable asset and must be preserved.Value of local wisdom is a strong inherent tendency on the individual to form the patterns of thought and behavior in deciding the good and the bad . Physics learning contained of local wisdom will produce fun and easy learning to be imagined by the students because it is very close to students' life. The learning process that integrated local wisdom and physics will help the process of character building. It is because in physics there are spaces that can be used as a tool in developing the educational values of character contained in the local community's life.Learningoriented local wisdom improves sudantes' problem-solving skillseffectively .

Based on the observation that has been done in SMA PGRI 6 Banjarmasin, the physics' learning process has not contained the local wisdom of Banjarmasin as the regional identity. Besides that, there has no physics teaching material for senior high school which is used as an intermediary between local wisdom of Banjarmasin and fluid physics material.This makes learning physics meaningless at school.One of local wisdom in Banjarmasin, South Kalimantan is floating market. In the 1950s, almost all Banjarmasin community activities are supported by the river and boat. Transportation activities to trade are also conducted on rivers and boats. Even river and Banjar trader are two things that cannot be separated. The existence of *jukung* or small boat which can float on the water can be explained by Archimedes Law in physics on fluid material.

Local wisdom value contained in floating market *iskayuh baimbai*. *Kayuh* has the meaning of paddling and *baimbai* means together. *Kayuh baimbai* can be interpreted as joint work is more successful than by self. Cooperation has become a living character in Banjar society that was born and raised in a rich river region. These values manifested in people's daily lives at work or hold Banjarmasin traditional rituals. Cooperation is a very important requirement for humans in living. Without cooperation then this life is extinct[1]-[7] .

One of the connections between the local wisdom and physics material is through learning material in the form of a module. The module is fully and systematically packaged with a set of planned learning activities designed to assist students to master specific learning objectives either with or without the facilitator . Module can be used for students to learn independently so that it can fit to

learning level of each student .A module that would be an intermediary to build *kayuh baimbai* local wisdom to the students. That local moral value is accustomed to the students in order to form the character. It is need an educator’s effort to develop learning materials based on the needs and to promote wisdom where the students live . Development of physics module contained local wisdom is needed to improve the character and to complete students’ learning[8].

Based on these, the development of learning materials in the form of physics module of fluid material contained floating market culture is done. Through this development, it is expected to produce suitable learning material based on validity, practicality, effectiveness, and achievement of *kayuh baimbai* character. This study is expected to give contribution in the field of physics which can develop science knowledge with local wisdom based and can be as an alternative to improve the quality of physics learning quality[9].

II. METHODOLOGY

A. Method

The method used in this research was Research and Development (R&D) with 4D development model developed by Thiagrajan The main stages in the development of 4D are Define, Design, Development and Dissemination. The development of physics learning material using 4D model is shown in table 1.

Stages	Activity	Output
define	analysis of curriculum, material, characteristics of students and	the description of curriculum
design	design of material, lesson plan and prototype	module prototype, instrument
development	development of product and validation	data and expert validator comment
dissemination	trial on actual condition	data and students’ comments

Table 1. Development of 4D model

B. Subject of Study

Subject of study in this research was 40 students of class XI IPA 1 SMA PGRI 6 Banjarmasin, South Kalimantan. The subject consisted of 9 boys and 31 girls aged 16 to 18 (100%). The subject of study was chosen by using purposive sampling technique. The election of subject of study on class XI IPA 1 is because the fluid material in the developed module with floating market local wisdom based was learned by science class students in class XI of Senior High School.

C. Instrument and Data Analysis

Instrument used in this research and development shows in table 2. Data of learning material validity were validate by 3 experts, and practicality, affectivity, and the achievement of *kayuh baimbai* character were taken from the 40 students as the subject of the study.

Aspect	Instrument
validity	validation sheet
practicality	questionnaire
effectiveness	learning outcomes test
kayuh	sheet of character

Table 2. Instrument of the research

In analyzing the validity of teaching material, an equation by Akbar (2011) was used. Validation value that has been analyzed then compared to the specified validity criteria in Table 3 .

Interval	Category
85.01% - 100.00%	strongly valid
70.01% - 85.00%	adequately
50.01% - 70.00%	less valid
0.0% - 50.00%	Invalid

Table 3. Validity criteria of the learning material

Teaching material practicality was analyzed by using an equation by Widoyoko (2016). Learning material practicality criteria are shown in table 4 (Widoyoko, 2016).

Interval	Category
$X > 4.21$	very practical
$3.40 < x < 4.21$	Practical
$2.60 < x < 3.40$	fairly practical
$1.79 < X < 2.60$	less practical

Table 4. Criteria of practicality learning material

Analysis of the result of students was done by using normalized gain equation (N-gain) Table 5 shows the effectiveness criteria of learning material (Hake, 1998).

Value	Category
$(\langle g \rangle) \geq 0.7$	very effective
$0.7 > (\langle g \rangle) > 0.3$	effective
$(\langle g \rangle) < 0.3$	less effective

Table 5. Effectiveness criteria of the learning material

Kayuh baimbai character achievement was analyzed by using equation by Widoyoko (2016). Table 6 shows the students’ achievement criteria.



Interval	Category
$X > 4.21$	excellent
$3.40 < x < 4.21$	good
$2.60 < x < 3.40$	fair
$1.79 < X < 2.60$	poor

Table 6. The criteria of achievement of students' character

Reliability value of the instrument was analyzed by using Alpha formula. The reliability value then compared to the category shown in table 7.

Interval	Category
0.81-1.00	very high
0.61-0.80	high
0.41-0.60	fair
0.21-0.40	low
0.00-0.20	very low

Table 7. The criteria of reliability

III. RESULTS AND DISCUSSION

A Product of Development

Figure 1 is a product of the development result of physics learning materials on fluid material for high school/ Islamic high school students. Physics learning material is developed based on floating market culture and *kayuh baimbai* character. Learning material consists of five experiments about fluid material. One of the development of learning materials is done by incorporating the floating market culture activities on the fluid material that is the use of jukung. Jukung is used as a means of transportation on rivers in Banjarmasin city. Jukung which floats on the river can be connected to the law of Archimedes. In addition, when floating market merchants use jukung to depart and return from the floating market, they are always together. This cooperation in Banjar is called *kayuh baimbai*. *Kayuh baimbai* character is trained to students through the module at the corner of local wisdom. In addition, the character of *baimbai kayuh* is also trained to the students when the students work on worksheets contained in the module. The developed module is complemented by illustrations of floating market cultures associated with fluid materials. This is what distinguishes the developed module with the existing modules.

The structure of learning material developed suitable with National Education Department (2008) that contains of some components, they are: (1) opening section which consists of title, table of contents, list of figures and lists tables. (2) core section comprises of (a) introduction; (b) relationship with other materials or concept maps; (c) description of the material that its systematical namely: learning activity, competency purpose, description of material, formative test, assignment, summary, feedback on

assessment. (3) closing section consists of a glossary or list of terms, final test and index.

The key is to form an appropriate logical relationship between the needs of learners, learning objective, results' assessment criteria, resources, strategy and evaluation of learning and teaching in the process of designing a learning material (Artilasari, 2013). Learning material is a package of teaching which accomodates one concept from lesson instruction (Kusmiyati et al, 2014).



Figure 1. Product of physics learning material

B. Validity

Results validation of learning materials is shown in table 8. Assessment's aspect of developed validation of learning materials includes format, language, content, presentation, and benefit. The result of the analysis shows that developed learning material has 82.25% of validity and categorized as adequately valid. Reliability if learning material is 0.75 and categorized as high. The result of developed learning materials validation shows that the learning material is valid to be used. Learning materials in the form of module which is developed should be suitable with learning objective that facilitate students to learn independently (Nana, 2012). To produce a good learning material it needs to be designed and developed based on some elements such as format, organization, attraction, font size, empty space and consistency (Daryanto, 2013).

aspect of assessment	Percentage (%)	Category
format	84	adequately valid
language	81.25	adequately valid
fill in the Module	82	adequately valid
presentation	80.75	adequately valid
benefits	83.25	adequately valid
average	82.25	adequately valid
reliability	0.75	High

Table 8. Results validation of learning materials

C. Practicality

Practicality of learning material is shown in table 9. Indicator measures the practicality of learning material are user convenience, benefit, and efficiency of learning time. Result of learning material’s practicality analysis categorized as very practical for indicator of user convenience, practical for indicators of benefit and practical for efficient learning time. Average category for these three indicators is practical. Reliability of the learning material practicality is 0.72 with high category. This shows that the learning material is practical to use in physics learning. According to Prastowo (2015), the function of teaching material, in this case the module, can save teachers’ time in teaching, change the role of the teacher becomes a facilitator, and make the learning process becomes effective, interesting and interactive. In addition, the product is said to be practical when it is easily used. Physics learning materials based on local wisdom that is practically used can be motivated students to follow the learning in the classroom [20]-[15].

Indicator	Average	Category
user Convenience	4.30	very practical
benefit	3.93	practical
efficiency of Learning Time	4.10	practical
average	4.12	practical
reliability	0.72	high

Table 9. Practicality of learning materials

D. Effectiveness

Effectiveness of learning material is shown in table 10. Effectiveness of developed learning material in this research is analyzed based on the score of students’ pre-test and post-test. The result from the test will be calculated with N-gain (Hake, 1998). Score of N-gain obtained is 0.81

categorized as very effective. Reliability of instrument effectiveness is 0.69 with high category. Learning material is very effective when its existence could meet participants’ needs in learning process at the class .

There are four requirements for a material is said to be effective, they are: student activity are met, student responses through the teaching material are positive, teachers’ high ability in managing learning process and the percentage of mastery of student learning are met. The development of science module based on local wisdom help students to construct knowledge and reality in the environment[8]-[16].

mean of Pre-test	mean of Post-test	N-gain	category	Reliability	category
11.27	83.29	0.81	very effective	0.69	high

Table 10. Effectiveness of learning materials

E. Kayuh Baimbai Character

Achievement of *kayuh baimbai* character is shown in table 11. Instrument of assessment of *kayuh baimbai* character is character assessment sheet. Instrument reliability of *kayuh baimbai* character achievement is 0.74 with high category. *Kayuh baimbai* character means cooperation . Indicator of attitude cooperation in this research is willingness of students to accept distribution of group task, willingness of students to utilize of time discussion, willingness of students to create a familiar atmosphere within the group, participation of students to give opinion during discussion, willingness of students to receive friend’s opinion, willingness of students to give information they know to help completing group task, willingness of students to solve problem during group discussion, willingness to accept decision made by group, willingness of students to keep the group constantly compact and participation of students in doing group discussion report together. The result of character achievement analysis of each indicator is categorized as good. It shows that in the learning process, students can work together. The character which must be developed in the education is the character that comes from the local wisdom communities. Character education is as important as mastery knowledge and skills to use technology. Cooperation’s character could be measured by using indicators, such as clear and open objective, and honesty in communication, cooperative decision making, trust, sense of belonging, skills of good listening and participation of all. Cooperation activities are a positive action to support deep knowledge and high level thinking skills .



Aspect of review	Average	Category
Aspect of willingness of students to accept distribution	3.71	good
Aspects willingness of students to utilize of time	3.55	good
Aspects willingness of students to create a familiar atmosphere within the group.	3.61	good
Aspects of students' participation of students to give opinion during	3.40	good
Aspects of willingness of students to receive friend's	3.58	good
Aspects of willingness of students to give information they know to help completing	3.83	good
Aspects of willingness of students to solve problem during group discussion	3.61	good
Aspects of willingness to receive decision made by	4.36	excellent
Aspects of willingness of students to keep the group	4.15	good
Aspect of participation of students in doing group discussion report together.	3.59	good
Average	3.74	good
Reliability	0.74	high

Table 11. Achievement of *kayuh baimbai* character

IV. CONCLUSIONS

Based on the result of testing and development, it can be concluded that physics' learning material about fluid material contained of floating market culture and *kayuh baimbai* character is feasible to be used. This is supported by the validity of the developed learning material which categorized as adequately valid, the practicality of learning material is categorized as very practical, the effectiveness of learning material is categorized as very effective and the achievement category of *kayuh baimbai* character was good.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

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