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# The Effectiveness of Physics Learning Material Based on South Kalimantan Local Wisdom

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**Abstract.** The local wisdom is essential element incorporated into learning process. However, there are no learning materials in Physics learning process which contain South Kalimantan local wisdom. Therefore, it is necessary to develop a Physics learning material based on South Kalimantan local wisdom. The objective of this research is to produce products in the form of learning material based on South Kalimantan local wisdom that is feasible and effective based on the validity, practicality, effectiveness of learning material and achievement of *waja sampai kaputing* (*wasaka*) character. This research is a research and development which refers to the ADDIE model. Data were obtained through the validation sheet of learning material, questionnaire, the test of learning outcomes and the sheet of character assesment. The research results showed that (1) the validity category of the learning material was very valid, (2) the practicality category of the learning material was very practical, (3) the effectiveness category of the learning material was very effective, and (4) the achievement of *wasaka* characters was very good. In conclusion, the Physics learning materials based on South Kalimantan local wisdom are feasible and effective to be used in learning activities.

## INTRODUCTION

Physics is a branch of natural sciences which has an important role in the formation of the personality and intellectual development of learners. This is in line with the Regulation of the Minister of Education and Culture No. 22 Year 2006 that the purpose of science teaching in schools is to enable learners not only to develop knowledge, understanding, positive attitude, and skills, but also have interest to learn objects or events in the environment. Therefore, the ideal science learning should be characterized to shape the personality of learners and is expected to be realized well in school. Ideal science instruction has not been realized as expected until now. Students only acquire theoretical material without direct application in daily life. In addition, the rapid influence of foreign cultures that enters Indonesia becomes an obstacle in the formation of noble character of the students. This leads to less meaningful learning and character formation of students becomes difficult to do. Overcoming these problems education in schools can be integrated with local wisdom. Local wisdom-based education is the education which is based more on the enrichment of cultural values. Wisdom is a knowledge born from the experience of the community and the accumulation of local knowledge that can arise from thought, attitude, and behavior [1]. Local wisdom-based learning teaches students to stay close to the concrete situations that students encounter every day [2]. Integrating local wisdom in the learning process is very potential to bring about an innovation with novelty [3]. Culture-based learning can provide opportunities for learners to create meaning and achieve an integrated understanding of obtained scientific information [4].

Based on observations and interviews at SMP Muhammadiyah I Banjarmasin, materials that are based on local wisdom have not been used in science learning in this school. During this time, students use integrated science supplementary book from publishers. Based on the results of the analysis, the integrated science supplementary book used by schools only discusses materials and exercises. Even many questions have no material description to get the answer. This is in line with the statement asserted by Martawijaya [5] that there is a tendency in which Physics books that are currently circulated in the field does not massively indicated the existence of the development effort

of Core Competence 2 Competence (attitude) in the form of character behavior. Another problem is the distinct way and pace of the material absorption from each student. In addition, the learning process that tends to use lecture method makes students passive, silent, lazy to write, and easily bored. This case results in the average value of student learning outcomes which is below minimum passing criteria (KKM, a used term in Indonesia). Students' scores only reach an average of 59.5 below the established KKM score of 70. Therefore, there is a need of a learning product which is capable of optimizing students' learning according to their pace of absorption.

Students who are easily bored during learning activities need instillation of strong character to work hard and be responsible. The character of *wasaka* is a character that can be instilled to the students and become the life motto of people in South Kalimantan. *Wasaka* is a character of hard work, never giving up with a strong determination and responsible for completing an effort that has been done in the process of achieving a goal [6]. In addition, one of the local wisdoms in the community of South Kalimantan is the making of *marning gumbili*. *Marning gumbili* is a typical Banjarmasin snack made from cassava, different from other regions which are made from corn. *Marning gumbili* is similar to chips. The difference is flat round chips while *marning gumbili* shaped small sticks. Therefore, the making of this *marning gumbili* snack can be integrated with the heat materials in science subject so that students can grasp real learning. Incorporating cultural knowledge in the learning process can assist students in linking science and developing a positive cultural identity [7]. Students are expected to be motivated and have a strong determination to work hard and be responsible for achieving the learning goals. Based on the background, the researchers developed learning material based on local wisdom of South Kalimantan. The developed learning material is a module on the heat subject. In this module, there are corner *wasaka* characters consisting of worksheets that contain the heat experiments relating to the making of *marning gumbili*. In addition, there are also practical exercises to apply the concepts of physics. To be able to complete these activities students must instill a hard working attitude and responsibility in accordance with the character of *wasaka*. The objective of this research is to produce products in the form of learning material based on local wisdom of South Kalimantan that is feasible and effective based on the validity, practicality, effectiveness of learning material and achievement of *wasaka* character.

## METHOD

### Research Design

This study is a research and development. This study developed learning material using ADDIE model consisting of five stages: *analysis, design, develop, implement, and evaluate* [8]. The site of the field tryout in this study was SMP Muhammadiyah I Banjarmasin. This study was conducted in the odd semester of the academic year 2016/2017. The subjects of the experiment in this study were the seventh grade students of SMP Muhammadiyah I Banjarmasin.

The instruments used in this research were validation sheet of the learning material, questionnaires, test of learning outcomes, and observation sheet of *wasaka* character. The data analyzed in this research were the validity, practicality, and effectiveness of learning material, as well as the achievement of the *wasaka* character.

### Technique of Data Analysis

Learning material is valid if there is a match between the guidance of the preparation of learning material and constructed instructional material. The suitability of the learning material with the guidelines was calculated using the equation (1).

$$\text{Validation Percentage} = \frac{X}{X_{max}} \times 100\% \quad (1)$$

Where are  $X$  = the total of the obtained scores and  $X_{max}$  = maximum score.

The validation result was compared with the validation criteria of the learning material. Table 1 shows the validation criteria of learning material [9].

**TABLE 1.** Validity criteria of the learning material

No	Average Value	Validity Criteria
1	80% - 100%	Highly valid
2	65% - 79%	Valid
3	55% - 64%	Less valid
4	< 55%	Not valid

The practicality of the learning material was analyzed through student response in the questionnaire. The practicality of learning material included three aspects: ease of use, benefit and efficiency of learning time [10]. Table 2 shows the practicality criteria of learning material [11]

**TABLE 2.** Practicality criteria of the learning material

No	Interval	Category
1	$X > 3.25$	Very practical
2	$2.50 < X \leq 3.25$	Practical
3	$1.75 < X \leq 2.50$	Fairly practical
4	$X \leq 1.75$	Less practical

The effectiveness of the learning material was analyzed based on the scores from the test of learning outcomes through pretest and posttest [12]. The analysis was performed using the normalized gain (N-gain) equation (2).

$$\langle g \rangle = \frac{\% \langle s_f \rangle - \% \langle s_i \rangle}{100 - \% \langle s_i \rangle} \quad (2)$$

Where  $\langle s_f \rangle$  = score from posttest and  $\langle s_i \rangle$  = score from pretest.

The analysis result of the learning result test was compared with the effectiveness criteria of the learning material [12]. Table 3 shows the effectiveness criteria of learning material.

**TABLE 3.** Effectiveness criteria of the learning material

No	Value	Category
1	$\langle g \rangle \geq 0.7$	High/very effective
2	$0.7 > \langle g \rangle \geq 0.3$	Moderate/effective
3	$\langle g \rangle < 0.3$	Low/less effective

The analysis of *wasaka* character was conducted by using the average scores obtained from the observation sheets during the learning process [13]. Table 4 shows the students' achievement criteria [11].

**TABLE 4.** The criteria of the achievement of student character

No	Interval	Category
1	$X > 3.25$	Very good
2	$2.50 < X \leq 3.25$	Good
3	$1.75 < X \leq 2.50$	Fair
4	$X \leq 1.75$	Poor

## RESULT AND DISCUSSION

### Product of Research and Development

The product of this research is learning material. The developed learning material is a module on the heat subject based on South Kalimantan local wisdom, namely the making *marning gumbili* and *wasaka* character. This module is systematically designed to teach a specific material in order to achieve the learning goals. The developed module consists of three main parts. The first part is an opening section consisting of cover page, introduction, table of contents, introduction (including module usage guidelines, competency standards, basic competencies, indicators and learning objectives). The core section consists of an introduction to a module explaining *marning gumbili*'s creation, concept maps, chapter titles, keywords, material descriptions, wasaka character corners as learners worksheets, and summaries. The closing section consists of exercise questions, competence tests, bibliography and glossary or list of terms and formative tests key answers. This is in accordance with the standards modul of the Ministry of National Education in which the module consists of three main parts: the opening, the core and the closing section [14].

### Validation of Learning Material

The results of the learning material validation analysis based on the content aspects are shown in Table 5. Validation results from the content aspect showed very valid category with the percentage of 80. This indicates that there was conformity of the content of the learning material with the guidance of the preparation of learning material, so the learning material is valid to be used. The reliability coefficient was 0.72 and categorized in high index. This shows that both validators were objective in filling the module validation sheet to obtain good reliability.

TABLE 5. Validation results of the content of learning material

Assessment Aspects	Mean	Category
Content Quality	3.00	Good
Organization	4.00	Very good
Language	3.38	Very good
Evaluation	3.00	Good
Validity	80.00%	Highly valid
Reliability	0.72	High

The results of the learning material validation analysis based on the displays aspects are shown in Table 6. The validation result of the learning material display showed very valid category with the percentage of 86.54. It shows that the appearance of the learning material has been in accordance with the guidance of preparation on aspects of consistency, format, attractiveness, shape and size of letters, and linguistics. The reliability coefficient of learning material was 0.70 with high category. It also shows that both validators filled out validation sheets objectively.

TABLE 6. Validation results of display of learning material

Assessment Aspects	Mean	Category
Consistency	3.33	Very good
Format	4.00	Very good
Attractive appeal	3.25	Good
Font type and size	3.50	Very good
Language	3.50	Very good
Validity	86.54%	Highly valid
Reliability	0.70	High

Based on the validation results of content and display aspects, very valid category, and high reliability were found. The results of this validation indicate that the developed learning material is valid and reliable for use in learning. Retta [15] states that "learning material in the form of module is said to be valid in terms of content and the material on the module is in accordance with the purpose of learning. In terms of construct, the precision of the

module is used in the learning as well as the use of the language in the module in accordance with the EYD (Enhanced Spelling)". In addition, Munadi [16] states that "learning material in the form of module is designed for self-learning systems with a whole and systematic learning program; contains objectives, material/activities, and evaluation; is presented in communicative, two-way form; can replace some teachers' roles; focused and measurable discussion coverage; concerned with users' learning activities".

### The Practicality of The Learning Material

The practicality of learning material measured included three indicators: ease of use, benefits, and efficiency of learning time [17]. Table 7 shows the results of the analysis of the practicality of learning material. The result of practicality analysis revealed very practical category with an average value of 3.34. This shows that the learning material is used practically by students. Sudarman [18] states, "learning material in the form of module is said to be practical if the implementation is easy and in a relatively short time". This is in accordance with the Ministry of National Education's [14] statement, "the function of learning material in the form of module is to overcome the limitations of time, space, and teachers/mentors, can be used appropriately and varied such as to improve motivation and passion of learning, students can evaluate their own learning outcomes".

TABLE 7. Analysis results of the practicality of the learning material

No	Indicator	Mean	Category
1	Ease of use	3.18	Practical
2	Benefits	3.40	Very practical
3	Efficiency of learning time	3.44	Very practical
	Mean	3.34	Very practical

### The Effectiveness of The Learning Material

The effectiveness of learning material was analyzed based on the scores of students' learning result test. Table 8 shows the effectiveness of learning material that has been developed. The result of analysis based on normalized gain (N-gain) test showed <g> value of 0.72 with very effective category. Based on these results, more than 70% of students are able to achieve the value of KKM that has been established by the school. This shows that the learning material developed is effectively used in the learning process. Proklamanto [19] also stated that learning outcomes are said to be effective if the number of students who reach KKM is at least 70% after using the developed learning module.

TABLE 8. The effectiveness of the learning material

Mean of pretest	Mean of posttest	N-gain	Category
10.70	75.27	0.72	Very effective

### The Achievement of Students Character

The *wasaka* character that becomes the focus of the observation was responsibility and hard work. Table 9 shows the achievement of students characters. The analysis results showed that the achievement of the *wasaka* character was categorized very good. This shows that students are able to strive and be responsible for achieving learning objectives. Sarbaini et al., [6] state that "the character of *wasaka* means effort to the end to achieve a goal". This is supported by Martawijaya [5] who states that learning material (Physics books) inserted content-based content of local wisdom can improve the character and mastery of learners. Similarly, research conducted by Mannan [20] also indicated that the development of learning tools based on local wisdom can develop positive characters of learners.

**TABLE 9.** The achievement of student character

No	Character	Meeting	Mean	Percentage (%)	Category
1		I	3.31	82.81	Very good
2	<i>Waja Sampai</i>	II	3.51	87.81	Very good
3	<i>Kaputing</i>	III	3.68	91.87	Very good
4		IV	3.69	92.19	Very good
	Total		3.55	88.67	Very good

Based on the results of validation, the practicality and effectiveness of learning material as well as the achievement of the wasaka characters, the developed Physics learning material based on local wisdom of South Kalimantan are feasible and effective in learning. Physics learning integrated with local wisdom makes students understand the learning material easily, meaningful and has an effect on students learning outcomes. Parmin [7] states when students learn science and information from environments that have similarities to the concepts of scientific knowledge being studied in schools have the opportunity to gain great attention in memory. Satriawan, et.al [3] also state that by integrating local wisdom on context-based Physics learning material, it is expected to make it easier for students to understand and grasp Physics lessons. In addition, students can take lessons from the phenomena of Physics that are contained in the learning material in the form of moral messages as a local wisdom, so the understanding of Physics and moral concepts of students becomes better. This is also in line with Saputra's [21] study in which students' learning outcomes are thoroughly classical using local wisdom based natural science module.

## CONCLUSION

The results of the development and field testing of Physics learning material based on local wisdom of South Kalimantan show the following: (1) the validity of material is on with highly valid category; (2) the practicality of learning material is on very practical category; (3) the effectiveness of the learning material is on highly effective category; and (4) the achievement of *wasaka* character is on very good category. Based on these results, the developed Physics learning material based on local wisdom of South Kalimantan is feasible and effective to use in the learning activities.

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