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I-CLORE Teaching Material Based on *Katupat Kandangan* Local Wisdom on the Topic of Heat and Temperature

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Abstract

The research aimed to focus on describing the practicality of teaching material based on *katupat Kandangan* local wisdom which arranged by I-CLORE (Islamic-Connecting to Local Wisdom, Organizing, Reflecting, dan Extending) learning model. This research was a research and development study, with the development model of ADDIE. The subjects of this research were first-semester students of the 2019/2020 academic year in the Physics Education Department, Faculty of Education and Teacher Training of UIN Antasari Banjarmasin who learned Fundamental of Physics 1. The data were obtained through the questionnaire and observation sheet. The data were analyzed quantitatively and qualitatively. The result of the research showed that the practicality was very good because the mean score of easy to use, benefit, time efficiency, and interest was 4.29. Then, the mean score of lecturer activities implementation and the mean score of student activities implementation were 4.72 and 4.31 in very good category. The conclusion of this research is the teaching material was practical. Therefore, this teaching material can be used in Fundamental of Physics 1 course and tested in another experiment with a larger sample.

Keywords: Heat and temperature; I-CLORE; Local wisdom; Practicality; Teaching material

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INTRODUCTION

Heat and temperature are one of the topics in Fundamental of Physics 1 course. Research results by Canlas (2016) and Sukarelawan, Jumaidi, & Rahman (2019) showed that students still experienced various misconceptions in studying this topic. They also had difficulty in solving problems related to this topic (Sukarelawan, Jumaidi, & Rahman, 2019). Other than that, based on questionnaires that filled by students in Physics Education Department at one of the Islamic universities in South Kalimantan, it was known that 53.33% of students stated that it was difficult to study heat and temperature, 60.00% of students did not like studying heat and temperature, and 46.67% of students stated that the teaching materials that had been used so far were unable to help them learn.

Teaching material is needed in the learning process. The existence of teaching material is needed so that learning can run effectively (Gunada, Sahidu, & Sutrio, 2015; Wati, Hartini, Misbah, & Resy, 2017). Teaching

material also aims to help students learn well and attract interest in learning and generate motivation in studying physics (Ali, Sunarno, & Sukarmin, 2015). Then, teaching material becomes basic orientation to teach scientific and appropriate concept so that students do not experience misconception (Billah, 2019). Other than that, research result of Ogunleye (2009) showed that one of the factors causing the difficulty of studying physics was the inadequacy of the teaching materials used as a learning resource. So, the use of appropriate teaching materials in learning determines the success of the learning process itself (Fatikhakh, Maftukhin, & Fatmaryanti, 2018). Therefore, it is necessary to have teaching material that suits the needs of students and can be used by them properly.

The good teaching material was prepared based on the CORE learning model \(Connecting-Organizing-Reflecting-Extending) (Mailisa, Masril, & Darvina, 2017). This is because the teaching materials are able to increase knowledge and attitude competence (Mailisa et al., 2017). Amrulloh & Suprapto (2018) proved that teaching material arranged based on the CORE learning model can improve learning outcomes. In fact, these teaching materials could improve students' higher order thinking skills (HOTS) (Chistella & Soekamto, 2017; Fatikhakh et al., 2018) and were suitable to use in learning physics (Mailisa et al., 2017; Amrulloh & Suprapto, 2018; Fatikhakh et al., 2018). So, Fundamental of Physics 1 teaching material, especially on the topic of heat and temperature, should be arranged based on the stages of the CORE learning model.

Besides being compiled based on the CORE learning model, teaching material that can be used by students properly should also have Islamic nuances. This teaching material is a teaching material that contains religious values and integrates with the verses of The Qur'an (Rahmaniati & Supramono, 2015; Winarti, 2015; Latifah & Ratnasari, 2016; Ihwanudin, Astuti, & Yulianto, 2018). Teaching material that contains Islamic nuances is easy to understand and suitable to use in learning (Wahyuni, Astuti, & Yulianti, 2017; Ihwanudin et al., 2018). In addition, these teaching materials could improve learning outcomes, spiritual attitudes, and social attitudes of students (Wahyuni et al., 2017; Ali, Sunarno, & Sukarmin, 2015).

Furthermore, teaching material will also be able to help students learn well if they are linked to local wisdom that they encounter in their daily life. Teaching materials that link local wisdom with physics material can help students to gain physics learning experiences that are relevant to various activities in daily life so that they can easily master physics (Hartini, Firdausi, Misbah, & Sulaeman, 2018). In addition, this teaching material becomes a bridge for students to connect traditional knowledge that has been trusted by the community with scientific knowledge (Ardan, 2016). Then, local wisdom can be used as a source of learning and the values contained in it can be used as a guide for students to behave so that they will have noble morals (Uge & Neolaka, 2019).

Based on this condition, research and development of modified CORE teaching materials were carried out. The modification was regarding the content of religious values and local wisdom in the teaching materials. The teaching material was developed with the contents of the verses of the Quran that are relevant to the topic of heat and temperature. This topic is also associated with the process of making and serving *katupat Kandangan* which is a traditional food typical of Hulu Sungai Selatan Regency, South Kalimantan (Normaleni, 2017) due to

the concepts and principles of temperature and heat involved in the process. Therefore, this teaching material is called I-CLORE (Islamic-Connecting to Local Wisdom-Organizing-Reflecting-Extending) teaching material.

The product of this research and development was a teaching material in the form of textbook that were compiled based on the I-CLORE learning model with Islamic nuances and *katupat Kandangan* local wisdom. In previous research, there were teaching materials that were arranged based on the CORE learning model but were not Islamic and based on local wisdom. In addition, there are still few research and developments in physics teaching materials that contain the verses of The Quran and local wisdom at once. So far, the focus of research has been more on developing teaching material that contains only The Quran verses or only local wisdom. The teaching materials that have been developed are generally for students in primary to secondary schools. The teaching material in this research was for college students.

Furthermore, it is necessary to measure the practicality of using teaching materials. This was done to measure the practicality of the teaching materials developed when used in Fundamental of Physics 1 course. The practicality of teaching materials was determined based on certain criteria (Hartini, Isnanda, Wati, Misbah, An'Nur, & Mahtari, 2018; Misbah, Hirani, Annur, Sulaeman, & Ibrahim, 2020; Rahayu, Eliyarti, & Festiyed, 2019; Rohman & Setyarsih, 2018; Wati, Putri, Misbah, Hartini, & Mahtari, 2020; Zainuddin, Afnizar, Mastuang, & Misbah, 2018). Therefore, this research was conducted to focus on determining the practicality of I-CLORE teaching material based on the local wisdom of *katupat Kandangan* on the topic of heat and temperature.

METHOD

This research was a research and development study with the ADDIE development model. This model consists of five stages, namely analysis, design development, implementation, and evaluation (Dick, Carey, & Carey, 2001). The developed product was I-CLORE teaching material based on *katupat Kandangan* local wisdom.

This article only examines the practicality of the product being developed. The research was conducted from June 2019 to February 2020. The subjects were semester 1 students of the Physics Education Department, Faculty of Education and Teacher Training of UIN Antasari Banjarmasin who took Fundamental of Physics 1 course in the odd semester of the 2019/2020 academic year. The number of students were 18 people.

Data collection techniques in this study were questionnaires and observation. The first research instrument used was students' response questionnaire. This was according to research Hartini, Firdausi, et al. (2018) and Rahayu et al. (2019) who used a questionnaire to determine the practicality of teaching materials. Practicality indicators in the questionnaire were the easiness of use, benefits, and the efficiency of time learning (Rahayu et al., 2019; Misbah & Wati, 2020) as well as an interest in teaching materials (Rahayu et al., 2019). Each indicator was further divided into several sub-indicators adapted from the research Hartini, Firdausi, et al., (2018), Rahayu et al. (2019), & Hamdunah, (2015). The questionnaire that had been developed was further validated by two experts. The average score of the questionnaire validation was 3.56 with very good validity category (Widoyoko, 2019) and the reliability was 85.71% with good category (Trianto, 2010). After that, the questionnaire was revised according to the suggestions. The

revised questionnaire was then filled out by students after they had finished participating in the four face-to-face meetings on the topic of heat and temperature using the developed teaching material.

Another instrument for measuring the practicality of teaching materials was an observation sheet. This was according to research Zainuddin et al. (2018), Rahayu et al. (2019), Astutik & Prahari (2018), and Wati, Hartini, Lestari, An'nur, & Misbah (2019) who used the observation sheet to determine the implementation of learning activities using I-CLORE teaching materials. The observation sheet was divided into two, namely the Lecturer Activity Observation Sheet and the Student Activity Observation Sheet. Each observation sheet was assessed by 2 observers. Before being used, the two observation sheets were validated by two experts. The average validation score of the two questionnaires was 3.63 and 3.88, respectively, with the very good validity category (Widoyoko, 2019) and the reliability was 100% with good category (Trianto, 2010).

The practicality of teaching materials was then determined by calculating the average of student answers on the indicators of the easiness of use, benefits, the efficiency of time learning, and interest in teaching materials. Based on this calculation, practicality can be determined was adapted by (Widoyoko, 2019). In addition, the practicality of teaching materials was also determined by calculating the average implementation of lecturer activities and student activities at each stage of I-CLORE learning in each face-to-face meeting of Fundamental of Physics 1 course on the topic of heat and temperature (Wati et al., 2019).

RESULT AND DISCUSSION

I-CLORE Teaching Material

Teaching materials were developed based on the steps of the ADDIE development model. The parts of teaching materials were generally adapted from (BSNP, 2014) which consists of front and back covers, offerings, preface, table of contents, table list, list of pictures, chapter 1: introduction, chapter 2: temperature and expansion, chapter 3: relationship of heat to changes in temperature and phase of objects, chapter 4: Black principles, chapter 5: heat transfer, bibliography, and attachments. The parts of teaching material can be seen in Figure 1.

In chapter 1: introduction, descriptions of Fundamental of Physics 1 course, manuals for students and lecturers, book section maps, and indicators of success are explained. The distinctive feature of this section that distinguishes it from other teaching materials is the inclusion of prayers that can be read by students, lecturers, and students at each stage of learning. Thus, this teaching material invites lecturers and students to apply religious values. The inclusion of religious values in this teaching material will make students have religious spiritual strength (Pertiwi, 2016). In addition, the section on *Petunjuk Penggunaan bagi Mahasiswa* (Guidance for Students) explains the values of character education and national culture along with the indicators they must apply during lectures, namely love of peace, the spirit of togetherness, cooperation, and democracy. These four values are translated from the motto of Hulu Sungai Selatan Regency, namely *rakat mufakat* (Wati et al., 2017; Leha, 2017).

Chapters 2 to 5 were further divided into sections according to the I-CLORE learning stage. These chapters consist of the Connecting section which contains an illustration of the story with the main character *Aluh Ipah* cooking the *katupat Kandangan*. In this story, there are

physics terms related to the material being discussed. In addition, there are also columns for *Kemampuan Akhir yang Diharapkan* (Expected Final Ability), *Kata Kunci* (Keywords), and *Bioskop Fisika* (Physics Cinema) which presents a video of the process of making and presenting *katupat Kandangan* which they can download via web address listed in that column. So, in this section, students relate the local wisdom of *katupat Kandangan* on the topic of heat and temperature. This section is an important part of physics learning based on local wisdom. This is because in this section the lecturer identifies students' initial knowledge of the original science that is in his mind. The identification aims to explore the various thoughts of students in order to accommodate the beliefs, concepts and principles they have which have been rooted in the culture of the community in which they live (Harefa, 2017). Next, Harefa (2017) also emphasized that this is important to do because every student may have different conceptions of a phenomenon that he encounters in everyday life. Furthermore, lecturer can explain the truth of these conceptions at the Organizing stage.

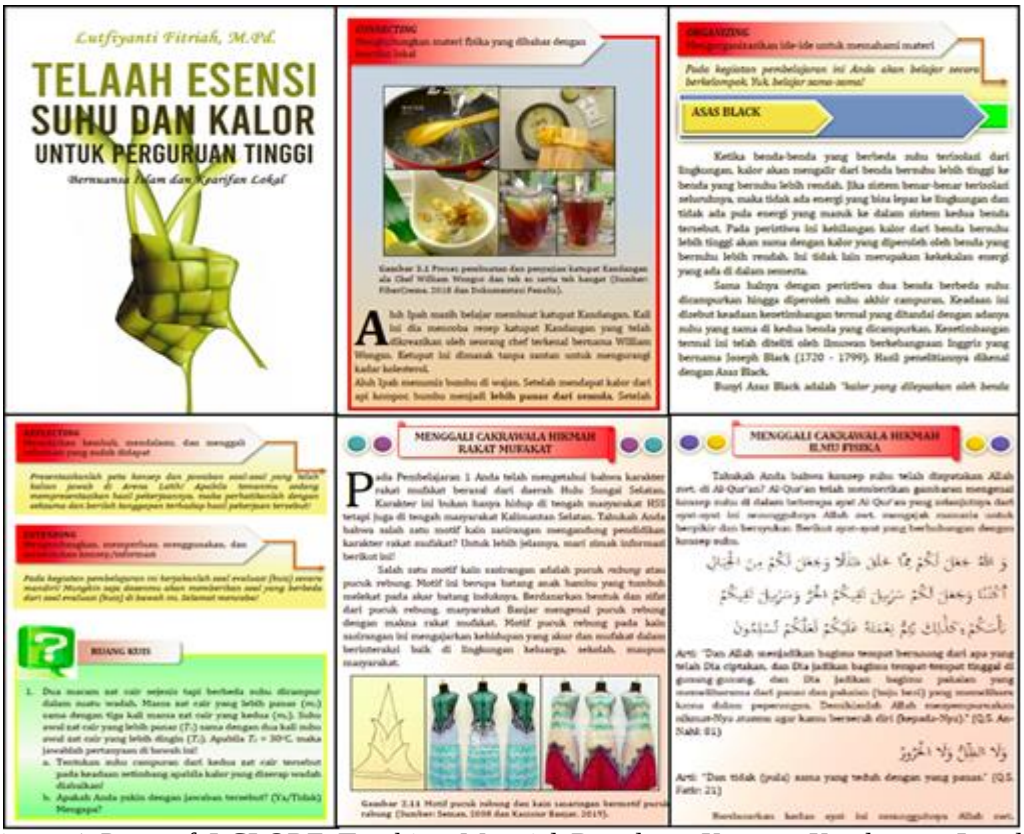

Figure 1 Parts of I-CLORE Teaching Material Based on *Katupat Kandangan* Local Wisdom on The Topic of Heat and Temperature (Fitriah, 2020)

In the Organizing section, there is a description of the physical material associated with the manufacturing process and presentation of *katupat Kandangan*. In addition, there are columns for *Telaah Soal* (Problem Study), *Aku Seorang Fisikawan* (I Am a Physicist), *Khazanah Banua* (South Kalimantan Information), *Wawasan Nusantara* (Archipelago Insights), Menggali Cakrawala Hikmah *Rakat Mufakat* (Exploring Horizons of *Rakat Mufakat* Wisdom), *Menggali Cakrawala Hikmah Ilmu Fisika* (Exploring

Horizons of Wisdom in Physics), and *Fokus Katupat* (Focusing on Katupat), and *Arena Latih* (Training Arena). In this section, students organize ideas obtained from the information provided by the lecturer so that this section can train students' ability to organize and manage the information they already have (Mailisa et al., 2017).

The nuances of Islam and local wisdom of *katupat Kandangan* are presented in the Organizing section. This section contains the essence of the physics concepts that exist in the process of making and presenting *katupat Kandangan*. It is listed in the *Fokus Katupat* (*Katupat Focus*) column. This makes students not only understand the concept of physics but also get to know the local wisdom of the area so that learning in the classroom is not only for transferring knowledge but also for passing on culture from one generation to another (Fuad, Misbah, Hartini, & Zainuddin, 2018). Therefore, local wisdom should be used as a learning resource related to the topic of temperature and heat.

There are some verses from The Quran relating to the values of character and national cultural education in terms of Menggali Cakrawala Hikmah *Rakat Mufakat* (Exploring Horizons of *Rakat Mufakat* Wisdom). Moreover, there are verses from the The Quran related to physics material which is discussed in *Menggali Cakrawala Hikmah Ilmu Fisika* (Exploring Horizons of Wisdom in Physics) column. Thus, the students would be having good Islamic literacy and encourage them to increase their faith and piety to God (Zainuddin, Astuti, Misbah, Wati, & Dewantara, 2020). Then, they become someone who has a noble character (Diani & Hartati, 2018). The next section is the Reflecting Section. This section contains instructions for students to present their work at the *Arena Latih* (Training Arena). In several pairs, students were asked to explain the concept and the answers to the questions they had worked on. In this section, students were invited to think reflectively on what they have learned for improving their thinking skill (Azizah, Mariani, & Rochmad, 2012). The final part of chapter 2 to chapter 4 is ‘Extending’. This section contains instructions for students to do quizzes independently. There are also several questions for trying out them to face it. Lecturer can give similar questions of the quiz listed in the *Ruang Kuis* (Quiz Room) or provide other questions. Besides the Quiz Room, there is *Simpulan Materi* (Material Conclusion) which contains the essences of the material discussed and *Sang Ilmuan* (The Scientist) who provides insight into physics scientists who have contributed to the development and progress of physics, especially on the heat and temperature topic. In this section, students developed and expanded the information they have obtained (Mailisa et al., 2017).

The Practicality Based on The Student’s Response

Based on the questionnaire of the four practicality indicators, the data were obtained as listed in Table 1. It shows that overall, the practicality of teaching material was very good.

Table 1 The practicality based on the student’s response.

Indicator	Average score	Category
Easiness of use	4.29	Very good
Benefit	4.40	Very good
Efficiency of time learning	4.10	Very good
Interest in teaching material	4.38	Good
Average score	4.29	Very good

The use of teaching material was very practical for students. These results indicated that the teaching materials were easy to use, easy to interpret, efficient, and the teaching materials were useful and they were interested to use it (Rahayu et al., 2019). This also indicated that this teaching material can be used by students in the learning process, applicable in learning, can help students in their learning process, and do not confuse students involved (Rahayu et al., 2019; Misbah & Wati, 2020; Astutik & Prahari, 2018; Astuti, Hartini, & Mastuang, 2018).

The teaching material was very practical for students. Firstly, students were motivated, challenged, and enthusiastic in learning because the teaching material was arranged based on the I-CLORE learning stages (Mailisa et al., 2017). Teaching material arranged made students connect their own knowledge with the newest knowledge, organizing new knowledge with old knowledge, and recalling the concept had been studied (Mailisa et al., 2017). As a result, they felt the benefits of using these teaching materials, which was improving learning outcomes (Amrulloh & Suprapto, 2018). In addition, I-CLORE teaching material also encouraged students to gather information from various sources so that they could develop their insights (Azizah et al., 2012). The results of this study also in line with the results of research by Azizah et al. (2012) and Amrulloh & Suprapto (2018) which showed that teaching materials arranged were coherence to the Connecting-Organizing-Reflecting -Extending and practically used in learning.

Secondly, this teaching material was connected to the physics material with the local wisdom of *ketupat Kandangan*, which students encountered in their surroundings. The correlation between the material discussed and the surrounding life in the teaching material made students motivated and enthusiastic in learning (Mailisa et al., 2017). Furthermore, the teaching material related to local wisdom also helped students to understand the topic discussed because they gained contextual learning experiences, which could be found in real life (Kurniawati, Wahyuni, & Putra, 2017).

Thirdly, the teaching material was developed based on Islamic nuance. Students felt the benefits of the religious values on the teaching materials. They were able to mix the meaning of life in the world and the hereafter through physics-based concepts and principles learning on religious values (Pertiwi, 2016). The religious values in teaching materials not only made them aware of various physical phenomena and physical equations but also could make them reflect on and understand that there is God Almighty behind these natural or physical events (Winarti, 2015).

The Practicality Based on the Implementation of Lecturer Activity

The practicality of teaching material was assessed based on the implementation of the lecturer's activity in the classroom. Based on the Observation Sheet of Lecturer Activity Implementation, which was filled in by two observers, it was known that in general, all lecture activities have been carried out very well. The details of the average scores can be seen in Table 2.

Table 2 The practicality based on the implementation of lecturer activity

Learning stage	Average score	Category
Connecting to local wisdom (introduction)	4.89	Very good
Organizing	4.78	Very good
Reflecting	4.90	Very good
Extending	4.75	Very good
Closing	4.28	Very good
Average score	4.72	Very good

The implementation of the lecturer's activities in each meeting was very good. This implementation referred to that the teaching material can be used by lecturer in teaching the heat and temperature topic in the class (Rahayu et al., 2019). These results also showed that lecturer has succeeded in following I-CLORE learning model steps (Wati et al., 2019) and teaching material was able to help lecturer in in carrying out the learning process (Misbah & Wati, 2020). Thus, the teaching material developed was very practical to be used by lecturer.

The Practicality Based on the Implementation of Students' Activity

The practicality of teaching material was also assessed based on the implementation of students' activity. The details of the average scores can be seen in Table 3.

Table 3 The practicality based on the implementation of students' activity

Learning stage	Average score	Category
Connecting to local wisdom (introduction)	4.50	Very good
Organizing	4.30	Very good
Reflecting	3.90	Good
Extending	4.25	Very good
Closing	4.58	Very good
Average score	4.31	Very good

The practicality of teaching material was also assessed based on the implementation of student activities in classroom. Table 3 shows that all student activities have been carried out very well.

The implementation of students' activity was very good. This happened because the students took part in every stage of I-CLORE learning actively (Wati et al., 2019). The implementation showed that the teaching material developed can be used by students in learning activities (Aini, Zainuddin, & Mahardika, 2018; Zainuddin et al., 2018). It was also showed that they were successful in following every step of the learning stages in teaching material (Wati et al., 2019). Hence, the teaching material was very practical for students to study (Zainuddin et al., 2018).

CONCLUSION

I-CLORE teaching material based on *katupat Kandangan* local wisdom on the topic of and heat temperature was very practical to use in Fundamental of Physics 1 because it was arranged based on I-CLORE (Islamic-Connecting to Local Wisdom-Organizing-Reflecting-Extending) learning stages and integrated with local wisdom of *katupat Kandangan*. This was reinforced by the average score of student responses to teaching materials was amount 4.29; the average score of the implementation of lecturer activity was 4.72 with very good category, and the average score of the implementation of student activity was 4.31 with very good category. Hence, developing teaching material can be used in the subject of Fundamental of Physics 1, especially on the topic of heat and temperature. For the next research, it should be conducted on the practicality of developing teaching materials in larger groups and developing similar teaching materials for various topics of physics in university.

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