The development of learning materials using contextual teaching learning (CTL) approach oriented on the character education

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Abstract. The implementation of mathematics learning, especially in junior high school experiencing obstacles, one of which is the lack of learning materials linking the subject matter with the context of students’ daily life. Also, there are a limited of learning materials paying attention to the aspects of students’ character development. This study aimed to develop a valid and practical mathematics learning materials using a contextual teaching and learning approach oriented on the character education. The subjects of the study were Year 7 students in one of junior high school in North Aceh, Indonesia. Data were collected through the expert validation for learning materials, observation of the learning process and questionnaire of students’ response. The expert validation results obtained for the lesson plan, student’s book, worksheet, teacher’s book, and achievement test showing highly valid criteria. The results of observation for the teachers’ skill in implementing the learning materials and students’ activities as a good category. The results of students’ responses towards the learning materials and the implementation of learning were also positive. It is recommended that further research will test the effectiveness of the learning materials to examine the impact on the more students.

1. Introduction

The purpose of learning mathematics is to equip learners with the ability to think logically, analytical, systematic, critical, and creative, as well as the ability to work in a team. The competencies required learners having the ability to acquire, manage, and use the information to survive in an ever-changing, uncertain and competitive situation [1]. However, mathematics is a frightening subject for students it is one of the most challenging subjects to be understood by students [2]. The teaching and learning process in schools have not yielded maximum results [3]. Most of the students are not able to connect what is learned and how that knowledge is used. Therefore, it is necessary for teachers to associate the subject matter to the context of everyday life so that students can benefit from the knowledge they have acquired. One of the approaches to be applied is contextual teaching and learning (CTL).

Contextual Teaching and Learning (CTL) is a learning system based on the philosophy that students can absorb the lessons if: 1) they can grasp the meaning of the academic materials and school assignments, and 2) they can associate new information with their previous knowledge and experience. CTL is in line with the human conscience that is always eager for discovering the
meaning. CTL invites students to associate school tasks in everyday life meaningfully. When students see the meaning in the tasks to be done, students will absorb the lessons and remember them [4].

One of the phenomena occurred today is the declining of characters. Various media reported the immorality involving state officials, community, teachers, and students. Cases of corruption, nepotism and immoral seem to happen commonly. Therefore, the government established a character education [5].

Hakim [6] stated that each school and the community should have the discipline and habits related to the characters to be formed. Character education is best given by indirectly influencing the students by showing examples of good behavior [7]. The students should learn on their own to understand one’s character through the influencer elements provided by the teacher/educator. The formation of students’ characters cultivated by the environmental factors can be done through exemplary strategies, interventions, strengthening, and habituation must be done consistently.

The law No. 18 year 2001 on Special Autonomy for the Province of Aceh, a region with strong Islamic characteristics and commitment to implement the education system based on the Islamic values. Qanun Aceh emphasizes the law regarding the provision of education asserting that the national education system organized in Aceh based on Islamic values. Based on the law, generally, it can be described that the concept of education in Aceh instructing the education concepts based on the values of Islam [8]. Furthermore, the use of the local culture can improve the quality of learning [9]. Therefore, schools in Aceh should integrate Islamic values in the learning, especially as modeling the character.

The mission of the character formation is not only the responsibility of the religious education but also other subjects. Therefore, other subjects should also foster the creation of students’ character [10]. Two approaches can be taken in the character education, namely: (1) the character is as a separate subject; and (2) the character is built-in in every subject. Also, character education is essentially cultivating the character through the process of knowing the good, loving the good, and acting the good, the education process involving cognitive, emotional, and physical, so that the noble character can transform into a habit of the mind, heart, and hands [11].

However, the education practice in Aceh pays less attention to the purposes of education mandated in Qanun [12]. The education in Aceh is less integrated with the values of divinity in the process of learning and school culture, and more oriented on the development of the cognitive structure. The integration of Islamic knowledge in mathematics learning in Acehnese school is not optimal; the Islamic values carried out is still limited to the separation of seats between male and female students, praying and reading the Qur'an before the lesson and giving advice. The observation results conducted by the researcher of mathematics textbooks in junior high school showed that it is difficult to obtain the learning materials using contextual approach learning and oriented to character education oriented on the vision of Islam.

Based on the earlier review, it is necessary to develop learning materials to be applied to learning. Johar [14] has developed mathematical learning materials using a realistic Islamic nuances approach for Year 4 of primary schools consisting of the lesson plan, worksheet, and achievement test for fractions and numbers. Furthermore, Ismail, Johar, Kamarullah, and Yusmanita [15] developed a mathematical textbook of Islamic nuances for all mathematics topics in the Year 4 of primary schools such as numbers, geometry, and measurer. There has been no research developing the mathematics learning materials using CTL approach oriented on the character education for students Year 7. The purpose of this research was to create a valid and practical mathematics learning materials using CTL approach oriented on the character education.

1. Method
The development of learning materials in this study referred to the Design Research of Plomp [16] consisting of three phases namely: the preliminary research, prototyping and assessment phase. In the preliminary research phase, the identification and analysis of the mathematics curriculum, the students’ condition, and the demands of the environment and community to learn mathematics were
conducted. In the prototyping phase, the learning materials using CTL oriented on the character education such as the lesson plan, teacher’s book, student’s book, worksheets, and achievement test were designed and validated. In the assessment phase, the learning materials were implemented to Year 7 students in one of junior high school in North Aceh, Indonesia.

According to Nieveen [17], the learning materials are qualified if they meet the quality aspects of the validity, practicality, and effectiveness. The validity is attributed to two issues: (1) whether the learning materials developed based on a strong theoretical rationale, and (2) whether there is a consistency between them internally. The practicality aspect is satisfied if (1) experts and practitioners argue that the learning materials can be applied, and (2) evidence shows that the learning materials can be utilized. Meanwhile, the aspect of effectiveness concerns whether the learning materials meet the desired outcomes or not. This study focused only on assessing the validity and the practicality of the learning materials.

The research instruments in this study were: (a) validation sheet was used to determine the validity of the student’s book, teacher’s book, lesson plan, worksheet, and achievement test, (b) observation sheet was used to obtain data on student activities during the learning and teachers’ skills to implement the lesson plans, (c) questionnaire was used to determine the students’ response to the student worksheet and book, and (d) the achievement test was used to analyze the impact of the learning materials to students’ learning outcome.

3. Results and discussion

3.1 The result of the preliminary research phase

In this phase, the curriculum, student, and environmental demand analyses were carried out. The results of the investigation found that the curriculum applied in Year 7 in one of junior high school North Aceh, Indonesia was the Curriculum version year 2006. The topic of fractions is one of the topics taught by utilizing contextual problems. The results of the student analysis are: (1) students only used the textbooks available in the library containing routine problems only; and (2) the context presented in the student’s book did not include values to build students' character. The results of environmental demand analysis reported that: (1) teachers do not have teacher’s book to help them teach in the classroom; and (2) the teaching and learning process has not accommodated the Islamic context oriented on the character education. Based on these analyses, it was concluded that it was necessary to develop learning materials with the contextual approach and oriented on the character education based on Islam.

3.2 Result of the prototyping phase

At this phase, learning materials were designed based on the contextual approach oriented on the Islamic character education, especially for Aceh as an Islamic cultural region. The learning materials consisted of the lesson plan, student worksheet, teacher’s book and student’s book to help students learn fractions; teacher’s book to allow teachers to achieve the learning objectives by using a contextual approach for teaching fractions, test to measure students' outcome about fraction, and questionnaire to analyse students’ response.

Four experts were assessing the learning materials in the validation process. The assessment included: the format, language, and content of the learning materials. Experts used grade 1 to 5 and provided comments to assess the learning materials. Based on the validation results, some revisions were made to the lesson plans, worksheets, student’s books, teacher’s book, and achievement test. The results from four experts showed that: (1) the lesson plan had an average of 4.21, valid criteria. Lesson plan allowed a particular time for teachers to provide guidance and character motivation for students. The lesson plan also contained good character habituation activities for students, such as religious, social care, and the environment care; (2) the student’s book had an average of 4.03, highly valid criteria. Student’s book contained problems that were contextually related to students’ daily life, and there are stories of characters that become role models for the students in their community. Four
experts concluded that the student’s book could be used with minor revision; (3) teacher’s book had an average of 3.7, valid and minor revision; (4) the average score of student worksheet was 4.02, also valid criteria and minor revision; and (5) the item test results had an average of 4.09, highly valid criteria.

The example of mathematics problems and character message on student worksheet is presented in Figure 1.

| Problem 1 | Character Message: |
|-----------|--------------------|
| Mr. Abdurrahman has 100 million IDR savings in the Bank and gold worth 300 million IDR. All the wealth has been kept since last year. Is Mr. Abdurrahman obliged to pay zakat? How much zakat should be paid? | Rasulullah SAW said: "Clean your wealth with zakat, medicate your sickness with charity, and reject the disasters by prayer" (Hadith Khatib from Ibnu Mas'ud) |

Note that:
The price of 1 gram of gold today 250,000.00 IDR
The formula of Zakat is:
The total amount of Zakat = 2.5% x Total wealth kept for 1 Year.

| Problem 2 | Character Message: |
|-----------|--------------------|
| Usman has two children, Joseph and Zainab. Both love the sweet martabak cake. One day he bought one of his favorite sweet martabak cake. Usman has three close neighbors, Mr. Sulaiman, Mr. Ibrahim, and Mr. Musa. It has become a habit of Mr. Usman's family where there is food; it should be not enjoyed alone; instead, some are distributed to the neighbors. Mr. Usman asked his daughter to share the cake equally for the family at home and the three neighbors. | Rasulullah SAW said: "Whoever believes in Allah and the Last Day, let him say good or silent. And who believes in Allah and the Last Day, let him glorify his neighbor. And who believes in Allah and the Last Day, let him glorify his guest. (Hadith Bukhari and Muslim) Rasulullah SAW said: "O Abu Dzarr, if you cook the cuisine with broth, then multiply broth and pay attention to your neighbor." (Hadith Muslim History) |

How many amounts of cake are distributed to neighbors? How much cake is left at home? Express in the form of the fraction.

Figure 1. Example of mathematics problems and character message on the student worksheet.

In Figure 1, the problems are presented by inserting Islamic character values based on the hadith. Acehnese students are familiar with the issue of zakat and fair sharing. This context leads students to be an excellent Moslem and easy to understand fraction problem.

3.3 Result of the assessment phase
In the assessment phase, a small group trial was conducted to examine the errors in writing the student’s book and worksheet such as typos, missing words, and upper and lower case errors. The subjects in small group trial were 9 Year 7 students in one of junior high school in North Aceh, Indonesia including three students at each level of ability (high-, medium- and low-level ability). The
information obtained from small group trial was used as a basis for improving learning materials for the field trial phase.

A field trial was conducted on 26 Year 7 students at one of junior high school in North Aceh, to examine the practicality of learning materials. The practicality of learning materials was obtained from 1) the assessment of two teachers of the learning materials, 2) the observation of student activities, 3) the observation of teacher skill during the lessons, and 4) the student responses on the learning materials and learning atmosphere.

The result of the teachers’ analysis on learning materials reported the average is 88.6%, for student’s book, 87.57% for teacher’s book, 87.4% for student worksheet, 88.9% for the lesson plan, indicating that the learning materials satisfied the excellent criteria.

The results of observation for students’ activities carried out by two observers during the learning showed that the average score of the first, second, third, fourth, fifth and sixth lesson were 86%, 93%, 96%, 98%, and 99%, and 100%. It was concluded that the students’ activities in the learning process met the very good criteria.

The assessment of teachers’ skill adapted from the characteristics of CTL according to Johnson [4] included: 1) presenting "models" as tools and examples in learning; 2) developing students' curiosity through questions; 3) creating an atmosphere of "learning community" by working in groups; 4) carrying out as many as possible discovery activities in the learning process; 5) developing the students’ thinking of learning more meaningfully by working individually, determining, and constructing their new knowledge and skills; 6) conducting a reflection at the end of the lesson; 7) carrying out the authentic assessment; and 8) learning atmosphere. Based on the observations by an observer, teachers’ skill in implementing learning materials for six lessons was found the average of 4.97 showing very good criteria.

The results of the students’ response reported that more than 80% of students were happy with the learning component and stated that the learning using a CTL approach oriented on the character education was new for them. Furthermore, more than 95% of students were interested in participating in the next learning applying this learning. Regarding the language of the student’s book, worksheet, and test items, more than 90% of students could understand them. Also, more than 85% of students were interested in the appearance of the student’s book, worksheets, and test items. Thus, the response of students to CTL approach oriented on character education was positive.

The test results of students’ outcome showed that there were 19 students (73%) who had achieved the mastery of learning (the score of 75), while seven students (27%) had not. Remedial for the topic of the fraction was conducted for the seven students. The remedial teaching aims to help students whose score below the average [18]. The validation results of the lesson plan, student worksheet, and test were 4.21, 4.02, and 4.09 respectively. Whereas, in Johar's study [14], the results of lesson plan validation, of student worksheet and test were 3.3, and 3.6. This indicates that the learning materials employing a CTL approach oriented on the character education developed to have a higher level of validity than the previous study. Besides, that students' response is positive, and 73% of students score is above 75. This is due to contextual learning allowing students to strengthen, expand and apply their academic knowledge and skills [19]. Contextual problems may be used to examine students’ interest in the problem and motivating students to work on it [20]. A teacher can encourage student’s thinking by providing appropriate problems and discussion in the classroom [21].

4. Conclusion
The learning materials using CTL approach oriented on the character education has met valid and practical criteria. It is suggested to the next researcher should examine the effectiveness of learning materials to find out the impact of them on more students.

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