The development of student worksheet based on islamic values in the basic laws of chemical calculations

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Abstract. The relationship between the basic values of the Quran in students life will be a reference to how students learn deeply and develop the knowledge gained. This was related to the core spiritual competencies that are expected to be possessed by students after completing one level of education in Aceh. The aim of this study was to produce student worksheets based on Islamic values in the Basic Laws of Chemical Calculation. Method of this research was R&D with the development model of ADDIE. The subjects of this study were students of class X IPA 3 of Inshafuddin Senior High School in Banda Aceh. Based on the results of the needs analysis, the students' worksheets based on Islamic values in the basic law of chemical calculations were needed. The results of the validation with an expert team that was equal to 89.4%, indicating that the student worksheets are possible to be tested. The positive responses of the questionnaire of students were obtained by 80.90%. Based on these results, it can be concluded that the development of students' worksheets was feasible.

1. Introduction

The curriculum of 2013 emphasizes the character building from the process of basic education to higher education. The curriculum of 2013 that has been developed was based on character and competence[1]. This development was expected to produce a productive, creative, innovative, and characterized human[2]. The character building was integrated into all learning field of the study based on the curriculum. The learning materials were related to the norms or values in each field of study need to be developed, made explicit, and related to the context of daily life[3]. Based on these, it was expected that the education of values and character building will not only be done by the cognitive side but also touches on internalization and real practice in daily life.

The administration of education in Indonesia was regulated in Indonesian Government Act and applied in certain curriculum patterns. The curriculum was a set of plans and arrangements regarding the objectives, content, and learning material as well as the methods used as a guide for organizing learning activities to achieve certain educational goals. At this time, the curriculum used is the 2013 revised 2017 curriculum. The curriculum 2013 was a curriculum that integrates skills, themes, concepts, and topics in the form of within single disciplines, across several disciplines and within across learners. The impact of this integration was the broader understanding and knowledge of students.
Four competencies must be achieved as curriculum objective. The four competencies in this term namely the spiritual attitude, social attitude, knowledge and skills competency[4]. The formulation of spiritual competence is to live and to practice the teachings of the religion as it adheres to. This competency can be achieved through indirect learning, one of the ways was through habituation[5]. The education achievement which is only based on cognitive achievement only cannot be said as good quality education. The quality of the moral and spiritual foundation of a nation shown the quality of human resources in a country[6].

The strengthening of the character value in education becomes its urgency in the Indonesian government. This is an attempt by the government to improve the quality of the human resources produced[7]. A character which was able to implement science in daily life without making any conflict with religion[8] and the values of Pancasila. Aceh, one of the provinces in Indonesia, has a specificity as a Serambi Mekah area. This was because the majority of the population in Aceh is Muslim, and they still carried out Indonesian government regulations as they should. However, in Aceh, there is a regional regulation called the Qanun Aceh. Education in Aceh was organized according to the Islamic values based on the Quran[9, 10]. This was for residents who are Muslim in Aceh. This was in line with the goal of national education to create the characteristic human resources[11]. In Aceh, the expected character was based on the Islamic value[8].

Referring to the regulations of the government, schools as a medium to provide the education and with the help of teacher as educators[12]. This is shown in the school's vision and mission. The teachers must be able to adjust to the conditions of the school and students to achieve the expected competencies[13]. So, the student could achieve certain of the different competencies in each level of school[4, 14].

In the learning process, one of the most decisive things was the type of teaching material used. There were several types of teaching materials that can be used as a source of learning by students, such as a book. Books were the sources of information that can be read directly by students to increase their knowledge[15]. However, chemistry is one kind of natural sciences with an abstract characteristic. Some chemical concepts will be easier to understand if accompanied by training and experiments[16]. The exercises and experiments were then arranged into a student worksheet[17].

Student worksheets were a learning tool that requires the students to be more active in doing exercises or experiments under the supervision of the teacher[18]. The direct involvement of students in doing exercises will make students formulate the concepts by their own so that they have a better understanding of the material. By the supervision of the teacher, it will increase the interaction between students and teachers so it will be easier for the student in the learning process[19, 20]. The student worksheets can be arranged according to the needs and expected competencies[21].

Student worksheets were developed by considering the character values generated after the learning process[22]. It would be very helpful to achieve the competencies. One of the competencies expected of students in Inshafuddin Senior High School Banda Aceh was to become a human resource with the Islamic character. Based on observations that have been made, the teacher said that the basic law of chemical calculation was one of the difficult concepts to relate to the Islamic values based on the Quran. The synchronization of theory with the right verse of Islamic value was also a particular obstacle for the teacher. If this was ignored, the expected student competence will not be achieved. The novelty of this study is the integration Quran value into chemistry concept on a worksheet student. Based on this background, through this paper, we would see how was the development of students' worksheets based on the Islamic values in the basic laws of chemical calculation.

2. Method
Method of this research was development research with the development model of ADDIE (Analysis, Design, Develop, Implement, Evaluate)[21]. The ADDIE model was used to develop a product (learning product. Step of ADDIE model can be seen in Figure 1. At the analysis step, the needs analysis was conducted on teaching materials to help the learning process for achieving the competencies of students that determined in the curriculum and regulations. The needs analysis data were obtained through a questionnaire which was given to the teachers and students. The results of the questionnaire were
processed by looking for percentages, averaged and compared with the achievement of percentage criteria. The design step was carried out by designing student worksheets as needed and made into a blueprint.

![ADDIE Model for Developing Product](image)

**Figure 1.** ADDIE Model for Developing Product.

In the developing step, the student worksheets were validated by the team of experts. The implementation step was carried out after the product was judged to be feasible and has finally been evaluated through questionnaires. The subjects of this study were students of class X in Inshafuddin Senior High School Banda Aceh, the academic year of 2018/2019.

### 3. Result and Discussion

The result of research by using ADDIE models with the stage of analysis, design, development, implementation, and evaluation were obtained the following result:

#### 3.1 Analysis

The needs analysis of teaching material consists of several parts, namely: curriculum, teaching administrations, teaching materials, and Islamic values on teaching materials.

![Result of Needs Analysis of Teaching Material](image)

**Figure 2.** Result of Needs Analysis of Teaching Material.

The needs analysis data were obtained through a questionnaire given to the chemistry teachers in the school. Based on the results were obtained, there were about 87.50% with the category of agreeing that the teacher understands in organizing education must be held according to the regulation. The teacher
also understood and approved the existence of character building by applying the Islamic values in the learning process[7, 9].

The vision of the school is realizing the superior people in science based on faith and piety. One of the school’s missions is to implement a learning system that contains the values of the Quran. The results of the questionnaire have obtained a percentage of 96.88% with the category of strongly agreeing about the learning administration to applied the Islamic values as a foundation in the character-building of students. Information were obtained through an interview, one of the subject which difficult to be integrated on Islamic values was the basic law of chemical calculations. The results of the questionnaire showed there were only 43.75% of teaching materials with Islamic values contained in them. This shows that teaching materials by applying Islamic values were still lack.

Based on the students’ questionnaire in Table 1, the students were difficult to understand the basic law of chemical compound. It was more difficult for them to relate the Islamic value on the subject. The results of the needs analysis that has been done, showed it can be seen that the student worksheet based on Islamic values needs to be developed.

| Students’ Questionnaire                                      | %    |
|--------------------------------------------------------------|------|
| Difficulty in material understanding                        | 80   |
| Difficulty in relating the religious values to material      | 75   |
| Book as the source of learning has already contained the Islamic value | 55   |
| The need for learning source which directly linked to the Islamic value | 95   |
| The need for learning source which directly trained to answer the calculation based on theory | 95   |

3.2 Design

Based on the needs analysis that has been done, the step of designing teaching materials was carried out. The student worksheets were arranged with the contents regarding the basic laws of chemical calculations. Theories on the basic law of chemical calculation were then studied in the sight of Islamic values. The Islamic value of each theory was based on the verses of the Quran that have been interpreted. On the design of the students worksheet was also presented the experimental activities and practice questions.

3.3 Development

In the development step, student worksheets were arranged based on the blueprint that has been designed and validated. The validation process was held to make sure that the student worksheet has fulfilled the specific, measurable, applicable, and realistic criteria. Student worksheet validation was done by several experts based on content, media, language, and the Qur’anic interpretation. The validation process was carried out twice. The results of the average validation of each section of the experts can be seen in Figure 3.

![Figure 3. Result of Student Worksheet Validations](image-url)
The validation result of media was 85% and in criteria of valid. The validation of content was 95% and in criteria of very valid. The validation of language was 90% with the criteria of very valid. The validation of interpretation of the Quran was 87.5% with the criteria of very valid. The average result of the last validation in Figure 3 was 89.4%, which means the criteria of this percentage was very valid[23].

![Figure 4. Result of Questionnaire were Tested on Small Group of Student](image)

**Information:**
1. interested in using student worksheets; 2. the increasing interest in learning; 3. worksheet with this model; 4. attractive appearance; 5. easy to learn; 6. clear instructions; 7. easy to answer problems; 8. getting benefits; 9. learning becomes fun; 10. ease of juxtaposing the value of the Qur'an against theory

Before implementing the student worksheets, the student worksheets were tested on students who have studied the basic laws of chemical calculation. The trial data were obtained through a questionnaire. The results of questionnaires were obtained can be seen in the Figure 4. Generally, it can be seen that students were able to understand the contents of student worksheets. Based on this, the student worksheets that have been developed are feasible to be implemented in learning.

### 3.4 Implementation

In the implementation process, the student worksheets were given to the teacher. The teacher guaranteed students to solve the problems of the basic law of chemical calculations and explore the Islamic values from the subject matter as exposed in the student worksheet [19, 20]. Finally, the teacher ensured the achievement of the expected core competencies and basic competencies after using this student worksheet[10, 11].

### 3.5 Evaluation

The last step of this development model was evaluation. The evaluation step in this study was carried out by distributing questionnaires to students. The results of the questionnaire were obtained can be seen in Figure 5.

![Figure 5. Result of Questionnaire were Tested on Student](image)

*Information of this questionnaire could be seen in Figure 4*

Based on the results of the questionnaire given to students, it was found that 100% of students were interested and felt the benefits after learning by using this student worksheet. As much as 68.18% of students agreed that they had never learned by using this worksheet, 86.36% of students agreed this worksheets were interesting and easy to understand, 68.18% of students agreed that the instructions were
clear, 81.82% of students agreed that it was easier to solve the given questions, 90.91% of students agreed of the enjoyable in learning, and 63.64% of students agreed that they had no difficulty of understanding the worksheet. Generally, the average student has a positive response to the worksheet of these students was about 80.90% with the criteria of agree. This result showed that this student worksheets were worthy to be used in further learning[21].

4. Conclusion
Based on the research discussions, it can be concluded that the student worksheets based on the Islamic values in the basic laws of chemical calculations was developed and already have valid criteria, easy to understand and attract students' interest to learn more. The average validation result of the expert team was 89.4% with very valid criteria. The average student questionnaire results after the teacher applied the student worksheet in the learning process namely 80.90% i.e. most students approved the student worksheet. These results indicate that the student worksheets based on Islamic values in the basic laws of chemical calculations are worthy of further use. The evaluation by using observation method should be used for more study to know the increasing of spiritual competencies of students.

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