Increase Motivation of Student in Vocational High School Using Unity of Sciences-Based Chemistry Books

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Abstract. This study aims to determine the increasing student motivation using chemistry books based on the unity of sciences. This study used pre-experimental design methods by one group pretest-posttest design. The subjects in this study was the class of X-TKR students of SMK Ma’arif NU 1 Semarang. Techniques of data collection used the questionnaire to know the motivation of student. The technique to analysis data descriptive and inferential statistical analysis (paired sample t-test and N-gain). The results showed that there the unity of sciences based chemistry books can increase motivation of students. The mean score of students’ motivation of experiment group was better than the control group, each with a value 3.64 and 2.91, t_count 20.106 and t_table 2.021 (t_count > t_table = 20.106 > 2.021) and N-gain score 0.64.

1. Introduction
Science education not only has the aim of increasing student knowledge but also to shape students who have good character. Education also has the objective of developing the potential of students to be people of faith, piety, noble character, knowledge, creativity and independence [1-3]. Chemistry as part of education generally has an essential role in forming students who can think critically, creatively, logically and have the initiative in responding to events in society caused by developments in science and technology [4]. At the Vocational High School (SMK) level, chemistry is a subject in the C1 group (normative-adaptive). In principle, the normative-adaptive group aims to support subject program expertise (productive) and as a basis for developing student competencies in their respective skill groups.

Based on observations in the field, students consider chemistry learning in vocational schools to be less supportive of learning skills program group. In fact, it is also obtained data that chemistry teachers at SMK are not related to chemistry material with their respective areas of expertise in the learning process. The condition resulted in the normative-adaptive group subjects, including chemistry, less of a student's attention [5]. This low student motivation can also result in poor student learning outcomes of chemistry [6-7]. From the description above, it can be assumed that student learning motivation dramatically affects student learning patterns. Besides having an impact on learning outcomes, it also will affect the meaning of learning. So, the hope of education to produce human beings who are noble, knowledgeable, creative and independent is also challenging to achieve. There are some options possible to increase student motivation. One of them is by integrating chemistry materials with religious values [8-10].
Based on observations and interviews have conducted at SMK Ma'arif NU 1 Semarang, there has been no scientific integration/unity of sciences in learning. This shows that religious lessons only discuss religious material, and science lessons only discuss theoretical and mathematical subjects without paying attention to the values contained therein. Other results were also found that vocational students prioritize religious and productive classes, rather than general topics. This is one of the causes of student learning motivation to reduce chemistry. Several studies state that the unity of sciences in learning has a positive impact on learning persistence in science (especially chemistry) to improve learning outcomes in both academic and non-academic fields [11-14].

The process of instilling a unity of sciences in chemistry learning can be done by integrating Islamic values in education, namely by quoting several verses of the Al-Qur'an then connecting them with chemical materials and inserting religious values into the learning material [15]. The learning process with the unity of sciences aims so that students can understand that knowledge comes from the Al-Qur'an. Islamic values in the learning process consist of aspects of faith, piety, noble morals, intelligence, and independence [16]. The unity of sciences in learning can be done through the chemistry teaching materials used, such as chemistry textbooks. The unity of sciences in chemistry textbooks can be seen in the material, practice questions and competency test questions. These materials and questions raise problems from an Islamic perspective without changing the basic competencies contained in the predetermined curriculum. This is because the Qur'an is a guide that can be used by anyone indefinitely. There has never been any change in the verses in the Qur'an, but modern science has succeeded in uncovering the secret of Allah for his teachings contained in the Qur'an [17].

The reality in the field is that the chemistry textbooks used in chemistry learning at SMK have not yet connected the unity of sciences. Students also cannot learn independently, so in the learning process, students only receive material from the teacher. Besides, students often display unwanted behaviours such as cheating, skipping school hours, and indifferent when a friend asks about a chemical material that has not been understood. This is because the motivation to learn chemistry is still low. Based on this description, the solution to this problem is by making chemistry textbooks based on the unity of sciences in SMK. It is hoped that this research can increase students' motivation to learn chemistry, to improve student learning outcomes of chemistry.

2. Methods

This research was conducted with a pre-experimental method through one group pretest-posttest design, namely a research design that provides treatment to the experimental group without being compared to the control group [18]. This is done because researchers assume that several other factors influence the dependent variable (motivation). The effect of the treatment given can be seen from the difference between the pretest and posttest. This research was conducted in three stages, namely: (1) preliminary observation before learning using chemistry textbooks based on the unity of sciences, (2) implementation of learning using chemistry textbooks based on the unity of sciences and (3) final observation after learning with books teaching chemistry based on the unity of sciences.

The subjects of this study were students of class X SMK Ma'arif NU 1 Semarang. The sampling technique was carried out by purposive sampling because the researcher chose a particular subject based on differences in the condition of the subject, namely a regular class. In contrast, the others were a special class. The instruments used in this study were observation sheets and questionnaires to determine students' motivation towards chemistry lessons. Data processing was continued with statistical tests in the form of normality tests to determine whether the data before and after learning was normally distributed or not using the Kolmogorov-Smirnov test. Then the hypothesis test was carried out by using the Wilcoxon test with a significance level of 0.05 and N-gain.
3. Results and Discussion

This study used descriptive analysis, which described the increase students' motivation to learn chemistry with chemistry textbooks based on the unity of sciences at SMK Ma'arif NU 1 Semarang. The results of the study were obtained from the analysis of the scores of each motivation indicator, which included (1) learning interest, (2) learning indentation, (3) learning participation, (4) learning effort, and (5) learning attention. Furthermore, conclusions are made to determine the category of increasing learning motivation, and analyzed the independent sample t-test statistics at the final stage. The research data on the motivation scores before and after learning in the experimental class are presented in Table 1.

Table 1. Results of Students' Chemistry Learning Motivation in Experiment Class

| Indicator          | Level of Learning Motivation | Change | Change Rate (%) |
|--------------------|-------------------------------|--------|-----------------|
|                    | Before                        | After  |                 |
|                    | Rate  | Category | Rate  | Category | Rate | Category |
| Learning interest  | 2.85  | M        | 3.65  | H        | Increased | 28.3 |
| Learning indentation | 2.73  | M        | 3.59  | H        | Increased | 31.4 |
| Learning participation | 2.78  | M        | 3.71  | H        | Increased | 33.5 |
| Learning effort    | 2.80  | M        | 3.61  | H        | Increased | 28.9 |
| Learning attention | 2.70  | M        | 3.65  | H        | Increased | 35.0 |
| Rate               | 2.77  | M        | 3.64  | H        | Increased | 31.4 |

Based on Table 1, it can be seen that the learning motivation of the experimental class students had a high category on each indicator. Student motivation for each indicator increased between 28.3% - 35.0%. It meant the experimental class that uses chemistry books based on the unity of sciences had increased student motivation. The research data on the motivation scores before and after learning in the control class are presented in Table 2.

Table 2. Results of Students' Chemistry Learning Motivation in Control Class

| Indicator          | Level of Learning Motivation | Change | Change Rate (%) |
|--------------------|-------------------------------|--------|-----------------|
|                    | Before                        | After  |                 |
|                    | Rate  | Category | Rate  | Category | Rate | Category |
| Learning interest  | 2.75  | M        | 2.90  | M        | Increased | 5.7 |
| Learning indentation | 2.66  | M        | 2.91  | M        | Increased | 9.3 |
| Learning participation | 2.77  | M        | 2.90  | M        | Increased | 5.0 |
| Learning effort    | 2.77  | M        | 2.88  | M        | Increased | 41.0 |
| Learning attention | 2.68  | M        | 2.97  | M        | Increased | 10.7 |
| Rate               | 2.72  | M        | 2.91  | M        | Increased | 6.9 |

In Table 2, it can be seen that the control class students' learning motivation for each indicator has a moderate category. Meanwhile, student motivation for each indicator increased between 4.1% - 10.7%. Then it was found that the control class that did not use chemistry books based on unity of sciences had an increase in student motivation, although the increase was lower than in the experimental class. The comparison of the increase in each indicator in the experimental and control classes can be seen in Figure 1.
After the data for the students’ learning motivation scores in both classes were obtained at the end of the lesson, the Wilcoxon statistical test and N-gain were continued. Previously, ensure that both classes have normal and homogeneous distributed data. Based on the Kolmogorov-Smirnov normality test, a significance value of 0.996 was obtained, and the homogeneity test obtained a significance value of 0.193. Based on this test, the data for the two classes were normally distributed and homogeneous. Furthermore, the Wilcoxon test obtained \( t_{\text{obs}} = 20.106 \) (\( t_{\text{table}} = 2.021 \)). Based on the Wilcoxon test, it can be concluded that there is a significant difference between the learning motivation of the experimental and control class students. To see the magnitude of the increase in student learning motivation, an N-gain test was carried out. Based on the N-gain test, the N-gain score was obtained in the experimental class of 0.64 (moderate category) and the control class of 0.09 (low category). Based on the N-gain test, it can be seen that the increase in student motivation to use chemistry books based on the unity of sciences is higher.

The results showed that student learning motivation indicators, including interest, persistence, participation, effort, and attention in learning, got the mean value in the experimental and control classes, respectively, 3.64 (high category) and 2.91 (medium category). It showed that students’ learning motivation is higher using chemistry books based on the unity of sciences. Students’ high motivation in teaching showed that the use of chemistry books based on the unity of sciences could increase students’ enthusiasm for learning.

In the indicator of interest in learning, the average score was 3.65 (high category). It shows that students have a high interest in learning using chemistry books based on the unity of sciences. The use of chemistry books based on the unity of sciences can keep students away from their boredom when they participate in learning by only listening to the teacher [19]. It also explained that chemistry books based on the unity of sciences could increase students' interest in learning [20]. Chemistry books based on the unity of sciences can also allow students’ to be involved with studies related to themselves. Of course, this encourages interest in learning, which then affects student motivation. As Sardiman also conveyed, the characteristics of students who have the right learning motivation are showing interest in education, if someone offered a good interest in learning, they have strong learning motivation [21].
In the learning indentation indicator, the average score was 3.59 (high category). It shows that students have high learning persistence in learning using chemistry books based on the unity of sciences. Persistence in learning indicates a sense of awareness of the objectives of the learning activities carried out and high responsibility both individually and in groups in completing the given task as well as possible. The values of persistence can only be carried out when oneself realize that to get good results requires hard work and is aware of the purpose of the activity. When students are aware of good results in learning, it will affect the quality of learning as a product and the perception of self-efficiency, affecting students' motivation to study harder [22].

In the learning participation indicator, the average score was 3.71 (high category). It shows that students actively participate in learning chemistry using chemistry books based on the unity of sciences. The active participation of students in learning cannot be separated from students' self-confidence in themselves. Students' active involvement relates to an attitude of trust and belief in success or related to the hope of successfully answering the questions. This concept is associated with a personal view that he can do a task, a prerequisite for success [23].

In the learning effort indicator, the average score was 3.61 (high category). It shows that students' effort increases in learning chemistry using chemistry books based on the unity of sciences. Efforts to learn are related to challenges in learning for students to understand the material. The principle of learning difficulties is consistent with the statement that if students are given the responsibility to learn independently, they are more motivated to learn, and students will learn to remember better [4].

In the indicator of learning attention, a mean score of 3.65 (high category) was obtained. It shows that students have a high interest in learning chemistry using chemistry books based on the unity of sciences. The Attention attitude means that curiosity arises and gets a stimulus so that it will provide attention during the teaching and learning process. This curiosity can be stimulated through new, strange elements from existing, contradictory, or complex [24]. The amount of student attention to learning using chemistry books based on the unity of sciences shows that students' learning motivation in understanding the subject matter is perceived as something that is needed and needed to be studied to generate more attention to study it. It is because learning uses an integrated science and religious approach to display the verses of the Al-Quran. This learning can attract students' attention to the lesson to be motivated to properly understand and carry out the learning stages [25].

Motivation to learn is very instrumental in encouraging students to achieve their learning success. The success they have committed will undoubtedly result in their satisfaction. Students who have succeeded in doing or achieving something feel proud/satisfied with that success. Success and pride become the reinforcement for these students to reach the next success. The increasing mean value in the experimental class was due to the teacher's satisfaction/pride component, always giving good grades and awards that following all the activities carried out by students. Spirituality and religion are generally positively correlated with life satisfaction [26]. Based on the analysis of motivation scores before and after students' learning, it is known that chemistry books based on the unity of sciences can increase student learning motivation. The experimental class motivation increase was in the medium category, with an average N-gain score of 0.64 in learning motivation. The research results show that learning chemistry books based on the unity of sciences can increase student motivation. In his research, Khoiri found that the application of Islamic science-based learning can improve learning outcomes and Islamic character in honesty and student cooperation [27]. It means that applying the integration of science and religion can increase student motivation and improve student learning outcomes.

4. Conclusions
Based on the results of this study, it can be concluded that the application of chemistry books based on the unity of sciences in learning has succeeded in increasing the vocational students learning motivation. It is hoped that chemistry books based on the unity of sciences can be applied in teaching and learning activities to increase student learning motivation and develop learning with chemistry learning based on the unity of sciences on different subjects to improve education in the future.
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