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Engaging Minds: The Effectiveness of Illustrated Story Handouts in Teaching Chemical Bonding

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ABSTRACT

Purpose of the study: This study aims to determine whether there is an increase in the motivation to learn chemistry of class X3 students of YLPI Marpoyan Senior High School, Bukit Raya District, Pekanbaru City through the use of handouts in the form of illustrated stories.

Methodology: The instruments used in this study are observation and documentation. Observation is done to find out the development of teachers and students in the learning process. While documentation is done to obtain school data, teacher data, and also student data.

Main Findings: Based on the results of data analysis, the percentage of student motivation before the action was 49.4%, cycle I 53.8%, cycle II 60.9%, and cycle III 76.4%, which increased at each meeting, so it can be concluded that the use of handouts in the form of illustrated stories can increase student learning motivation.

Novelty/Originality of this study: The novelty of this study is to determine the effectiveness of using handouts in the form of illustrated stories to increase students' learning motivation on the topic of chemical bonds.

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1. INTRODUCTION

The development of chemistry can drive technological progress and encourage humans to be more careful in capturing phenomena found in everyday life [1], [2]. It is not impossible that the development of chemistry will affect the teaching and learning process. The rapid development of science and technology requires steps that are interconnected and appropriate in their use [3][4]. In this case, it is related to the impacts that will be caused by these developments, both positive and negative. Education clearly plays an important role because education is something that is needed by individuals, anytime and anywhere [5], [6].

Chemistry is still considered difficult for some students [7], [8]. The assumption that chemistry is a difficult subject has been embedded in students [9], [10]. This is quite reasonable because the characteristics of chemistry lessons are abstract, taught in a simpler form, while in reality chemistry lesson materials are sequential and develop rapidly. There are many materials that must be learned that are rote, involve more than just solving problems and require a lot of learning [11]-[13].

The teaching and learning process is a communication process between teachers and students or between students and students [14], [15]. The teaching and learning process is the core of the overall education process with the teacher as the main actor [16]-[18]. The communication that occurs should be a reciprocal communication

that is created in such a way that the message delivered in the form of teaching materials should be directed at increasing student activity that emphasizes more on how students can master the subject matter [19], [20]. If the subject matter can be mastered well by students, then the success of the learning process is in sight.

The success of the learning process is the main thing that is desired in implementing education in schools. In the learning process, the main components are teachers and students [21], [22]. In order for the learning process to be successful, teachers must guide students. Therefore, an appropriate learning method is needed so that the teaching and learning process can take place properly [23], [24]. The use of inappropriate methods can cause boredom, students are not motivated and cannot understand the material explained by the teacher so that it has an impact on the learning outcomes achieved by students [25], [26]. Learning outcomes are statements of student abilities that are expected to master some or all of the established competencies.

Based on the results of observations that have been carried out at YLPI Marpoyan Pekanbaru Senior High School, the subject of chemical bonds is usually taught using lecture methods, assignments, homework, and questions and answers. These learning activities are centered on the teacher, so that students are less active in learning, less motivated, less ready to receive lessons and are not independent in doing assignments [27], [28]. This has an impact on student learning outcomes, where the average value of students' daily tests is still relatively low.

Students are not motivated to seek information from books, students only accept what the teacher gives them in class [29], [30]. Students' interest in reading existing books is very low [31], [32]. Actually, the books that are already available are quite interesting but these books have not been able to motivate students to read them [33], [34]. Therefore, efforts are needed to motivate students so that the material presented is enjoyed by students. One way is by making a handout in the form of a picture story.

A picture story is a story/tale conveyed by the author through continuous pictures. A student will be motivated if the picture story presented in the lesson is in accordance with the hobbies and characters that students like [35], [36]. If students are motivated, it will affect changes in behavior from not knowing to knowing which can ultimately improve learning achievement [37], [38].

Research conducted by Tanjung and Louise [39] focused on the development of discovery learning-based student worksheets with the aid of augmented reality technology on chemical bonding to improve student motivation and learning outcomes. This study emphasized the integration of interactive technology as a visual and exploratory learning tool. Meanwhile, Harmer and Groß [40] examined the effectiveness of explanatory videos in the context of chemistry learning, specifically metallic bonding, by assessing the suitability of the content and its impact on student understanding. Both emphasized the importance of visual media and technology in increasing student engagement and understanding of abstract chemical concepts. However, neither study specifically explored the use of simple, narrative print media, such as illustrated story handouts, as a means of increasing student learning motivation. This is where the current research is novel, offering an alternative approach based on visual storytelling that is easily accessible and close to students' lives, but its effectiveness has not been widely studied in the context of chemistry learning, particularly on the topic of chemical bonding. Thus, this study fills the gap in previous research by offering a non-digital method that is still oriented towards increasing student learning motivation.

This study aims to determine whether there is an increase in the motivation to learn chemistry of class X3 students of YLPI Marpoyan Senior High School, Bukit Raya District, Pekanbaru City through the use of handouts in the form of illustrated stories.

2. RESEARCH METHOD

This study involved 30 10th-grade students at YLPI Marpoyan Senior High School in Pekanbaru. The object of the study was the use of handouts in the form of illustrated stories to increase student learning motivation on the topic of chemical bonding. This study was Classroom Action Research, a form of research conducted by teachers in their own classrooms through a series of actions aimed at improving and enhancing the quality of learning [41], [42]. The primary objective of this Classroom Action Research was to enhance the learning process and quality, particularly by increasing student learning motivation for a subject considered quite abstract, such as chemical bonding.

This Classroom Action Research was conducted through four important stages: (1) planning, (2) implementation, (3) observation, and (4) reflection [43], [44]. These four stages form a sequential cycle that can be repeated if necessary to achieve continuous improvement. Each cycle was systematically designed to ensure the effective implementation of the intervention, which included the use of illustrated story handouts. This medium was chosen because it is simple, easily accessible, and has the potential to arouse student interest and motivation through engaging narrative and visual elements.

The data analysis technique used in this study was descriptive statistical analysis. Descriptive statistics are used to collect, organize, process, present, and analyze numerical data to provide an overview of observed phenomena or conditions [45], [46]. In the context of this research, descriptive statistical analysis aims to describe the level of student learning motivation during the learning process. Data collection was conducted through two

main methods: observation techniques to directly observe student responses and engagement, and documentation techniques to record visual or written evidence supporting the observation results.

3. RESULTS AND DISCUSSION

3.1. Cycle I

In cycle I, learning activities refer to Lesson Plan II with the use of handouts in the form of illustrated stories that are different from the previous Lesson Plan. In which in cycle I after the teacher takes attendance of students, the teacher distributes handouts containing chemical bonding material to students. Then the teacher prepares students to learn, the teacher reminds students of the previous lesson and what students have known to attract students' attention so that they are not embarrassed and can follow the learning, so that they can foster a positive attitude, so that students are willing to ask and answer questions from the teacher.

Furthermore, students are given the opportunity to read and study the handout, after which the teacher informs students to find partners to discuss the handouts they have. Then the teacher asks questions to students, namely questions about the material in the handout. After being given several questions, students and the teacher discuss, the teacher distributes Student Worksheets that they will immediately work on individually. Then the teacher and students conclude the day's material. Then, students are given reinforcement regarding the material and results obtained during the learning process.

In cycle I, the results of data analysis for the average motivation of all students have not shown maximum improvement. This can be seen from the lack of students' desire to complete assignments individually, and there are still students who play around in discussions. Students do not follow the learning process such as asking and answering questions, and are still not confident in defending their own opinions. The average motivation percentage of all students reached 53.8% with the Sufficient Category. In the previous meeting, the teacher did not give awards so that it did not attract students to learn better. This is known from the results of observations made by the chemistry teacher as an observer and the results of discussions with the observers. In this cycle, the teacher provides more motivation and opportunities for students to ask and answer questions. From the results of the data obtained, the use of handouts in the form of illustrated stories needs to be continued in cycle II by paying attention to the shortcomings that occurred in cycle I.

3.2. Cycle II

In this cycle II, learning activities refer to Lesson Plan III, which is also slightly different from Lesson Plan II in cycle I, where in this cycle after the teacher takes attendance of students, the teacher distributes handout sheets to be studied and the teacher writes the title of the lesson material to be studied and its uses, even though the students already know it. Then the students read and discuss with their partners. Then the teacher motivates students by giving them the opportunity to ask questions and after the teacher explains the material. Then the teacher gives the Student Worksheet to be worked on, and the students complete it in turns. Furthermore, to find out the extent of the competency achieved by the students, the teacher holds a quiz. Then the teacher guides the students to conclude the lesson material and provides feedback. After that, the teacher distributes handouts for the next meeting. The results of observations in cycle II with the use of handouts in the form of illustrated stories, according to the observer, the researcher has been able to control the class, give awards to students who are fast and answer correctly, and can make students feel happy and interested in learning. The researcher also saw the motivation and activeness of students, students were willing to work independently on assignments and almost all students who collected assignments, and looked enthusiastic in discussing and helping friends. However, in cycle II, there are still some students who do not do their assignments and they still do not want to express their opinions and they are always hesitant in defending their opinions. And in cycle II, the achievement of all indicators has not shown a significant increase, not too far from the first cycle, which is 60.9%. So, learning activities using handouts in the form of illustrated stories need to be continued in cycle III because the target has not been achieved up to 75%.

3.3. Cycle III

In the third cycle, there are improvements from the previous cycles. In this third cycle, learning follows the Learning Implementation Plan IV and V. Which is also slightly different from the previous cycle. As in the previous cycle, learning begins with taking student attendance, recalling previous material by discussing questions together. Next, the teacher conducts a question and answer session with students, then a quiz is held. To find out the extent of the competency that has been achieved, after that students work on the Student Worksheet. At the end of the lesson, the teacher and students conclude the material that has been learned and before saying hello, the teacher informs the students that the next meeting will be an evaluation of the material that has been taught. The results of the analysis of the average motivation data for all students in cycle III increased by 76.4%. Almost all indicators have increased. Several indicators that have also increased, the criteria are asking and answering questions and concluding learning outcomes. All indicators have reached the criteria of very good and good. This

is indicated by better student activity in the learning process. Students are increasingly serious about using learning activities to prepare for their learning. The tasks given by the teacher, both in the form of Student Worksheets and questions and answers, are done well by students. Students are motivated to participate in learning activities. Students are more active in interactions to discuss. Thus, students' learning motivation has reached the target, so that the cycle that is carried out can be stopped.

3.4. Research Data Analysis

The data to be analyzed is data from observations that have been collected during the learning process, both pre-action and with actions using handouts in the form of illustrated stories. In cycle I, student motivation in learning only reached 53.8% which is categorized as sufficient. Student learning motivation has not gone as expected, which is at least 75%. At that time, it was seen that some students were still confused about what the teacher said. So this action needs to be continued in cycle II.

In cycle II, students are re-directed in learning, namely by adding various methods that make all students participate in doing assignments. From the results of the observation sheet at this second meeting, motivation slowly began to increase, reaching 60.9% which is categorized as good. Students already seem enthusiastic, it's just that students still don't ask enough questions. Still not able or not confident enough to defend their opinions. In cycle III, student motivation has started to be optimal by reaching 76.4%. which is categorized as very good motivation. Thus, it can be seen that students are able to be motivated in learning by using handouts in the form of illustrated stories in class X3 of YLPI Marpoyan Senior High School, Pekanbaru.

The data obtained from the presentation were then analyzed by considering student motivation before and after the action. The weight of student learning motivation achievement per indicator during the learning process is known that the percentage value of student learning motivation indicator achievement in the learning process through action using handouts in the form of illustrated stories is higher, from the beginning of the pre-action meeting to the action, the indicators are increasing. The weight of achievement is 47.8%; 55.5%; 60.9%; and 78.7%. Furthermore, the researcher stopped the study because the target had reached the desired scale. Meanwhile, the analysis of actions for individual students during the learning process with the provision of actions showed that in general each student experienced an increase in motivation to learn chemistry. This can be seen from the weight of student motivation achievement for all indicators.

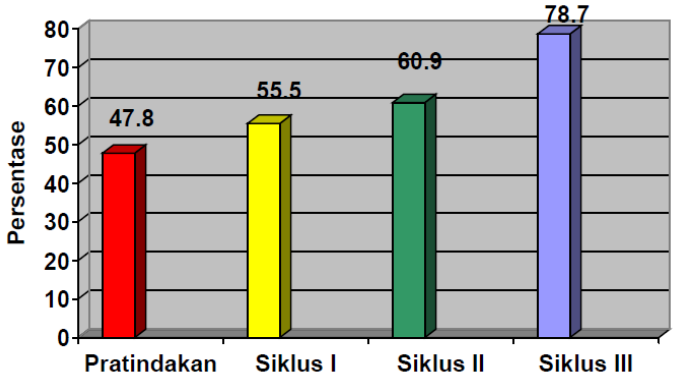

Figure 1. Graph of Percentage of Student Motivation Indicators

The researcher grouped the weight of the pre-action and through-action motivation observations. The results of the percentage of achievement through action during three meetings were added up and divided by three cycles. Based on the results of the Post-test, the scores obtained by students also showed an increase where the class average was 78.

The implementation of illustrated story handouts in the teaching of chemical bonds had a significant impact on increasing student learning motivation. This can be seen from the increasing trend that occurred from cycle I to cycle III. Each cycle demonstrated improvements stemming not only from changes in teacher strategies in delivering the material but also from increased active student participation in the learning process. The use of more engaging media, such as illustrated stories, has been shown to create a more enjoyable learning environment and encourage emotional and cognitive student engagement.

Although the increase in student motivation was quite clear from cycle to cycle, this study also faced several limitations. One of these was that not all students showed the same rapid and uniform changes in motivation. Some students remained passive, reluctant to ask questions, and reluctant to express their opinions, especially in the first two cycles. This suggests that in addition to learning media factors, student characteristics and classroom interaction patterns also influence the success of motivation-boosting efforts. Furthermore, the limited timeframe for implementation across three cycles may not have been sufficient for the full internalization of the desired learning motivation over the long term.

Overall, the results of this study emphasize the importance of innovative learning media tailored to student characteristics and the material. Illustrated stories in handout format not only provide visual and narrative information but also build students' emotional connections to the material being taught. Therefore, this approach can be recommended as an alternative strategy to increase student learning motivation, particularly in chemistry, which tends to be perceived as difficult and abstract. Future research is expected to examine the sustainability of this strategy's impact over a longer period of time and in different learning contexts.

This research has a positive impact in enriching alternative innovative learning approaches, particularly in chemistry instruction at the high school level. By using handouts in the form of illustrated stories, teachers can bridge abstract material such as chemical bonds to make it easier for students to understand [47], [48]. Furthermore, this approach can stimulate students' affective aspects, namely motivation and emotional engagement in the learning process. The results of this study can also serve as a reference for other teachers implementing visual story-based learning media as an engaging and effective strategy, especially in lessons requiring the understanding of complex concepts.

However, this study has several limitations. First, the research subjects were limited to one class in one school, so the results cannot be widely generalized. Second, the measurement of student motivation was still observational and descriptive, not using more standardized psychometric instruments. Third, external factors such as the learning environment, student background, and differences in teacher teaching styles were not fully controlled, which could influence the results. Therefore, further research is needed with a more robust experimental design and a larger sample size to ensure more representative and valid results for application in a more general context.

4. CONCLUSION

Based on the results of the research and data analysis, it was concluded that there was an increase in the motivation to learn chemistry of class X3 students of YLPI Marpoyan Senior High School, Pekanbaru on the topic of chemical bonds through actions using handouts in the form of illustrated stories. The increase in students' motivation to learn chemistry occurred when the learning process used the steps contained in each cycle. The increase in students' motivation to learn cannot be separated from the teacher's efforts to make students feel happy in learning and provide motivation to students. In the first cycle, only 53.8% of students' motivation in learning was categorized as sufficient, in the second cycle there was a slight increase. Students' motivation to learn was 60.9% which was categorized as good. While in the third cycle, students were really motivated. Judging from the data, it reached 76.4% which was categorized as very good student motivation. So that the cycle can be stopped. It is recommended that further research involve more classes and schools to allow for broader generalization of the results. Furthermore, the use of more standardized and quantitative motivation measurement instruments should be considered to obtain more objective and accurate data.

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