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Innovation of Chemical Learning through The Application of Chemical Supplement Book Based on Asmat Tribe Papua Local Wisdom

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***Abstract*— This research is a classroom action research that aims to improve the learning outcomes of chemistry of the eleventh grade students of SMA Negeri 1 Tanah Miring and SMK Negeri 1 Tanah Miring on the of colloid topic through the application of chemical supplement books based on Asmat Tribe's local wisdom. The sample in this study were 9 students of class XI of SMA Negeri 1 Tanah Miring and 9 students of SMK Negeri 1 Tanah Miring. The research procedure consists of 4 stages, namely planning, implementing, observing, and reflecting as many as 2 cycles. Data analysis techniques are quantitative data (percentage of learning completeness) and qualitative data (percentage of teacher activity, student activity, and student response). The results showed that the percentage of students completing learning at SMA Negeri 1 Tanah Miring at pre-cycle was 55.56%, cycle I was 77.78%, and cycle II was 100.00%. The percentage of teacher activity in the cycle I was 86.11% and cycle II was 97.22%. The percentage of student activity in the cycle I was 73.96% and cycle II was 84.38%. The percentage of student responses to chemical supplement books based on the local wisdom of the Asmat Tribe of Papua is 82.29%. The students completing learning at SMK Negeri 1 Tanah Miring in pre-cycle was 22.22%, cycle I was 66.67%, and cycle II was 88.89%. The percentage of teacher activity in the cycle I was 72.22% and the cycle II was 94.44%. The percentage of student activity in the cycle I was 73.61% and the second II was 82.29%. The percentage of student responses to chemical supplement books based on the local wisdom of the Asmat Tribe of Papua is 84.12%. Based on the research could be concluded that the application of chemical supplement books based on the local wisdom of the Asmat tribe of Papua could improve the student chemistry learning outcomes.**

Keywords—colloids, supplement books, local wisdom, Asmat tribe, learning outcomes

I. INTRODUCTION

Learning in the implementation of character-based and competency-based curriculum should be carried out based on the needs and characteristics of learners, as well as competence in general, therefore the character and competency-based learning principles and procedures should be used as one of the references and understood by teachers, facilitators, heads schools, school supervisors, and other education personnel in schools [1].

Indonesia is very rich in natural resource potential, cultural culture, and social character, which is spread throughout the region and region, and becomes a reliable potential to be developed. This regional potential can be utilized for the benefit of learning. This is in line with Law No.20 of 2003; that the curriculum at all levels and types of education is developed with the principle of diversification in accordance with the education unit, regional potential, and students. Also supported by Law No. 22 of 1999, the Regional Government and its staff, and the public have the obligation and authority to be able to manage and optimize the potential of the region. Educational institutions have a very strategic role to make it happen. The hope is that it can provide students with knowledge, skills and behavior in order to have a solid insight into the potential of their regions, through meaningful learning processes [2].

Science is related to an effort to systematically understand various natural phenomena. Natural phenomena in the natural sciences can be viewed from the object, problem, theme, and place of the incident. This indicates that the utilization of regional potential in science learning becomes very relevant.

Local wisdom is the intelligence of local people to manipulate the influence of external culture and existing culture into a new, more beautiful form, which is better and harmonious to suit local tastes and at the same time is a specific form or identity of the region itself.

Chemical education in Indonesia has not shown superiority compared to other countries. One root of the problem is that chemical education is perceived as meaningless and not oriented towards community development. The values embraced by indigenous people that are full of local wisdom values are ignored in learning, especially science learning. Chemical education at the tertiary level or high school is often seen as theoretical, not applicable. Chemical education that does not pay attention to local values and potential, will produce education that is not community-oriented development [3].

Preliminary research had been carried out in the form of an analysis of the needs of supplementary books based on Papuan culture. The results of the study showed that teachers and students were in desperate need of media learning chemistry related to the local culture of the Papuan people [4].

Based on this background researchers had developed a medium of chemical learning based on local wisdom for high school students and the equivalent, namely chemical supplement books based on local wisdom of the Asmat tribe of Papua. The supplement book contained an explanation of the culture of the Asmat tribe and was then linked to the

chemical concepts learned at school. This study aims to describe the learning outcomes, activities, and responses of students as well as teacher activities after the chemistry learning process using chemical supplement books based on Asmat tribe Papua local wisdom.

II. Research Design

This research is a Classroom Action Research (CAR) with research subjects are 9 students of class XI of SMA Negeri 1 Tanah Miring and 9 students of class XI of SMK Negeri 1 Tanah Miring in the academic year 2017/2018. This study was conducted for 14 meetings (7 meetings per school), in July until August 2018. The design of this study was a cycle model class action research consisting of four stages, namely planning, implementation, observation, and reflection.

In the pre-cycle stage the teacher explains the material with a lecture model using the whiteboard. The material presented is the definition and nature of the colloidal system. In learning some students seem to be not interested in listening to the lesson. Students are also not active in recording teacher explanations. In the discussion session, students did not actively ask questions or answer teacher questions. At the end of the lesson, the teacher gives a test to measure student understanding.

Furthermore, the classroom action research activities began with compiling a plan for implementing chemistry learning through the application of Chemical Supplements Book Based on Asmat Tribe Papua Local Wisdom.

The implementation of the action in the first cycle was carried out with an allocation of 3x45 minutes as many as 3 times face to face. Students who attend learning are 9 students at each school. The material discussed is about the colloids, nature of the colloidal system, and application of colloids in the culture of the Asmat Tribe Papua.

Pre-activity takes approximately 5 minutes. In this activity begins with the teacher conditioning the class so that learning activities take place in an orderly manner. Then the teacher greets, continues with prayer and presence.

The initial activity lasts for approximately 10 minutes. In this activity the teacher gives apperception to students with question and answer. Then the teacher conveys the subject matter to be studied. Next the teacher confirms the learning objectives.

The core activities take place for approximately 20 minutes, including 3 activities namely exploration, elaboration and confirmation. In the exploration activity the teacher gives an explanation of the material colloids, nature of the colloidal system, and application of colloids in the culture of the Asmat tribe Papua. In the elaboration activity, the teacher initially explained about the learning procedure that will be applied in learning, namely by using the media of Chemical Supplements Book Based on Asmat Tribe Papua Local Wisdom.

In the teacher confirmation activity, it gives reinforcement and adds points that have not been discussed by students during the exploration and elaboration stages. Then the teacher reflects on the learning activities that have been carried out. Then students are given the opportunity to ask questions about material that is not yet understood.

The final activity lasts for approximately 10 minutes. In the final activity the students are assisted by the teacher to conclude the material that has been learned. Then students work on evaluation questions in writing. The teacher provides follow-up in the form of enrichment for students who obtain high learning outcomes and improvements for students who obtain low learning outcomes, then end the learning by saying greetings.The collection technique in this study uses observation sheets consisting of student learning activities, student responses, teacher activities, learning outcomes tests in the form of essays and field notes.

The implementation of the second cycle action is carried out with a time allocation of 3x45 minutes as much as 3 times face to face. Grade XI students who attend chemistry classes are 9 students from each school. The material discussed is colloidal stability and how to make colloids. Pre-activity takes approximately 5 minutes. This activity begins with the teacher conditioning the class so that learning activities take place in an orderly manner. Then the teacher said greetings, followed by praying and the teacher made a presence.

The initial activity lasts for approximately 10 minutes. In this activity the teacher gives apperception by conducting question and answer to students related to the learning material. Then the teacher conveys the main material to be studied namely colloidal stability and how to make colloid by writing it on the board. Next the teacher confirms the learning objectives.

The core activities take place for approximately 20 minutes, including 3 activities namely exploration, elaboration and confirmation. In the exploration activities the teacher explained the colloidal stability material and how to make colloids. The teacher asks questions and answers to students. In elaboration activities, the teacher increases back to students about the steps in applying concept map media. then the teacher formed a group of 3 groups, each group consisting of 3 students. Each group received Chemical Supplements Book Based on Asmat Tribe media supplies in Papua Local Wisdom and experimental equipment to make colloids with the main ingredient of sago. The teacher guides the course of the discussion and helps the group experiencing difficulties. Each group reads the material that has been studied; identify the tools and materials needed, make colloids with the main ingredients of sago, and observe the results of the experiment. After the discussion was over, each group represented the results of the discussion in front of the class.

In the confirmation activity, the teacher gives reinforcement and adds points that have not been discussed by students during the exploration and elaboration stages. The teacher gives praise to students who dare to come to the front of the class. Then the teacher reflects on the learning activities that have been carried out. Then students are given the opportunity to ask questions about material that is not yet understood.

The final activity lasts for approximately 10 minutes. In the final activity the students are assisted by the teacher to conclude the material that has been learned. Then students individually do evaluation questions in writing. Then the teacher ends the lesson by saying hello.

Data analysis techniques used consisted of observation sheets of student learning activities, student response

observation sheets, teacher activity observation sheets, tests, and field notes.

This study was declared successful and the learning cycle was stopped when the percentage of student learning completeness reached 85%, the percentage of teacher activity reached 90%, and the percentage of student activity and response reached 80%.

III. Research Results and Discussions

The results obtained include student learning outcomes, teacher activity, student activity, and student response to the media book Chemical Supplements Based on Asmat Tribe Papua Local Wisdom.

SMA Negeri I Tanah Miring and SMK Negeri I Tanah Miring are located in the Tanah Miring district which is in the territory of Merauke Regency, Papua. Tanah Miring District is the target area for transmigration, so students at this school consist of students from indigenous Papuan tribes and those from migrant tribes such as Java, Toraja, Makassar, and so on.

The research implementation at those schools went well. teachers and students were very enthusiastic in research because the applied media was a very close innovation in the learning environment of teachers and students in daily life.

Teachers in their teaching practice activities ideally need help from teaching aids such as learning media that could support their success in teaching. Media was anything that can be used to channel messages from the sender to the recipient so that they can distract the thoughts, feelings, attention and interests and attention of students in such a way that the learning process occurs. The use of media in learning is not limited to its use in the learning process but also had a specific goal of achieving effective learning [5].

The learning media used were supplement books which were the product of development research. The supplement book contained information about the culture of the Asmat Tribe which was then linked to chemistry. So students were expected to be easier in understanding the application of chemistry in their daily life. When students were able to understand the concept of chemistry being studied, students would also achieve better learning outcomes.

Learning outcomes are an evaluation action that can reveal aspects of the cognitive process, which can also reveal other psychological aspects, namely the affective domain and skill aspects (psychomotor domain) - stick to each individual student. This means that through learning outcomes can be holistically illustrated the depiction of student achievement after learning [6]. The data of student learning outcomes of SMA Negeri 1 Tanah Miring in the study are shown in Table 1.

TABLE I. STUDENT LEARNING OUTCOMES

Description	SMA Negeri I Tanah Miring			SMK Negeri I Tanah Miring		
	Pre-cycle	*Cycle I*	*Cycle II*	*Pre-cycle*	*Cycle I*	*Cycle II*
Average score	67.33	75.89	81.11	59.22	69,22	75.56
Percentage of learning completeness (%)	55.56	77.78	100	22.22	66.67	88.89

Table 1 showed the increase in the average value of students from the pre-cycle stage to cycle I to cycle II. In the SMA Negeri I Tanah Miring pre-cycle stage the average score of students reached 67.33 with the percentage of learning mastery 55.56%. In the SMK Negeri I Tanah Miring pre-cycle stage the average score of students reached 59.22 with the percentage of learning mastery 22.22%. This shows that almost half the class still has not reached the minimum mastery criteria value. During the pre-cycle stage, many students did not pay attention to the teacher's explanation, were not active in question and answer activities, and did not show interest and motivation to learn.

In the first cycle students were introduced to the media of Chemical Supplements Book Based on Local Wisdom of the Asmat Tribe of Papua. Enthusiasm and curiosity of students begin to awaken, discussions become more active, and the learning process takes place more pleasantly. The end of cycle I was tested and average score increased to 75.89 with 77.78% of learning mastery for SMA Negeri I Tanah Miring students. Average score increased to 69.22 with 66,67% of learning mastery for SMK Negeri I Tanah Miring students.

In the second cycle students were guided to make colloids from materials related to the local wisdom of the Asmat Tribe, namely making traditional "papeda" food from sago. Students' interest and understanding increase with the test of these skills. At the end of cycle II a test was conducted and an average score of 81.11 was obtained with a percentage of learning mastery 100% for SMA Negeri I Tanah Miring students. Average score increased to 75.56 with 88.89% of learning mastery for SMK Negeri I Tanah Miring students.

Doing to change behavior through action is the principle of learning. Whether or not learning is reflected in the presence or absence of activity. Without activity, learning was impossible. So that in the interaction of teaching and learning activities was an important principle [7]. Table II and table III showed an increase in the activity of teachers and students in the learning process from cycle I to cycle II.

TABLE II. TEACHER ACTIVITY

Indicator	SMA Negeri I Tanah Miring		SMK Negeri I Tanah Miring	
	Cycle I	*Cycle II*	*Cycle I*	*Cycle II*
Open lesson	4	4	3	4
Give questions	3	3	3	4
Explain the material	3	4	2	3
Individual learning	3	4	3	4
Guiding small group discussions	4	4	3	4
Manage classes	3	4	3	3
Make variations	4	4	3	4
Provide reinforcement	4	4	3	4
Close the lesson	3	4	3	4
Total score	31	35	26	34
Average percentage	86.11%	97.22%	72.22%	94.44%

Table II shows that in SMA Negeri 1 Tanah Miring, the average percentage of teacher skills in cycle I reached 86.11%, increasing in cycle II to 97.22%. At SMK Negeri 1 Tanah Miring, the average percentage of teacher skills in the first cycle reached 72.22%, increasing in the second cycle to 94.44%. Explaining skills is an important aspect that must be possessed by the teacher, given that most of the learning requires the teacher to give an explanation. In addition to explaining skills, teachers must also be able to utilize creative media so that students easily understand the material [8]. In this study the creative media used is a chemical supplement book based on the local wisdom of the Asmat Tribe of Papua. The media assists the teacher in explaining chemical concepts related to the culture of the Asmat Tribe.

There are several reviews on the basis of the use of instructional media, namely: (1) Philosophical foundation, the existence of various kinds of learning media, students can have many choices to use learning media in accordance with the characteristics of the students themselves. Thus students will be more free to make choices and easily understand the material being studied; (2) Psychological foundation, psychology studies state that students will more easily learn concrete things than abstract things. With the diversity in the learning process and the accuracy of choosing the appropriate learning media can affect student learning outcomes; (3) The technological foundation, learning technology is a complex process involving people, procedures, ideas, equipment and organizations to analyze problems, find solutions, implement, evaluate and manage problem solving in situations where learning activities have a purpose and are controlled; and (4) Empirical Foundations, students will gain significant benefits if they learn by using learning media that is appropriate to the characteristics or type of learning because students can better understand what is meant from the material being studied [9].

Classroom activities can (1) engage students in learning activities, facilitate learning by doing, and practice communication skills; (2) provide many benefits, give immediate feedback to students, arouse a high degree of students' interest and enthusiasm, meanwhile allow teachers to work with a wide range of student capabilities, and (3) allow experimentation with a model of the real environment [10]. Table III shows an increase in student activity from cycle I to cycle II.

TABLE III. STUDENT ACTIVITY

Indicator	**SMA Negeri I Tanah Miring**		**SMK Negeri I Tanah Miring**	
	Cycle I	***Cycle II***	***Cycle I***	***Cycle II***
Students are ready to receive lessons	31	30	28	30
Students pay attention to the teacher's explanation	27	31	30	33
Students ask questions	25	30	27	28
Students identify the concepts of the local wisdom of the Asmat Tribe Papua	30	29	24	29
Students identify chemical concepts contained in the local wisdom of the Asmat Tribe Papua	26	32	28	27
Students connect the concepts of local wisdom of the Asmat Tribe Papua with the concepts of chemistry	28	29	27	31
Students are enthusiastic in working on evaluation questions	24	30	22	29
Summing up the material with the teacher and reflecting on the activities that have been carried out	22	32	26	30
Amount of acquisition	213	243	212	237
Average score	15.21	17.36	15.14	16.93
Average percentage	73.96%	84.38%	73.61%	82.29%

Student activity at SMA I in the cycle I reached an average percentage of 73.96% increasing in the cycle II reaching 84.38%. The activity of students of SMK Negeri I in the cycle I reached an average percentage of 73.61% increasing in the cycle II reaching 82.29%. This showed that students' enthusiasm for learning increases, so students become more active in the learning process.

Paul B. Diedric said there are several types of learning activities that must be done well by students to achieve maximum learning goals including: (1) visual activities, namely reading activities, paying attention. (2) oral activities, namely activities carried out such as formulating, asking, giving advice, opinion, discussion, and instruction (3) listening activities namely listening activities, (4) writing activities namely writing activities, (5) drawing activities, namely activities drawing, making graphs, maps and diagrams (6) motor activities, namely activities to do work, make construction, models, (7) mental activities namely activities to respond, remember, solve problems, analyze and make decisions, (8) emotional activities namely calm , feeling bored, nervous [11].

The teaching and learning process in schools places students as components that determine the success of achieving goals. Students are subjects as well as objects in the teaching and learning process, because students who do learning and students also become learning goals. Through the learning process students are expected to experience changes in knowledge, values, attitudes and skills needed in daily life [12]

TABLE IV. STUDENT RESPONSE

Component	**SMA Negeri I Tanah Miring**	**SMK Negeri I Tanah Miring**
	Score	***Score***
Material	206	218
Presentation	604	594
Language	219	241
Graphic	230	234
Total score	1259	1287

Component	SMA Negeri I Tanah Miring	SMK Negeri I Tanah Miring
	Score	*Score*
Average percentage	82.29%	84.12%

Table IV showed students' responses to the learning media used in learning, chemical supplement book based on Asmat Tribe Papua local wisdom. The average percentage of responses from students of SMA Negeri 1 Tanah Miring reached 82.29% and the average percentage of responses of students of SMK Negeri 1 Tanah Miring reached 84.12%. Students argue that the book was interesting, the language used was communicative, accompanied by pictures, and clear work instructions that make it easier for them to understand the chemical concepts contained in the culture of the Asmat Tribe.

IV. CONCLUSION

There is an increase in the learning outcomes of chemistry through the application of chemical supplement books based on the local wisdom of the Asmat Tribe of Papua. The results showed that the percentage of students learning mastery at SMA Negeri 1 Tanah Miring at pre-cycle, cycle I, and cycle II were 55.56%, 77.78%, and 100.00%, respectively. The percentage of teacher activity in the cycle I was 86.11% and cycle II was 97.22%. The percentage of student activity in the cycle I was 73.96% and cycle II was 84.38%. The percentage of student responses to chemical supplement books based on the local wisdom of the Asmat Tribe of Papua was 82.29%. The students learning mastery at SMK Negeri 1 Tanah Miring in pre-cycle was 22.22%, cycle I was 66.67%, and cycle II was 88.89%. The percentage of teacher activity in the cycle I was 72.22% and the cycle II was 94.44%. The percentage of student activity in the cycle I was 73.61% and the second II was 82.29%. The percentage of student responses to chemical supplement books based on the local wisdom of the Asmat Tribe of Papua was 84.12%.

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