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Application of Make A Match to Improve Students' Chemistry Learning Outcomes in Vocational Schools

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Abstract: Application Make A Match to Improve Learning Outcomes Student Chemistry in SMK. In this research cooperative learning model type make a match applied. Cooperative learning type make a match is one of learning model enable students to study easier because the students will discuss one another, students are encouraged to have enthusiasm, active, and confidence. The goodness of this learning model are : (a) physically (cognitive aspect it will improve student's learning activity; (b) this is an enjoyable that involve games learning model; (c) not only improve student's comprehending on topic learned but also student's learning interest; (d) student's confidence to present their ideas will be trained effectively; (e) student's discipline will be trained effectively. This is a classroom action research. The research conducted in grade X TITL 3 SMK Negeri 4 Palembang with 36 students. Research conducted in two cycles with some stages, they are : (a) planning; (b) action; (c) observation; (d) reflection. Based on the research result, in the first cycle percantage of students who pass the minumum standard (75 in scale of 100) are 41,67% and in the second cycle the percentage become 86,11%. There's improvement in second cycle. Target percentage is 85%, therefore this classroom ation research is success improve student's learning outcome and student's learning interest.

Keywords: make a match

▪ INTRODUCTION

Many students think that studying chemistry at school is uninteresting and less important, students feel bored and have very little interest in chemistry subjects. Some students feel pressured and are forced to study chemistry, so their motivation and interest becomes low. And this causes the learning objectives to not be achieved (Sunyono, Suyanto & Suyadi. 2009)

Before the research was carried out, an interview was conducted with one of the chemistry teachers at SMK Negeri 4 Palembang. The condition obtained was that students' interest was very low in chemistry subjects. The KKM value that has been determined by the school is 75, and only 30% of students achieve this figure. The teaching material provided is in the form of concepts so that students find it difficult to understand the material. Another obstacle is that students focus more on subjects that support their vocation.

Based on the things above, we can write an outline of the problems in studying chemistry at SMK Negeri 4 Palembang, namely: a) students feel bored and stressed when studying chemistry, b) students' interest in chemistry is very low, c) students have difficulty understanding concepts learning chemistry, d) students focus more on subjects related to their vocational major.

To overcome the above problems, an appropriate learning model is needed so that student learning outcomes are not low or reach the KKM and student interest in learning

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increases. Learning models are patterns used in organizing material, compiling curricula, providing instructions to educators. Interest is a tendency from within the heart to have high hopes for something, giving rise to desire and passion for something (Suprijono 2011). Students' interest in learning needs to be increased by using appropriate learning models. This can also be seen in one of the make a match type learning models that has been implemented by Rahmayanti, Redjeki & Saputro (2014) with the thesis title namely Using the Make A Match Learning Method to Increase Learning Activity and Achievement on the Main Material of Hydrocarbons for Class X State High School Students 1 Ngemplak Boyolali Academic Year 2013/2014 resulted in an analysis that in the initial conditions of cycle I, students' cognitive learning mastery was 50%, increasing to 83% in cycle II.

The problem in the research is how to improve student learning outcomes in Electrochemistry material in class X Vocational School through a make a match type cooperative learning model. The limitations of the problem in this research are student learning outcomes seen from evaluation tests, interest in learning seen from student respondents' questionnaires, the learning material at the time of the research was Electrochemistry and the model used was a make a match type cooperative learning model.

This research aims to improve student learning outcomes in Electrochemistry material in class TITL 3 of SMK Negeri 4 Palembang through the Make A Match type cooperative learning model, to describe the application of the make a match type learning model and to determine learning outcomes.

The benefit of this research for researchers is a valuable experience conducting classroom action research. For tutor teachers, providing input to improve the learning process on Electrochemistry material. For schools, adding alternative models of classroom action research on Electrochemistry material. For future researchers, providing references in further research to improve the quality of the learning process, especially chemistry learning.

Referring to the background of the problem described above, the author is interested in conducting research with the title: "Application of Make A Match to Improve Student Chemistry Learning Outcomes in Vocational Schools".

▪ METHOD

Subject, Time and Place of Research

The subjects in this research were class X students majoring in Electrical Power Installation Engineering (TITL) 3 SMK Negeri 4 Palembang in the 2017/2018 academic year. The research subjects were 36 people. The research was carried out from November 2017 to May 2018. Data collection was carried out in class X TITL 3 in the even semester of the 2017/2018 academic year.

Types of Research

The type of research carried out is classroom action research. This research was assisted by the chemistry subject teacher in class X TITL 3 SMK Negeri 4 Palembang. This classroom action research was carried out in several stages, namely planning, action, observation and reflection.

Stages of Research Implementation

At the planning stage, researchers prepare learning tools, namely lesson plans, learning media and prepare materials and documentation tools.

In carrying out the research, several steps were carried out, namely a) the teacher prepared students to start learning; b) the teacher conveys the learning objectives of the Electrochemistry material; c) the teacher divides students into several groups with an even number; d) the teacher explains how the make a match type cooperative learning model works; e) the teacher gives cards containing questions and answers to students; f) the teacher directs students to read chemistry books on Electrochemistry material and look for suitable answers to the questions they get. This search for answers is given a time determined by the teacher; g) the teacher notes that students are active and enthusiastic in working on the questions given; h) if the student has received a suitable answer from his friend then the student can report to the teacher, at this stage the teacher gives appreciation in the form of additional points; i) students who do not receive an answer are recorded by the teacher; j) after each student has received an answer, each group presents their answer; k) at this stage the teacher assesses students' understanding of the material being studied; l) In the final stage the teacher and students both conclude the material that has been discussed; m) the steps above are carried out again for the next meeting. If the learning that has been determined has been implemented then a test is carried out on the students.

Next is observation of the activities that have been carried out. Observations or observations are carried out through video recording of the research taking place. In this case, the recorded video functions so that researchers can see the condition of student activity. Seeing deficiencies that could occur during learning. Observations are also carried out during the learning process.

And the last one is reflection, carried out to correct any deficiencies in the learning process. This reflection is carried out by looking at all sides, both from the researcher's side and the student's condition. For example, if the researcher does not master the material and learning model, the researcher must prepare more firmly for the next meeting in cycle II. Another example is the condition of students who have difficulty concentrating because the outdoor environment is noisy. So for the next meeting the teacher must ensure that the student's condition is ready to learn.

For the next stage in cycle II, what will be carried out depends on the conditions obtained from the actions that have been carried out in cycle I. Likewise for cycle III, if in cycle II the research objectives have not been achieved then it must be continued to cycle III. However, if in cycle II the research objectives have been achieved then the research stops in cycle II. Activities in cycles II and III are the same as activities in cycle I, consisting of planning, implementation, observation and reflection activities. In this research activity, several research instruments were used, namely test instruments, questionnaires and observation sheets. The test instrument used is multiple choice questions. The number of test questions given to students was 20 questions given at the end of the second and fourth meetings. The number of questions for the respondent questionnaire consists of 15 questions. The questions in this questionnaire consist of student respondents regarding chemistry learning which is carried out to measure students' interest in learning. The observation sheet contains all the conditions of both teacher and student activities in the classroom when learning takes place. The activities recorded were in the form of student activity and the researcher's own teaching performance. If the cycle shows that the learning outcomes have reached 85% completeness with a KKM of 75 then the cycle has been successful. However, if

completeness has not been achieved then it continues to the next cycle. Analysis of data from a questionnaire containing statements about students' interest in the learning being carried out, using the formula:

$$Persentase = \frac{jumlah\ responden}{jumlah\ seluruh\ siswa} X\ 100\%$$

Data analysis for student learning outcomes was carried out using Webb's Depth of Knowledge formula

$$skor\ siswa\ (N) = \frac{skor\ perolehan}{skor\ maksimum} X\ 100$$

▪ RESULT AND DISCUSSION

Research result

The research consisted of two cycles, one cycle consisting of two meetings. Volta cell material was studied in the first cycle and corrosion material was studied in the second cycle. In this research, at the end of each cycle, a learning outcomes evaluation test is given. Analysis of learning outcomes in each cycle is carried out using Webb's Depth of Knowledge. In cycle I, student learning outcomes were 41.67%. The learning outcomes obtained should be 85%. Analysis of students' learning interest was carried out by providing a questionnaire containing questions about students' interest in the applied chemical material, namely electrochemistry. The description of the results of the first cycle of research is as follows:

Planning stage, at this stage the researcher prepares the required learning tools, namely lesson plans, media, LKPD, documentation tools, markers, teaching materials, observation sheets and other materials such as student numbers attached to each student's clothes, absences and documentation tools. Researchers also prepare an understanding of the material that will be presented.

Action stage, classroom action research activities for cycle I were carried out in two meetings on April 13 and 20 2018 with the topic of voltaic cells. Learning is carried out in accordance with the RPP.

In the observation stage, at the beginning of the activity the researcher gave greetings, directed the students to maintain the cleanliness of the class, appointed one of the students to lead the prayer beforehand start learning and check student attendance and provide absence numbers which will be stuck on students' clothes, this is used to make it easier to assess students objectively. In the next stage the researcher asked about last week's learning. Then, the researcher showed a picture of a battery and a picture of a dry battery and asked students what pictures they saw and what they knew about the pictures. The researcher conveyed the learning objectives that must be achieved that day and provided an explanation about battery cells and dry batteries and linked them to the material that day, namely voltaic cell material.

Next, the researcher directed students to form groups consisting of eight groups, even group pairs are one of the characteristics of the make a match type cooperative learning model. The names of the eight groups are groups A, B, C, D, E, F, G, and H. Then the researchers distributed LKPD, teaching materials and chemistry handbooks. The researcher appointed one of the students to read the work instructions on the LKPD. There

were three tasks that the students had to complete, namely stimulation, discussion and exercise tasks. The researcher then distributed Q and A cards containing questions and answers and reminded students to report immediately when the assignment had been completed. Q and A cards are distributed to each group, each group gets two cards. Researchers invite students to work on the assignments in the LKPD.

Students start working on stimulation and discussion assignments. When working on discussion assignments, two student representatives from each group looked for answers to the questions they received. The situation in the classroom was quite chaotic because all the students were very eager to find answers. Groups A, B and E asked the researcher because they did not understand the question of writing voltaic cell notation. In the exercise assignment there was a question about writing a voltaic cell, 80% of students did not understand it. The researcher gave an example of a question about writing a voltaic cell. The discussion was attended to by the researcher and two observers. The researcher recorded the order of the students who collected the fastest LKPD, the order for the first meeting from fastest to late was groups E, D, A, F, C, G, B, and H. After completion, the researcher appointed group E to present the results of their discussion to the front.

Figure 1. Researchers help students work on LKPD assignments

After the results of the discussion were presented, a question and answer session was given, but no students asked questions. Next, conclusions about the voltaic cell material from the researcher as a closing lesson. The researcher gave students the opportunity to ask questions if there was still something they did not understand. No students asked questions. At the end of the activity, the researcher reminded students to study cell potential calculations and the types of voltaic cells. Then, researchers collected chemistry handbooks and LKPD. The researcher closed the class by saying hello. The observer carried out an analysis of student interactions in one group, in this case groups A, B, C, F, and H had less interaction. The tools and materials needed have been met by all groups.

In identifying problems, understanding and discovering knowledge concepts about voltaic cells, students from each group still need guidance from the teacher.

At the second meeting, voltaic cell material was still discussed, namely cell potential and types of voltaic cells. When the learning process activities took place, the situation in this room started to become conducive, there were four groups, namely groups A, B, C and H who asked questions most often. The researcher recorded the order of the students who collected the fastest LKPD, the order for the second meeting from fastest to late was groups C, F, E, B, G, D, A, and H. In the research at the second meeting, the

observer analyzed the students by paying attention to student interactions , in this stage the observer saw that there were three groups whose students interacted, namely groups B, C and G. When working on the LKPD, A, B, C and H were the groups that had the most difficulty completing the LKPD.

Figure 2. Students making a presentation

At the end of the second meeting, a learning outcomes evaluation test was carried out, questions in the form of multiple choices that represented indicators of competency achievement. From the learning outcomes tests that have been carried out, it was obtained that 41.67% of the number of students had passed the KKM, while what had to be achieved was 85%. Therefore, it is necessary to continue research in cycle II so that the number of students who reach the KKM is 85%.

Reflection, based on data analysis that has been carried out on student learning outcomes and student interest in learning, it was obtained that the percentage of students who passed the KKM was 41.67%, the average student learning outcome was 61.11 and student interest in the chemistry subject electrochemical material was still very small, student interest can be seen in the questionnaire analysis. From the results of the discussions written in the LKPD, students' understanding of the voltaic cell material was quite good, however when given the evaluation test the number of students who passed the KKM was still not met.

The follow-up plan for cycle II is to improve the conditions obtained from cycle I, namely to emphasize to students that the value given to students is an individual value, so that each student is willing to work in each group. Researchers will also provide more concrete examples, provide pictures related to the material so that it is easier for students to relate the material being studied to everyday life, provide deeper final conclusions if time allows, deeper conclusions in the form of emphasis on the material -material that has been studied during study time, ask more questions at the beginning of the activity and students who can answer correctly and bravely get additional points, give prizes at the end of cycle II and researchers will pay more attention to group activities and be assisted by observers to record all activities of researchers and students .

The description of the research results in cycle II is as follows:

Planning stage, activities carried out at the planning stage in cycle II are preparing lesson plans, learning media in the form of pictures of objects experiencing corrosion and Q and A cards, preparing strategies that will be implemented to increase student activity, compiling LKPD, compiling test instruments for evaluation. learning outcomes, preparing learning interest questionnaires, and preparing teaching materials.

Action stage, research activities carried out in cycle II were carried out in two meetings, namely on April 27 and May 4 2018 with corrosion material.

Observation stage, the stages of the learning process carried out are the same as the stages or learning steps in cycle I. The conditions for students in the classroom are increasingly conducive, all students already understand the work instructions. Students who play and just stay quiet are in groups of only two people. In the exercise questions there were six groups who asked, namely groups A, B, G and H. In the third meeting, after the discussion was finished the researcher recorded the order of the groups that completed the LKPD fastest to the slowest, namely D, C, E, F, G, H, A and B.

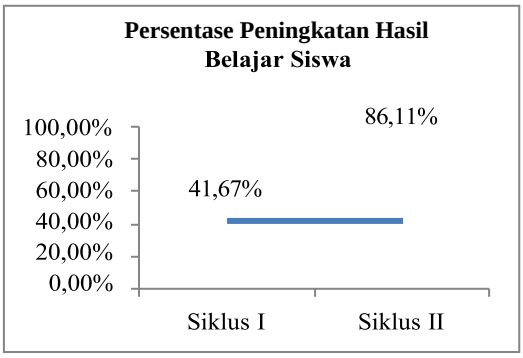
The fourth meeting showed progress, namely students were more brave, active and interacted in their groups. At the end of the fourth meeting, the researcher read and gave prizes to the best groups, namely groups D, E and C. This group was the group that completed the LKPD assignments the fastest from the first meeting to the fourth meeting. Then the researcher gave prizes to the most active students in each group.

Figure 3. Class atmosphere. Students are looking for answers from the question cards.

Figure 4. Giving prizes to active students.

Based on the results of observations from observers, students as a whole have started to be active, dare to come forward and ask questions to the teacher. When asked about last week's learning, students who gave different responses from students at the previous meeting, the researcher gave the opportunity to students who had never answered, from this it could be concluded that students were becoming more active and brave.

Reflection stage, based on data analysis of students' learning outcomes and interest in learning, it was found that the percentage of students who obtained a KKM pass score was 86.11%. 31 students. This shows that this research was successful, although shortcomings were found, namely that students still had difficulty answering the exercise section of the LKPD questions. And students' interest in learning has increased, this can be seen from the questionnaire analysis. The results of the questionnaire analysis of student responses to the electrochemistry subject showed that more than 50% of students gave positive responses. The following is a graph of the percentage increase in student learning outcomes from cycle I and cycle II.



Graph 1. Percentage increase in student learning outcomes

An increase in the percentage of students passing the KKM was obtained in the first cycle, 41.67% and in the second cycle, 86.11%. This increase occurred because several improvements had been made based on what occurred in cycle I. Some of these improvements included paying more attention to individual students so that during the learning process each student was more responsible for their group assignments. Another corrective action is the addition of concrete examples so that students understand the material more easily. By achieving an increase in the percentage of learning outcomes, researchers categorized cognitive learning outcomes based on the table below.

Table 1. Cognitive learning outcome categories

Interval Skor (1 100)	Nilai Kompetensi (1-4)	Predikat	Kriteria
95 < N ≤ 100	4,00	A	Sangat baik
90 < N ≤ 95	3,66	A-	
85 < N ≤ 90	3,33	B+	
80 < N ≤ 85	3,00	B	Baik
75 < N ≤ 80	2,66	B-	
70 < N ≤ 75	2,33	C+	
65 < N ≤ 70	2,00	C	Cukup
60 < N ≤ 65	1,66	C-	
55 < N ≤ 60	1,33	D+	Kurang
N ≤ 55	1,00	D	

From a total of 36 students, the criteria for student learning outcomes were obtained, namely: 3 students with very good score criteria, 26 students with good score criteria, 3 students with sufficient score criteria and 4 students with poor score criteria. The number of students who have the good learning outcome category is 26 students. This shows that more than 50% of the students already have a good understanding of Electrochemistry material through the application of the make a match type cooperative learning model. And only 3 students were found who were included in the category of sufficient cognitive learning outcomes, this shows that only 3 students did not understand the learning, 4

students were included in the criteria score of less, meaning researchers need to make a little more effort by adding several actions so that students are not on the low value criteria. Then there were 3 students who had very good score criteria, this was an added value for researchers because there were students who really understood the concept of make match type cooperative learning in Electrochemistry material.

To help see students' abilities related to students' learning interests, researchers gave students a learning interest questionnaire. The percentage of student respondents from the interest questionnaire is as follows.

Table 2. Percentage of respondents to the student interest questionnaire

No	Pertanyaan	Siklus	Alternatif Jawaban					
			Setuju	Kurang setuju	Tidak setuju	Persentase Setuju	Persentase kurang setuju	Persentase Tidak setuju
1	Siswa semangat mengikuti pelajaran kimia materi elektrokimia sampai akhir pelajaran	I	9	11	16	25	30,6	44,4
		II	20	7	9	55,56	19,44	25
2	Siswa berusaha menjawab pertanyaan yang diberikan oleh guru dengan baik dan benar	I	5	8	23	13,89	22,22	63,89
		II	15	10	11	41,67	27,77	30,56
3	Ketika siswa diberi tugas atau PR dengan sungguh-sungguh saya mengerjakannya	I	17	12	7	47,22	33,33	19,45
		II	27	5	4	75	13,89	11,11
4	Sebelum pelajaran kimia dimulai, siswa memper-siapkan buku kimia terlebih dahulu	I	21	10	5	58,33	27,78	13,89
		II	29	5	2	80,56	13,88	5,56
5	Siswa sungguh-sungguh memperhatikan pelajaran kimia yang telah dijelaskan	I	16	13	7	44,44	36,11	19,45
		II	26	5	5	72,22	13,89	13,89
6	Siswa menjawab perta-nyaan yang diberikan oleh gurunya	I	7	16	13	19,45	44,44	36,11
		II	16	12	8	44,44	33,34	22,22
7	Siswa mengungkapkan pendapat saat diskusi pelajaran kimia berlangsung	I	6	5	25	16,67	13,89	69,44
		II	17	4	15	47	11,11	41,67
8	Ketika ada tugas atau PR, siswa berusaha mengerjakannya sampai tuntas	I	17	7	12	47,22	19,45	33,33
		II	28	3	5	77,78	8,33	13,89
9	Siswa mencatat materi kimia yang telah didiskusikan di kelas	I	19	7	10	52,77	19,45	27,78
		II	32	2	2	88,88	5,56	5,56
10	Ketika guru memberi kesempatan untuk mengungkapkan pendapat, siswa memanfatkan kesempatan itu	I	8	12	16	22,23	33,33	44,44
		II	18	7	11	50	19,44	30,56
11	Ketika ada materi yang tidak dimengerti oleh siswa, siswa mencoba mempelajarinya dengan teliti	I	3	9	24	8,33	25	66,67
		II	16	7	13	44,44	19,44	36,12
12	Siswa membaca materi Elektrokimia terlebih dahulu sebelum pelajaran dimulai	I	2	7	27	5,56	19,44	75
		II	13	13	10	36,11	36,11	27,78
13	Siswa senang belajar kimia materi Elektrokimia	I	8	8	20	22,22	22,22	55,56
		II	21	6	9	58,33	16,67	25
14	Siswa bekerja sama dengan aktif bersama teman sekelompok	I	15	15	6	41,67	41,67	16,66
		II	29	2	5	80,56	5,56	13,88
15	Siswa mengikuti instruksi guru dengan baik untuk berlangsungnya proses pembelajaran	I	15	10	11	41,66	27,78	30,56
		II	27	3	6	75	8,33	16,67

Based on the percentage data above, it was obtained that students' interest in learning increased. In cycle I, there were still many students who gave disagreeing responses in preparing chemistry textbooks, completing assignments, and working actively in groups. However, in cycle II there was an increase in students' interest in learning, more students agreed to prepare themselves before class learning began. This can be seen in the increase in agreeing responses to incorrect questions, namely number 4. Before chemistry lessons started, students prepared chemistry books first. The increase in agree responses was from 58.33% to 80.56%. Students become more serious about learning as seen from their enthusiasm during the learning process. Students' interest in

learning increases, students enjoy the learning process more so that interest in student learning outcomes increases.

Discussion

Classroom action research was carried out in 2 cycles. The research was only carried out for 2 cycles because in cycle II the number of students who received a completion score had already been reached. Classroom action research for the cycle is carried out in four stages, namely the planning stage, action stage, observation and reflection stage. In cycle I the learning process took place using a make a match type cooperative learning model with voltaic cell material. In cycles I and II students were divided into eight groups. During the ongoing discussion, the research group distributed LKPD, in the LKPD there were several task sections, namely stimulation, discussion and exercise. In carrying out these tasks, there were six groups who did not understand the instructions for working on the LKPD. In the exercise assignment section, 80% of students did not understand. When the researcher gave students the opportunity to provide responses, no students wanted to provide responses. At the end of cycle I, students were given an evaluation test, the percentage of students who got the KKM score was 41.67%. Meanwhile, the target that must be achieved is 85%.

Then, to analyze student interest in cycle I, students had very little interest in chemistry subjects. This can be seen from student responses through questionnaires. There are 25% of students who are enthusiastic about taking chemistry lessons, 19.45% of students who answer questions given by the teacher, very few students who study chemistry carefully, namely 8.33%, very few students who read electrochemical material before the lesson starts, namely 5 .56%, students who enjoy studying chemistry are only 22.22%. The number of students responding to other questions was around 40% to 50%, this illustrates that the number of students who gave positive responses was less than half the number of students.

In cycle II, many improvements were made, namely emphasizing to students that the value given is an individual value so that students are responsible for themselves, providing more concrete examples, providing more pictures, relating the material to everyday life, providing conclusions. deeper ending, asking more questions to students at the beginning of learning activities, giving prizes to the most active students. After this was done, many improvements were made, students' interest in learning increased, students were more active, students enjoyed learning more and were more cheerful, interactions between students were getting better, there were fewer students asking for LKPD assignments. In cycle II, an evaluation test was also carried out, it was obtained that the percentage increase in the number of students who passed the KKM was from 41.67% to 86.11%.

It was found that students were more active, this is in accordance with the opinion of Shofiyah (2013) who stated that cooperative learning type a match encourages students to be enthusiastic about learning, more active and more mastery of lessons and cooperation will directly influence students' interest and learning outcomes. The advantages of this learning model are that both cognitively and physically it can increase students' learning activities, learning contains elements of play so that students are not stiff in carrying out discussion tasks, it can increase students' understanding, students are more courageous and disciplined (Huda 2014). The advantages of the make a match type learning model are that it increases interaction between students and increases student

motivation in exploring information independently (Wartini 2014). This has been achieved in the research that has been carried out.

Students' increasing interest in learning chemistry can be seen from the results of the questionnaire analysis, the average student interest is at a percentage of 41% to 89% (can be seen in Table 2). This shows that students are increasingly interested in learning chemistry. Interest in learning functions so that students are encouraged to study diligently, to achieve goals and always be motivated (Suprijono 2011). Based on the results of student cognitive analysis and student interest, it can be concluded that the application of the make a match type cooperative learning model in electrochemical material improves student learning outcomes.

▪ CONCLUSION

Based on the research that has been conducted, it can be concluded that through objective form evaluation tests, student learning outcomes can be improved by implementing the make a match type cooperative learning model. This was obtained from an increase in the percentage of students who achieved a KKM score of 75 in cycle I, from 41.67% to 86.11% in cycle II. The application of the make a match type learning model is by dividing students into pair discussion groups. This learning model contains game elements so that student interest and learning outcomes increase. The average student learning outcome in cycle I was 61.11 and there was an increase in cycle II which was 81.94. With this increase in value it can be stated that the application of the make a match type cooperative model in electrochemical material in class X has been successful because it has reached the target of 85 % of the percentage of the number of students.

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