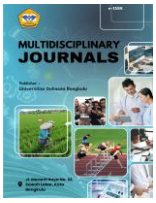
Multidisciplinary Journals
Volume 2 Issue 1, 2025 (29-40)
ISSN (*online*) : **3047-8499**
Homepage : https://jurnalunived.com/index.php/MJ
Doi : https://doi.org/10.37676/mj.v2i1

Differences in Motivation and Learning Outcomoes Using The Index Card Match and Index Card Sort Leraning Models in Biology Subjects at SMA Negeri 10 Mukomuko

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Received [03-02-2025] Revised [05-03-2025] Accepted [08-03-2025]

Abstract. This study aims to determine the differences in student motivation and learning outcomes using the index card match (ICM) and index card sort (ICS) learning model in biology subjects at SMA Negeri 10 Mukomuko Regency. The research method used is observation with qualitative approach. The population in this study consisted of 10th-grade science students, with samples taken from two classes applied consecutvely. The study was conducted in pre-existing classes : Class X IPA 1, Class IPA 2, and Class IPA 3, with a total of 75 students. The results of the study indecate that learning using the ICM model in the experimental class led to an increase in motivation, as avidenced by the questionnaire results. Similarly, the ICS model in experimental class also showed increased motivation based on the scores obtained. In terms of learning outcomes, both experimntal classes experinced an improvment in scores. However, there was no significant or statistically distinct difference in leraning outcomes between the two models.

Keywords: *Leraning Differences, Motivation, And Learning Outcomes*

INTRODUCTION

Education is a daily activity and behavior, therefore teachers as an inseparable part of students, teachers play an important role in the learning process and can provide support. Education in Indonesia still experiences many problems. These problems involve many factors related to education, in education can also conduct scientific investigations through data collection, processing, analysis based on certain approaches, methods, and techniques to answer problems in the field of education (Arifin 2011,). As a process, one of the problems of education is the low quality of education at every level and education unit. Science including biology can experience development.

Problems related to educators can be the ability and expertise of educators/teachers in applying their teaching skills, both in the selection of media, use of strategies, learning models, and others. While problems related to the curriculum can be the accuracy of the applicable curriculum whether it is appropriate to the development of the times that occur.

Then, the problem of students, for example related to their motivation and interest in learning biology which is closely related to Latin, the lack of learning media used in the teaching and learning process in this subject which is the main obstacle is books, because in SMA Negeri 10 to conduct learning using media such as power points will only take place a few times, this also makes students less active because students are not directly involved, thus to uncover the problem and find a solution, research is needed.

Ngalimun (2015:3) states that the provision of appropriate and appropriate learning media will create conducive learning conditions. In addition, according to Munadi 2013:1), in carrying

out learning, teachers are also required to have the ability in terms of designing and implementing learning. In line with that, Ahmadi and Supriyono (2013:91) also state that the absence or incompleteness of learning media is one of the factors that causes learning difficulties for students.

This non-conducive learning atmosphere can affect student learning outcomes. Based on the results of observations and interviews conducted with biology teacher Mrs. Eva S.Pd at SMA Negeri 10 Mukomuko. Learning carried out at SMA Negeri 10 has now been carried out direct learning starting in August 2020, because previously at SMA Negeri 10 learning was carried out through WhatsApp groups due to Covid-19. The current learning process is better than before because the learning process has been carried out directly, but in the learning process the teacher still has not implemented active learning, such as lack of interaction between teachers and students, not involving students in every learning activity so that student learning outcomes are less than optimal and there are still students who do not understand the material given by the teacher, this can be seen from the learning outcomes obtained by class X students, there are still many students who get scores below the completion rate of less than 70.

In addition, during the learning process, many students are still less active in asking or answering questions, so that activities have an impact on student learning outcomes. To overcome the problem of biology learning, one of them is by providing innovation in learning to make the learning process take place optimally by using the index card match and card sort learning models to actively involve students, can motivate, students as mediators, and can create a good, communicative and enjoyable teaching and learning atmosphere so that they can explore the competencies possessed by students to achieve optimal learning outcomes. According to Maulida (2018) The active learning model of the index card match type (finding card pairs).

Index card match is a learning that requires students to work together and can increase students' sense of responsibility for what they learn in a fun way so that it can increase student motivation and learning outcomes in their learning process. Card sort learning model (choosing cards/sorting cards). Card sort is a learning model that can be used in the learning process to interact with each other so that students can learn more actively, and students are not only passive recipients of information, students are challenged to actively communicate, especially the activeness of finding relevant information and designing solutions to the problems faced.

The results of observations from researchers found that during this Covid-19, students can still learn as usual, only the school changes the time rules in the teaching and learning process in the classroom, namely by reducing learning time unlike before, with this the learning process in the classroom has a short time in order to minimize time so that schools can still do offline learning even though there is Covid-19.

For this reason, researchers will carry out the learning process using a learning model using the index card match and card sort models in order to see whether during this Covid-19 period learning can provide better results than the usual learning process. The purpose of this study was to determine the differences between the Index Card Match and Card sort learning models on the motivation and learning outcomes of students at SMA Negeri 10 Mukomuko.

LITERATURE REVIEW

1. The results of a study in 2011 by Haryanto entitled "Differences in learning achievement between students who actively learn the Index Card Match and Card Sort types on the subject of vibrations and waves. Futuhiyyah 1 Mrangen Demak. Based on his research, learning taught with the index card match type is superior to using card sort.

2. The results of a study in 2013 conducted by Mufidah, concluded that the results of the study concluded that the application of learning strategies can improve the learning outcomes of science in the material of light and its properties in students, Colomadu in the 2012/2013 academic year.
3. Agung Prasetya, Faculty of Teacher Training and Education, University of Mataram, 2016, entitled Application of Mathematics Learning Outcomes Through the Application of Index Card Match Strategy for Mataram Students in the 2016/2017 Academic Year. The results of this study indicate that there is an increase in learning motivation that is categorized as active in cycle I, continuing to cycle II which gets the active category. The average student learning outcomes in cycle 1 are 74.8 and in cycle II 84.48. Student learning outcomes show an increase from cycle I with 19 students completing it with a classical completion of 66%, and in cycle II 25 students completing it with a completion of 86%. 4. Cahaya, Biology Education Study Program, Medan University, 2016, entitled Differences in Student Learning Outcomes Using Active Learning Strategies of Index Card Match and Card Sort Types on Life Organization Materials. The results of the study showed that the average learning outcomes of students taught using index card match were higher than the learning outcomes of students using card sort, with the results of the hypothesis test obtained t count > t table, namely 2.22 > 2.002.

METHODS

This research is an experimental research. The type of data used is quantitative data, namely data on student learning outcomes obtained from the results of the final test (posttest). This research will be conducted in Class X of SMA Negeri 10 in Mukomuko Regency. The population in this study were all students of class X IPA SMA N 10 Mukomuko in the 2020/2021 academic year consisting of three classes. In this study, samples were taken from two classes that were applied sequentially. This research was conducted on classes that were already available.

Where class X IPA 1 is the control class. Class IPA 2 is a card index sort type learning model, while class X IPA 3 uses index card match type learning. The independent variables in this study are the ICM and ICS cooperative learning models and the dependent variables in this study are student motivation and learning outcomes. The data collection technique in the study used a questionnaire, to obtain student learning outcomes obtained using a pretest and posttest.

The data obtained were analyzed quantitatively, namely by using statistical techniques, both descriptive and inferential analysis. To provide the results of each learning model used, the results can be seen whether there is a difference between the two models on student learning outcomes. This study is in the form of pretest and posttest question instruments in the form of multiple choices and questionnaire sheets.

RESULTS

The results of the study show that learning can be concluded from the motivation of learning outcomes carried out in the ICM experimental class, which provides increased motivation values, as can be seen from the results of the questionnaire. there is while in the experimental class type ICS gives increased results also seen from the existing values. In the learning outcomes in the experimental class that has been carried out provide an increase in the value of learning outcomes in each experimental class. However, there is no significant difference or real difference in learning outcomes

Table 1 Calculation Questionnaire Motivation Student

	Questionnaire Motivation		
Calculation	ICM	ICS	CONTROL
Total Score	1597	1218	1284
Highest Score	70	63	67
Lowest Score	53	43	43
Average	67	50.75	51.36
Criteria Motivation	Currently	Low	Low

Based on table 1 can seen that For third class with using the learning model ICM type , ICS and class control own difference motivation Study with see amount score the got class experiment with use ICM experiments and class control . Before do ui hypothesis , data the will tested normality and homogeneity For knowing data is distributed and homogeneity or No .

Normality test

Testing normality test done to mark questionnaire students in class X IPA II as group experiment ICM , class X IPA III as group ICS experiments , and class group control . For normality test use Kolomogrov -Smirnov.

Table 2 Normality Questionnaire Motivation Study Student

MOTIVATION	**Class**	**Kolomogorov-Smirnova**		
		Statistics	Df	Sig.
	ICM	.129	26	.149
	ICS	.136	24	.101
	Control	.105	25	200,

From table 2 above show that value significance test normality kolmogorov-smirnov on value data questionnaire motivation Study student main discussion of specific viruses between class the use model learning Inquiry distributed.

Homogeneity Test

Table 3 Homogeneity Test Questionnaire Motivation Study Student Test of Homogeneity of Variances

MOTIVATION Test of Homogeneity of Variances				
	Levene Statistics	df1	df2	Sig .
	.2179	2	97	.119

Based on table 3 above can viewed data value questionnaire motivation Study with student test *Levene Statistic* on the three class that is used sample using ICM, ICS and inquiry learning models own homogeneous variants .

Hypothesis Testing

Result data analysis questionnaire motivation Study student normally distributed and own Variants the homogeneous , then For know there is difference motivation Study or no , so need One Way Anova test was conducted .

Table 4 Test Questionnaire Motivation Study Student Motivation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	530,850	2	265,425	4,872	.010
Within Groups	5,284,110	97	54,475		
Total	5,814,960	99			

Based on table 4 above value significance more small from 0.05 so that questionnaire For third class the No there is difference motivation learn , then analysis test required frequency motivation Study students . Based on results motivation Study the has given to student class experiment and class control obtained distribution each answer statement . Answer students who have expected . Frequency answer student can seen on table under This :

Table 5 Frequency Questionnaire Motivation Study Student

CLASS	Category	Interval	Frequency	Presentation
ICM Experiment	Very high	85-100		
	Tall	69-84	13	50.00%
	Currently	52-68	13	50.00%
	Low	36-51		
	Very Low	20-35		
TOTAL		26		100%
ICS Experiment	Category	Interval	Frequency	Presentation
	Very high	85-100		
	Tall	69-84		
	Currently	52-68	10	41.67%
	Low	36-51	14	58.33%
	Very Low	20-35		
TOTAL 24				100%
Class Control	Category	Interval	Frequency	Presentation
	Very high	85-100		
	Tall	69-84		
	Currently	52-68	10	40.00%
	Low	36-51	15	60.00%
	Very Low	20-35		
TOTAL 25				100%

Based on results analysis in table 5 motivation Study student class The ICM experiment was obtained by 13 students (50%) with High category , 13 students (50%) with category in progress . Motivation Study students in class ICS experiment obtained 10 students (41%), 14 students with category being and motivation learn students at (58%) with category low and motivation Study students in class control obtained 10 students (40%) with category moderate and 15 students (60%) with category low

Analysis *Pretest*

Pretest given to students For to know so far where understanding student to learning that will given before given model learning each class . Data results *pretest* can seen on table 6

Table 6 Result Data *Pretest* student ICM class , ICS and class Control

Calculation	Class		
	ICM	ICS	Control
Total score	760	890	830
Highest	50	40	50
Lowest	20	20	20
Average	32.96	31.66	33.29

Based on table 6 above can seen that average value for classes that use learning models *card match index* which is 32.96 , the average for class *index card sort* is 31.66 dam average for class control which is 33.29. From the average results known that no there is significant difference between third class said . However For to know is the data the distributed normally or No then We must perform normality test as well as homogeneity For knowing the data has homogeneous variants .

Test Normality data *pretest* results learn student

Before perform anova test One track moreover formerly normality test was performed distribution and homogeneity variance distribution . Test of normality of score data pretest results cognitive student using the one-sample Kolomogorov - Smimov test with criteria If sig. value >0.05 then the data is normally distributed .

Table 7 Normality Test *pretest results* Study cognitive student

Class	Kolomogorov-Smirnov		
	Statistics	Df	Sig.
ICM	.169	24	.075
ICS	.163	26	.073
Control	.123	25	200

Based on table 7 known that mark *pretest* results learn cognitive student Good in class ICM, class ICS and class control more big from 0.05. Hal the the show that third said distributed normal . If mark the distributed normal can further testing was carried out that is test homogeneity :

Test homogeneity *pritest* result Study cognitive student

After in need test normality and distribution normal furthermore will done test data normality with homogeneity test variance with use Levene statistic. Result of the test homogeneity results learn student can seen on table 7.

Table 8 Test Homogeneity Pretest Result Study Cognitive Student Test of Homogeneity of Variances

	Levene Statistics	df1	df2	Sig .
pre test score	.049	2	72	.952

Based on table 8 can seen significant of 0.952. This is show sig value more big from 0.05 so that the data pretest results cognitive student have variance the The same or homogeneous

Test anova *pretest* results Study cognitive student

After known that the pretest data results Study cognitive normally distributed and homogeneous so For see difference between third class study ANOVA test was conducted with results can seen on table 9

Table 9 Anova Test Learning Outcomes Cognitive Student

ANOVA						
		Sum of Squares	Df	Mean Square	F	Sig .
pre test score	Between Groups	748,282	2	374,141	4.194	.019
	Within Groups	6423.718	72	89,218		
	Total	7172.000	74			

Based on table 9 above can seen mark significant 0.19 more big from 0.05 to No there is difference cognitive student with thus for know difference results learn cognitive student with using learning model *index card match* , *card sort* and conventional can to be continued with use mark *posttest*

DISCUSSION

Differences in Learning Motivation Using the ICM (Index Card Match) Learning Model, ICS (Index Card Sort) Type and Inquiry Model on Students' Biology Subjects

Based on the results of the Onel Wey Anova test data analysis on SPSS 124.0, a value of 10.010 was obtained which was smaller than 10.05 (0.010 <10.05), which means that there are differences in the ICM experimental class learning model, the ICS experimental class and the control class using the Inquiry learning model on students' learning motivation. This can also be seen from the data on the frequency analysis of student learning motivation which shows that students' learning motivation in the ICM experimental class is 50% higher. This difference is because in class X IPAl 2 using the ICM type learning model, in the learning process everything is determined by the teacher and students only need to do the learning process in determining the group students can choose themselves, the teacher only gives cards in the form of answers and questions after that the teacher will only monitor and students start doing group work to find their card pairs because each group member has a role and responsibility in solving problems that result in students during the learning process students are very active and enthusiastic to build, explore, search for information thoroughly to solve problems in the group to find answers or questions in the form of cards and the learning process is centered on students to play an active role in the learning process to create interest in wanting to learn. So that it requires

students to work together and interact in groups to determine ideas, then each student will work to complete their responsibilities to the group and help each other to solve problems faced in the group. This is supported by Puspita, D. et al (2018) who stated that using the ICM type learning model is an active learning model in conducting group discussions, problem solving and also many students who actively ask questions and give opinions during learning and students are very enthusiastic in presenting and making decisions and making documentation. Meanwhile, for students who are less active will be left behind in understanding the material, so from the ICM model learning, teachers must provide motivation and opportunities for students to find suitable answers to the questions that have been given and invite students to actively participate in various activities during learning with the help of teachers as facilitators and motivators.

Sukmawati (2014) also stated that when viewed from the syntax or learning steps, the ICM type learning model emphasizes students to be more active and work together in activities, so that students are fully responsible for learning activities and students are given the opportunity to develop their activities and mindsets optimally to stimulate learning motivation. In the ICS type cooperative learning model that emphasizes students for interaction and cooperation activities in this group, there are shortcomings in its learning which result in low-ability students having great difficulty in following the learning and high-ability students will feel disturbed because in solving it they only piggyback so that group work will be less effective. So in reality there are still many students who do not cooperate in their groups which results in only some group members having more interest and curiosity about the material while other group members will only rely on their group mates to solve existing problems. So that students who are more dominant will have more curiosity and responsibility towards their group while students who have ordinary abilities feel uninterested and less curious because they do not have responsibility towards the group in solving problems as a result students do not pay attention and lose focus when learning. and in the learning process the teacher is also still involved in determining and instructing the material to be discussed by students which causes students to be less motivated and will only do what the instructions given by the teacher. So that the highest indicator is in the ICS type learning model. So that the highest indicator in the ICS type learning model is not easy to let go of what is believed in completing the tasks given by the teacher, because for students who are interested and have curiosity, it will be believed but not for students who are less interested and the lowest motivation in the persistent indicator in facing tasks, students who do the tasks given by the teacher will work hard but for students who are lacking, they will not do it seriously.

And it will be very influential for students who have a high curiosity so that they can provide good and active abilities. This is supported by the opinion of Mufidah et al. (2013) that the ICS type cooperative learning model is a learning model for students who show an enthusiastic attitude towards lessons and they accept the learning opportunities given by the teacher well and enjoyably, but there are still many students who are not motivated to work together in their teams who have very low abilities, very lacking in their curiosity in learning because they will only look for what has been instructed by the teacher. While in the control class the learning process always has problems with the time allocated, because the learning process requires a long time to collect information, so that many students experience errors in problem solving, incomplete and wrong results when collecting information which requires special supervision to stay controlled but most of the information search process students chat more, are busy themselves and lack curiosity in learning so that it can reduce their learning motivation. So that the motivation indicator shows interest in learning, interest in finding information will be very lacking in the problems of questions given by the teacher so that students do not show activeness in learning and are more busy chatting and busy themselves. This is supported by Amelia, et al (2013) where the learning process still looks not conducive

which results in students being less active and chatting more, besides students feel less able to answer and solve existing problems, this makes students less motivated to learn.

Differences in Biology Learning Outcomes of Students Using the ICM Learning Model (Index Card Match), ICS Type (Index Card Sort) and Conventional Models for Students' Biology Subjects

Based on the results of the One Way Anoval test data analysis on SPSS 24.0, a value of 0.0001 is obtained, which is smaller than 10.05 (0.0001 <0.05), which means that there are differences in the learning model in the ICM experimental class, the ICS experimental class and the control class using the Inquiry learning model on student learning outcomes have different values between classes, namely; for classes using the ICS learning model and the control class. This difference is because in class X IPA II with the ICM type learning model in the learning process, it provides students with the opportunity to be directly involved in finding partners from questions or answers that have been shared with other students and work together in solving problems and are enthusiastic. Students are also actively involved in the learning process in order to be able to develop their knowledge so as to provide maximum learning outcomes through stages in the learning process that make students concentrate on finding their own concepts of the material that has been studied so that their understanding of the previous material can be reviewed again to make it easier to remember. With the stages that have been determined for the material, students will be more focused because students only need to study it, but in the responsibility of students can collect or find pairs of questions or answers that already exist and can develop information from various sources, making students more participating between students with activeness in learning to improve student learning outcomes.

This is supported by Puspita, et al. (2016) who stated that the ICM (Index Card Match) learning model makes students understand the material better by playing games, working together in groups, and not focusing on one member of the group, this joint learning process is what allows students to build and find their own understanding. In line with the opinion of Amrayeti, et al (2011) that the form of the ICM type cooperative learning model that emphasizes students to be more courageous in front of the class to explain what they have learned in learning, share knowledge about the material being studied and can work together between group pairs in understanding the lesson material indirectly gives students responsibility for the group and attracts students in teaching and learning. In this ICS (Index Card Sort) type cooperative learning model, students are required to solve problems that have been given by the teacher so that this learning model has shortcomings, namely requiring students to learn more actively, increasing students' critical power, increasing appropriate group work in a fairly short time while students in the class are less able to meet the demands of the active learning model.

This is supported by Mufidah et al. (2013) who stated that there are still some students who have difficulty in understanding the material given by the teacher and are less active in participating in the card games provided by the teacher. They just follow their friends in sticking the cards without understanding the contents of the material on the card. In addition, this learning model makes students less able to dig up more information from the problems in the group and understand students who are less in depth in the material, because students will only receive information from what has been given and explained by the teacher is very minimal to improve student learning outcomes. This is supported by Haryanto (2011) who stated that the existence of high-achieving students or smart members is more dominant, and requires more time for students who make it difficult to improve student learning outcomes. In line with the opinion of Mufidah et al (2013) where the concentration and activity are less enthusiastic in the

game because not all students are able to discuss and develop lessons through answers to the problems given after the learning process takes place. Students are indeed able to store the material given but are less able to activate memories of the material that has been given and relate it to new material. Students are still lacking in showing an attitude of participation and competition in completing the steps given. Self-confidence is not high enough so they are afraid to ask questions, answer, and express opinions. Which causes the learning process to be hampered because many students are less active and less concentrated on the existing learning objectives.

And students focus more on the group itself compared to students with low abilities which results in their learning outcomes not being optimal. This is proven by Puspita, D. et al (2018) stating that students who have low understanding are likely to make noise and cause other students who are concentrating to be disturbed in the learning process. So that the value of the work results is less than optimal. From the results of further testing using the LSD test, it is known that the class taught with the ICM model and does not have a significant difference or is not significantly different from the ICS model class with an average difference of 1.739. As for the sig value. which is 0.653 is greater than 0.05 which means H0 is accepted, this is inseparable from the learning process carried out in each class. The results of the study show that the ICM learning model and the ICS learning model can both improve student learning outcomes. This is due to the similarity of the ICM and ICS models, which are the same as using games in the learning process. Giving great responsibility to students also to interact with each other so that strong motivation arises in students to develop curiosity that can train students' high-level thinking skills. However, although there is no significant difference between the ICM learning model and the ICS learning model, it turns out that the ICM learning model has higher learning outcomes compared to the learning outcomes of the ICS learning model. This can be seen from the average posttest results where the ICM class has a higher average than the ICS class, namely 81.85, while in the ICS class it is only 67.5. This is because in the ICM type cooperative learning model, it turns out that the ability to think and remember material in students is higher. Research conducted by Puspita, D et al. (2018) stated that the ICM learning model was higher than the ICS learning model, which differed significantly in student learning outcomes.

CONCLUSION

Based on the results of the research and discussion of the data collection that is the focus of this research regarding the differences in the ICM (Index Card Match) and ICS (Index Card Sort) learning models on student motivation and learning outcomes at SMA Negeri 10 Mukomuko, In the learning outcomes in the experimental class that has been carried out, it provides an increase in the value of learning outcomes in each experimental class. However, there is no significant difference or real difference between the learning outcomes of students who use the ICM experimental class learning model and the ICS experimental class at SMA Negeri 10 Mukomuko.

REFERENCES

Ahmadi, H. Abu Supriyono Widodo. 2004. *Psikologi; belajar,* Jakarta: PT Rineka Cipta

Akbar, Salim, Muhammad & J A.Pramukuntoro.(2014). Pengaruh Model *Quantum teaching* terhadap motivasi siswa pada standar kompetensi dasar-dasar elektronika di SMK. *Jurnal pendidikan teknik elektro* vol 3, No 1 (2014). Diakses melalui https://jurnalmahasiswa.unesa.ac.id pada tanggal 10-02-2021

Amelia Rosmala, Isrok'atun, Regina Lichteria Panjaitan.2013.Perbandingan Pengaruh Pendekatan PBL Dan Pendakatan Inkuiri Terbimbing Terhadap Kemampuan Komunikasi Metematis Dan Motivasi Belajar Siswa. *Ejounar UPI*.11213-23517-SM

Cahaya .2012. Perbedaan hasil belajar siswa menggunakan strategi pembelajaran aktif tipe index card match dengan card sort pada materi organisasi kehidupan. *Jurnal pelita pendidikan* vol 4, No 2 (2016). Diakses melalui https://jurnal.unimet.ac.id/2012/index.php/pelita/article/view/4052 pada tanggal 09-02-2021

Diah A, Alvi R, Riezky M. (2011). Hasil belajar Biologi menggunakan strategi pembelajaran index card match ditinjau dari motivasi. *Jurnal Pendidikan Biologi* 3 (3):27-40. Diakses melalui http://www.neliti.com. Pada tanggal 12-01-2021

Ernata.2017. Pengaruh strategi pembelajaran aktif tipe index card match terhadap hasil belajar siswa SMA*. Jurnal pendidikan dan pembelajaran khatulistiwa* Vol 5, No 3 (2016). Diakses melalui https://jurnal.untan.ac.id. Pada tanggal 10-01-2021

Hamdani. 2014. *Strategi belajar mengajar*. Bandung : pustaka setia

Hamdani.(2014). Pengaruh model pembelajaran group investigation GI terhadap motivasi dan hasil belajar ipa biologi siswa mts nurul huda sarimulyo ngawen blora. *Skripsi jurnal sains biologi*, usk.Yogyakarta. Diakses melalui http://www.neliti.com pada tanggal 12-02-202

Haryanto.2011. Perbedaan prestasi belajar antara siswa yang pembelajaran aktif tipe *index card match* dan *card sort* pada pokok bahasan getaran gelombang. *Jurnal penelitian pembelajaran fisika*. Diakses melalui https://www.researchgate.net. Pada tanggal 10-01-2021

Johnson, David & Roger Johnson. (1994). Leading the cooperative school. (Terjemahan edina). MN: Interaction Book company.

Lita, Listiyana. 2012. Meningkatkan *motivasi belajar IPA melalui model pembelajaran kooperatif tipe team game tournament* pada siswa tahun ajaran 2011/2012.

Malik.(2014).*Teori motivasi dan pengukurannya.* Bumi Aksara. Jakarta.

Marjan J, Aryana & Setiawan N. (2014) . Pengaruh Pembelajaran Pendekatan Saintifik Terhadap Hasil Belajar Biologi Dan Keterampilan Proses Sains Siswa MA Mu'alimat NW Pancor Selong Kabupaten Lombok Nusa Tenggara Barat. *Jurnal program pascasarjana universitas pendidikan Ganesha* 4(4):4. Diakses malalui http://media.neliti.com pada tanggal 10-01-2021

Marwan. (2012). Pengaruh metode pembelajaran *Index Card Match* (ICM) terhadap hasil belajar AKUNTANSI. *Jurnal pendidikan ekonomi.* Diakses melalui http://jurnal.stiippgritulungagung.ac.id. Pada tanggal 09-01-2021

Maulida. (2018). Pengaruh *Strategi Index Card Match* terhadap hasil belajar IPA siswa kelas v MIS AZ-ZAHRA SENDANG REJO [*skripsi]*. Diakses melalui http://repository.uinsu.ac.id. Pada tanggal 09-01-2021

Mediawati .(2018). Pengaruh motivasi belajar terhadap prestasi belajar mahasiswa di STMIK Stikom Bali. *Jurnal bakti saraswati*. Diakes melalui https://www.researchgate.net pada tanggal 08-01-2021

Mufidah AU, Hadi, Sularmi. 2013. Penerapan strategi pembelajaran Card sort untuk meningkatkan hasil belajar IPA tentang Cahaya dan Sifat-sifatnya. *Jurnal pendidikan Univeritas Sebelas Maret, Surakarta*. Diakses Melalui https://eprints.uns.ac.id pada tanggal 17-01-2021

Ngalimun. (2011). Pengaruh strategi pembelajaran *Card Sort* terhadap hasil belajar biologi peserta didik. *Jurnal saintifik* vol.2 no.1, januari 2016. Diakses melalui https://www.researchgate.net pada tanggal 22-02-2023

Nugraha. (2018). *Cooperative Learning* dengan *Index Card Match* untuk Meningkatkan hasil belajar siswa pada materi sistem tata surya.Diakses melalui https://www.researchgate.net pada tanggal 08-01-2023

Prasetya A .2017. Penerapan hasil belajar siswa melalui Penerapan *Strategi Index Card Match* bagi siswa kelas V SDN 32 Mataram. *Jurnal Pelita Pendidikan*. Diakses melalui htttp://eprints.unram.ac.id pada tanggal 17-01-2021

Puspita.,D prastowo, P. (2018). Perbedaan hasil beljar yang diajar menggunkan strategi pembelajaran Aktif *Tipe Index Card Match* dengan *Card Sort* pada materi sistem ekskresi manusia di sma negeri 1 Binjai. *Jurnal Pelita Pendidikan. 6 (3), Universitas Negeri Medan*. Diakses melalui https://www.researchgate.net pada tanggal 12-01-2021

Rahmawati,A. D., Suratno & Wahyuni, D. (2014). Penerapan *Strategi Index Card Match* menggunakan aktif *Index Card Match* ditinjau dari motivasi. *Jurnal pancaran,* 03 (01), 37-48. Diakses melalui http://media.neliti.com pada tanggal 18-01-2021

Rusman (2012). *Model-model pembelajaran mengembangkan profesionalisme guru*. Jakarta : PT Raja grafindo Persada.

Sardiman. (2011). *Interaksi dan motivasi belajar mengajar*. Jakarta : Raja grafindo persada

Sudirman. (2015). *Penilaian dan motivasi belajar mengajar*. Bandung: remaja rosdakarya

Sukmadinata Z. (2017). Peningkatan hasil belajar siswa melalui penerapan *Strategi Pembelajaran Index Card Match* pada mata pelajaran IPA di kelas IV Min 10 Bandar Lampung. *[Skripsi]:* Institut Agama Islam Negeri Raden Intan lampung.

Sukmawati D. (2014). Pengaruh penggunaan strategi pembelajaran aktif *Tipe Index Card Match* terhadap hasil belajar biologi pada materi jaringan hewan di kelas XI IPA SMA Neger 8 Muaro Jambi *[Skripsi].* Jambi : Universitas Jambi

Suprijiono, A. 2009. *Cooperatif Learning* teori dan aplikasi PA IKEM. PT Pustaka Bandung Yogyakarta

Suhana.(2017). Penerapan strategi pembelajaran aktif index card match untuk meningkatkan hasil belajar IPA. *Jurnal progam study pendidikan* Vol 1, (2017). Diakses melalui https://ojs.unm.ac.id pada tanggal 09-02-2021

Wiralondra G. (2019). Peningkatan hasil dan aktivitas belajar dengan model pembelajaran kooperatif *tipe index card match* dan peta konsep. *Jurnal Universitaswiralondra* 10(1). Diakses melalui https:/gemawiralondra.unwir.ac.id/index.php/gemawiralondra/article/download/10/6/ pada tanggal 10-02-2021

Witari M, Usman R, Sri H. (2016). Penerapan *Strategi Pembelajaran Aktif Tipe Card Sort* (Kartu Sortir) Untuk Meningkatkan Prestasi Belajar Siswa Pada Pokok Bahasan Hidrokarbon Di Kelas X Sman 5 Pekanbaru. *Jurnal pelita pendidikan.*Diakses malalui https://www.neliti.com/id pada tanggal 11-01-2021.