



Cognitive Conflict-Based Conceptual Change Model on Concept Mastery & Student Self-regulation

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Abstract: This study aims to determine the effect of the conceptual change model with a cognitive conflict approach on concept mastery & self-regulation of class X students in biology subjects. The quasi-experimental method with posttest only controls group design. The research population is students of class X Mathematics & Natural Sciences, class X Mathematics & Natural Sciences 1 as the experimental class, & X Mathematics & Natural Sciences 2 as the control class. Data collection techniques with concept mastery tests & self-regulation questionnaires. Data analysis used an independent sample t-test. Based on the results of the study, the average value of mastery of concepts in the experimental class was 71.14, & the control class was 65.52. The average self-regulation in the experimental class was 73.29, in the control class it was 65.91. Independent sample t-test test shows that $p\text{-value} > 0.05$. This means that there is an influence of the conceptual change model with a cognitive conflict approach on concept mastery & self-regulation in class X in biology subjects.

Keywords: conceptual change, conflict cognitive approach, mastery of concepts, self-regulation

Abstrak: Penelitian bertujuan untuk mengetahui pengaruh model perubahan konseptual dengan pendekatan konflik kognitif terhadap penguasaan konsep dan self regulation peserta didik kelas X pada mata pelajaran biologi. Metode eksperimen semu dengan posstest only control group design. Populasi penelitian yaitu peserta didik kelas X MIPA, kelas X MIPA 1 sebagai kelas eksperimen dan X MIPA 2 sebagai kelas kontrol. Teknik pengumpulan data dengan tes penguasaan konsep dan angket self regulation. Analisis data menggunakan uji independent sample t-test. Berdasarkan hasil penelitian, nilai rata-rata penguasaan konsep kelas eksperimen 71,14 dan kelas kontrol 65,52. Rata-rata self regulation kelas eksperimen 73,29, pada kelas kontrol yaitu 65,91. Uji independent sample t-test menunjukkan bahwa $p\text{-value} > 0,05$. Artinya terdapat pengaruh model perubahan konseptual dengan pendekatan konflik kognitif terhadap penguasaan konsep dan self regulation kelas X pada mata pelajaran biologi.

Kata kunci: perubahan konsep, pendekatan konflik kognitif, penguasaan konsep, self-regulation.

■ INTRODUCTION

Biology is one of the science fields that is taught to students in high school (SMA). Biology in the learning process contains many concepts that are abstract or invisible to the eye. A concept is a collection or set of properties that are connected by certain rules and concepts are mental images, ideas, and processes. The concepts contained in biology are interconnected (Ardiyanti & Utami, 2017). So that to master certain higher concepts, students should be able to master the prerequisite concepts (Micalisková & Prokša, 2018). This means that students are required to have a good mastery of concepts.

Mastery of biological concepts is the cognitive ability of learners in understanding and master scientific concepts through phenomena, events, objects, or activities related to biology (Harahap, Komala, & Ristanto, 2020). Good concept mastery means that students can correctly understand the concepts in the material taught by the teacher and can apply them in everyday life. Students who have a good mastery of concepts help students have higher cognitive skills.

In addition to building mastery of concepts, in learning biology, teachers also need to practice self-regulation (Yerdelen & Sungur, 2019). This ability is needed by students so that they can organize and direct themselves, adjust and control themselves, especially in dealing with difficult tasks. Self-regulation is a strategy that can be done consciously or unconsciously. Students who have self-regulation with good criteria mean that they are learners who can activate and maintain cognition, emotion, and behavior to achieve the expected goals (Li et al., 2018). Students who have high achievement dominantly have good self-regulation. (Nugroho, Waluya, & Wardono 2022). Self regulation is one of the most main factors that can ensure students' independence and help them solve possible motivational conflict in managing between studying an other non-academic activities (Suralaga et al. 2021).

The problem above explains that mastery of concepts and self-regulation are two abilities that must be possessed by students. However, the facts on the ground are different. Mastery of concepts and self-regulation of students still needs to be improved. Research by Hairy explains that students are only able to master 11% of concepts in the reproductive system & the rest do not understand concepts and even misconceptions (Hairy, Kusmiyati, & Yamin, 2018). Students are limited to mastering concepts in the realm of C1 (Furqani, Feranie, & Winarno, 2018). The self-regulation category of students is also still in the low criteria (Widiatmoko & Herlina, 2021).

Preliminary study on students at SMAN 1 Pagelaran. More than 40% of students from 120 people observed have low mastery of concepts and their self-regulation in the criteria is very poor. Interviews with biology subject teachers provide information that learning in class is still passive and the learning model used is still not optimal for increasing mastery of concepts and self-regulation of students and also not often trained by teachers. The teacher explained that he had given homework in the form of a resume on the material to be studied, but students tended to ignore the assignment.

A study states that the learning model used by the teacher is a determining factor for mastery of concepts and self-regulation of students. So the solution to overcome the above problems is to use an innovative learning model to improve the mastery of concepts and self-regulation of students. The learning model that allows students to increase their mastery of concepts and self-regulation is a conceptual change learning model with a cognitive conflict approach.

The conceptual change model is a learning model that helps students to construct their knowledge with new knowledge. The advantage of the conceptual change model is that it can provide new knowledge without leaving the old knowledge possessed by students (Yuliati, Sutopo, & Huda, 2016). The new knowledge is a reinforcement and explanation for old concepts/knowledge that has not been mastered by students. While the cognitive conflict approach is a learning approach that presents a contradiction to students to achieve a higher balance of knowledge (Hidayatullah et al., 2020).

Previous research has shown that the cognitive conflict approach can improve students' critical thinking skills (Gunawan, Kosim, & Lestari, 2020). The cognitive conflict approach can improve students' conceptual understanding better than ordinary learning with the n-gain test result of 0.40 (Kusuma & Caesarani, 2019). Cognitive conflict can also reduce students' misconceptions about a certain concept. This approach can reduce the misconceptions that students have with the results of the t-test, namely, $\text{count} < t \text{ table}$ & $0.000 < 0.05$. (Parvati, Makhrus, & Ganada, 2019). Based on the problems and advantages of the conceptual change model and the cognitive conflict approach, a study was conducted to determine the effect of cognitive conflict based conceptual change model on concept mastery and student self regulation.

▪ **METHOD**

The research methodology used was quasi-experimental using a posttest-only control group as the research design. There were two groups, namely the experimental group and the control group, then the two groups were given a post-test at the end of the lesson. (Sugiyono, 2016) The following is the design of the research conducted: Learning conceptual change model with cognitive conflict approach in experimental class and Conventional learning model in control class.

The population in this study were all students of class X SMA Negeri 1 Pagelaran, namely class X MIPA 1, X MIPA 2, X MIPA 3, and X MIPA 4, totaling 120 students. The research sample was obtained by cluster random sampling, namely 29 students in class X MIPA 1 as the experimental class and 29 students in class X MIPA 2 as the control class. Data collection techniques in this study used tests and questionnaires. The research instrument to determine the mastery of students' concepts is using a test in the form of an essay with indicators of mastery of the concept of 12 items. Meanwhile, to find out the self-regulation of students, using a questionnaire with self-regulation indicators totaling 20 statements. Both instruments were then validated by expert judgment. The instrument was then tested on students of class XI MIPA at SMA N 1 Pagelaran. The results of the test of validity, reliability, level of difficulty, & discriminatory power of the instrument, as many as 10 items of concept mastery essays & 20 items of self-regulation statements were used in the study. The two instruments were given to students in class X MIPA 1 and X MIPA 2 at the end of the learning process (posttest). Based on the results of data analysis, the value of mastery of concepts and self-regulation of experimental and control class students were classified in the normal & homogeneous data distribution with a $p\text{-value} > 0.05$. Therefore, the hypothesis test used is the independent sample t-test or unpaired t-test using SPSS 17.0.

▪ **RESULT AND DISCUSSION**

Learning with the conceptual change model with a cognitive conflict approach is carried out online using the WhatsApp (WA) application. Learning begins with the teacher presenting the problem. The teacher provides information or simulates examples of contradictions with the conceptions already possessed by students related to the concepts of the material being studied. Students are also given a student discussion sheet (LDPD) to further explore the problems given. Then the step of setting the result or position. The teacher asks a question or problem to be solved by students. Students are

required to focus on the questions or problems that have been given by answering questions & proposing solutions to problems given by the teacher.

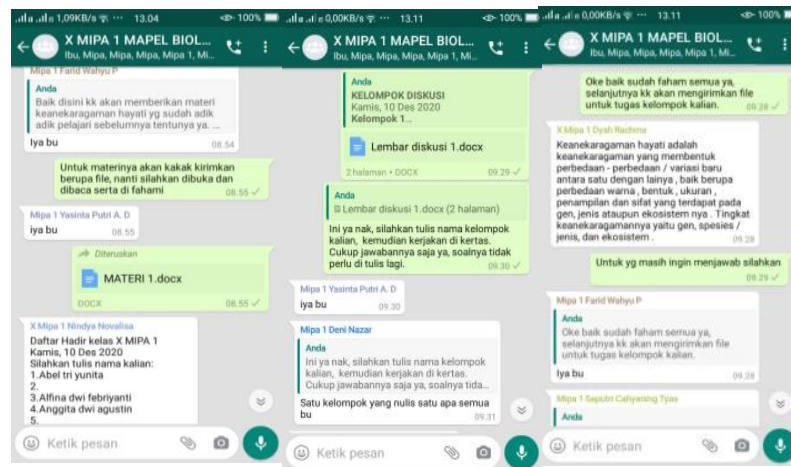


Figure 1. Context of the problem

The next step is for the teacher to expose beliefs by guiding students to share their ideas, assumptions, and reasons for providing answers and solutions before students carry out the investigation process. The next fundamental stage is confronting beliefs or creating cognitive conflicts. Students are guided to confront their current ideas/ideas by recalling their experiences by the concepts in the material being discussed in learning. Learners accommodate concepts and ideas by concluding, discussing, and incorporating new information.

The teacher guides students to expand the concepts that have been obtained in learning. Students apply and make connections between new concepts and other events & ideas by doing the exercises contained in the LDPD. The next stage is completion and evaluation. This stage is carried out by students presenting the results of the discussion and responding to the results of the discussion. Students ask each other questions and provide new ideas and problems in their way. Then the teacher directs students to evaluate the truth of the concepts they have and apply appropriate scientific concepts.



Figure 2. Student discussion

1. Concept Mastery Posttest Result Data

Based of the posttest experimental class has the highest score than control class with the average value is $71,14 > 65,52$. These results indicate that learning in the experimental class is more supportive of students having a good mastery of concepts

compared to learning carried out in the control class. This is also indicated by the percentage of each indicator of concept mastery in the experimental and control classes, which is shown in the image below.

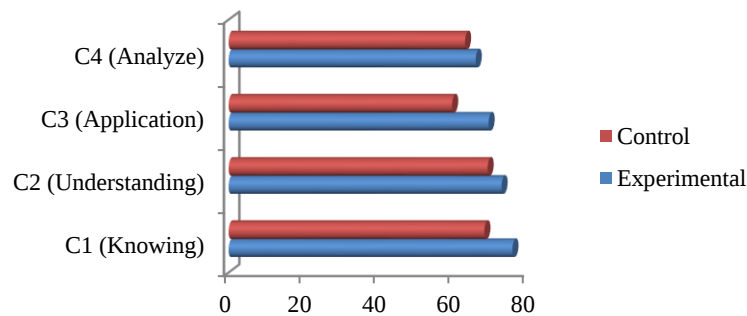


Figure 3. Percentage of achievement indicators of students' concept mastery

Indicator C1 (Knowing) is an indicator of the realm of low-level thinking LOTS (low thinking order skills) which has the highest percentage with a value of 75.89% in the experimental class and 68.39% in the control class in Figure 3. This means that students in both classes master the basic knowledge of the material being discussed. Previous research revealed that in the C1 domain students had mastered the concept well because it was a basic level of knowledge and had been taught at the previous school level (Wilujeng, Suryadarma, & Ertika 2020). Previous research explained that if the percentage of acquisition of the concept mastery indicator was >65%, it means that students have mastered the concept (Oktavia, Sadiana, & Asi, 2019). The concept that is taught correctly helps students master the concept

The Understanding indicator or C2 is classified as a LOTS indicator. Figure 3. shows the percentage of C2 in the control class 69.25% & the experimental class 72.99%. The results mean that students understand the concept and can explain the concept correctly using their language. Students who understand the concept can explain the concept in their language style and do not violate existing concepts. Especially in the experimental class that uses the conceptual change model, this learning model helps students to better understand the concepts correctly to reduce the error in explaining the concept. While in the experimental class, the learning model has a weakness in which students find the concept of the material themselves because it is discovery learning (DL). So that the concept is not necessarily correct according to scientists, because the DL model is a discovery learning model who still need direction from the teacher to get the concept right.

The next indicator realm is the application indicator or C3. This indicator directs students to be able to apply the concepts that have been obtained into problem-solving. Back in Figure 3., the experimental and control classes have percentages of 69.52% & 59.77%, respectively. There is a significant difference between the mastery of concepts in the experimental class and the control class. Students in the control class when learning takes place, have not been maximally able to apply concepts, such as not being able to identify problems related to learning material, so that their mastery of concepts is lower. This explanation is supported by previous research which provides information that

students have not been able to identify problems properly, they are categorized as not having mastered the concept of the material in the problem.

Indicators that are included in the HOTS or higher-order thinking skills are the indicators of analyze or C4. Students can achieve the analysis process, which means they have higher-order thinking skills. Figure 3. shows that the percentage of C4 in the control & experimental classes is 63.22% & 66.07%, respectively. Both classes are categorized as having the ability to analyze a problem, however, the experimental class is superior to the control class. Students in the experimental class during learning take place, they can analyze problems better, they can present problem solutions by applying the correct concepts. That students can analyze a problem well, they are categorized as having a good mastery of concepts related to the concept of material in the problem.

2. Questionnaire Result Data Self regulation Experiment Class & Control Class

The following is the value of the self-regulation questionnaire of students, the average value of self-regulation in the experimental and control classes is 73.29 and 65.9. This shows that the learning model applied in the experimental class is more supportive of students cultivating self-regulation than learning in the control class. These results are also illustrated by the gain per self-regulation indicator in the image below.

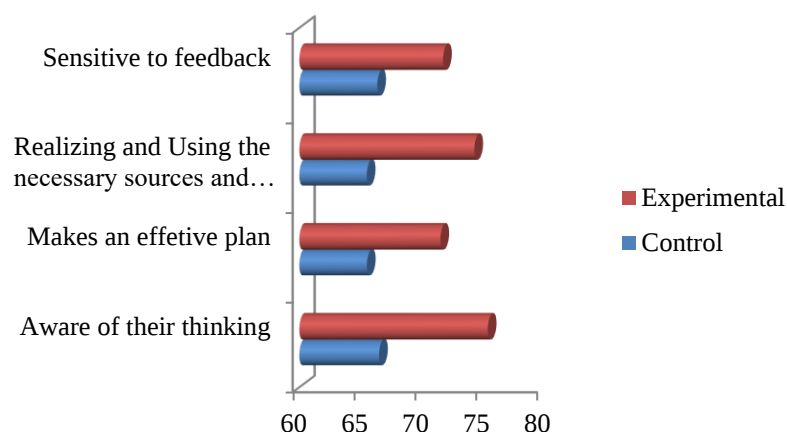


Figure 4. Percentage of achievement of self-regulation questionnaire indicators

Figure 4. shows that the percentage of indicators that are aware of their thinking from the experimental and control classes are 75.43% and 66.53%, respectively. This percentage shows that the indicator is aware of its thinking is the indicator that gets the highest percentage of the other three indicators. The experimental class is categorized as having awareness of their thoughts in good criteria, while the control class in the criteria is quite good. This means that students in the experimental class have awareness & think to obtain meaningful learning. This means that students in the experimental class can regulate themselves, such as being able to minimize and overcome difficulties in the learning process.

Second, the indicator makes an effective plan. Figure 4. shows that the percentages in the experimental and control classes are 71.55% & 65.23%. Both classes are categorized as being able to contain an effective plan quite well. Students in the

experimental and control classes can formulate ideas to have a good lesson plan because they have awareness and responsibility for the learning process. Students who make effective plans well mean they can design the lesson.

Figure 4. shows that the indicators of realizing and using the necessary sources of information in the experimental and control classes are 74.43% and 65.52%. The difference is quite far, meaning that students in the experimental class have more awareness of the use of information sources needed to solve problems compared to the control class. In the learning process in the classroom, students in the experimental class because with learning conceptual changes and cognitive conflicts there is a clash between their concepts and the concepts given by the teacher, this makes students look for the right data and information to get which concept is correct. This is what fosters awareness of the use of information to obtain more accurate results.

Figure 4. shows that the indicators sensitive to feedback from the experimental and control classes are 71.88% and 66.38%. This indicates that the experimental class students have a higher level of sensitivity than the control class to feedback activities. So that students in the experimental class can make self-corrections, evaluations and can provide better responses or assistance to their friends towards learning or discussion than the control class. When learning is not appropriate, they will improve or evaluate the process so that they get better learning. The explanation in previous research shows that students improve and evaluate the learning system that is lacking because they are sensitive to feedback. (Ryeson, 2017)

3. Test Results Independent Sample T-test

The results of hypothesis testing using an independent sample t-test using SPSS 17.0, the posttest data on concept mastery conduct the p-value of concept mastery and self-regulation are 0.008 & 0.000. There is an influence of the conceptual change learning model with a cognitive conflict approach on the mastery of concepts and self-regulation of students. These results provide information that the supported learning model will affect the mastery of concepts and self-regulation of students. The conceptual change learning model includes an active learning model that supports the learning process and two-way interaction. In addition, the learning model helps students to be able to construct their knowledge. Active learning can affect students' mastery of concepts (Wahyu, Suharno, & Triyanto, 2019).

The application of the conceptual change model helps students to explore a concept that has not been mastered. The experience & knowledge that students have had before can also help the process of forming new knowledge and building concepts. This is because learning can develop concepts & formulate existing ways of thinking. In the conceptual change model, there is an accommodation stage, a process in which schemas are changed when students get new information that does not match existing ones. (Nadelson et al., 2018) This process provides students with new knowledge that can strengthen and explain a problem that is being experienced without leaving the old concepts that have existed before. Therefore, students can master the concept better than before.

The formation of knowledge through a cognitive conflict approach is based on the philosophy of constructivism that one's person constructs knowledge. (Puspasari, 2017) In the cognitive conflict approach, students are required to actively participate in

reorganizing the knowledge that has been stored in the cognitive structure.(Gunawan, Kosim, & Lestari, 2020)The initial concepts that already exist in students are faced with new information or phenomena that trigger the assimilation process to form new concepts that will be adapted to the cognitive structure. This concept change can be used to improve students' conceptual understanding. This series of learning steps provides students with the ability to construct concepts that they already have that are not yet appropriate to be precise and correct. This is what helps students master more concepts in the material being taught.

Learning with a conceptual change model with a cognitive conflict approach can provide space for students to consciously learn independently. (Haka et al., 2021)This is because the conceptual change model views learning as an active effort for students to construct their knowledge, compare new information with previous understanding & use it to generate new understanding. When students are faced with cognitive conflicts, they are aware of previously existing thoughts & independently they think how to resolve and construct these conflicts so that they become new knowledge. This is what makes the self-regulation of students in the experimental class better than the control class. Previous research explained that the higher the self-regulation possessed by students, it can help them understand a concept (Wahyuni, Anggoro, & Komarudin, 2019) Self-regulation during the learning process is needed by students because it can motivate their learning activities. Self regulation can manage and give self-satisfied students, and the self satisfied students have a behavior ability to build structured learning environments that increase their ability to achieve greater academic self-organization (Sawalhah & Zoubi 2020).

While in the control class with the discovery learning model, the learning is carried out by the discovery learning steps, namely stimulation, problem statements, data collection, data processing, verification, and generalization. Although the learning carried out is by the learning steps, students still tend to not be able to find new knowledge, they have not been able to carry out the problem statement, data collection, and verification steps properly. They are still not actively asking questions or responding to discussions during the learning process. Students also tend not to be able to collect the assignments given by the agreed time. They still need the teacher to remind them that the assignment collection schedule is approaching the given deadline. This shows that students have not been able to regulate themselves to learn on their own, so it can be said that the self-regulation of students in the control class is still low and needs to be improved.

▪ CONCLUSION

Based on the results of data analysis, cognitive conflict based on the concept change model has an effect on students' mastery of concepts and self-regulation. Students with this learning have better mastery of concepts and self-regulation. The implication of the results of this research in education is that it can be used as a reference for educators to re-civilize mastery of concepts and self-regulation of students. This study provides an overview for teachers and researches that learning conducted by online learning with discovery learning in SMA N 1 Pagelaran was not effective in order to enhance mastery concepts and students self-regulation. The problems come from teachers who can control the class and then make learning lose control and besides, the students do not familiar with the model to practicing mastery concepts and self-regulation from their device. Thus,

in the further study researches or teacher have to modify and optimize learning syntax by combining model or strategy so the online learning class look like real class. Teachers are expected to improve its ability to vary learning model, then in the implementation of learning should designed in such a way that can encourage the implementation of active, effective, and fun learning, aslo use authentic assessment in assessing learning. This research is limited to analyze mastery concepts and students self regulation in learning with the cognitive conflict based conceptual change model in the senior high school grade 10th in SMA N 1 Pagelaran. The research provides a general description ability of the students especially mastery concepts and self-regualtion on biology learning particulary with the cognitive conflict based conceptual change model.

▪ REFERENCES

- Ardiyanti, Y. & Utami, M. R. (2017). *Identifikasi Miskonsepsi Siswa Pada Materi Sistem Reproduksi*. [Identification of Students' Misconceptions on Reproductive System Material]. *Biosfer, Jurnal Biologi Dan Pendidikan Biologi*, 2 (2), 18–24.
- Furqani, D. Y., Feranie, S., & Winarno, N. (2018). The Effect Of Predict-Observe-Explain (Poe) Strategy On Students' Conceptual Mastery & Critical Thinking In Learning Vibration & Wave. *Journal of Science Learning*, 2 (1).
- Gunawan, K., & Lestari, P. A. C. (2020). Instructional Materials For Discovery Learning With Cognitive Conflict Approach To Improve Vocational Students' Achievement. *International Journal of Instruction*, 13 (3), 433–44.
- Hairy, M. R., Kusmiyati, & Yamin, M. (2018). *Analisis Penguasaan Konsep Materi Sistem Reproduksi Pada Siswa Sma Negeri Di Kota Mataram*. [Analysis of Mastery of Reproductive System Material Concepts in State High School Students in Mataram City] *J. Pijar Mipa*, 13(2), 119-123. 13 (2), 119–23.
- Haka, N. B., Nururrohmah, A., Wulansari, D., & Sari, M. (2021). The Effect Of Conceptual Change Using The Adobe Quran On Misconception. *Thabiea, Journal of Natural Science Teaching*, 4 (1), 82–95.
- Harahap, L. J., Komala, R. & Ristanto, R. H. (2020). Assesing Critical Thinking Skills & Mastery Concepts, The Case of Ecosystem. *Edusains*, 12 (2), 223–32.
- Hidayatullah, Z., Jumadi, Nadhiroh, N., Kartika, E., Ainun, A., & Erlangga, S. Y. (2020). *Identifikasi Miskonsepsi Dan Konflik Kognitif Fisika, Kasus Terkait Perubahan Konseptual*. [Identification of Conceptions and Cognitive Conflicts in Physics: A Case Related to Conceptual Change] *Edusains*, 12 (1), 64–7.
- Kusuma, J. W., & Caesarani, S. (2019). *Penerapan Pendekatan Konflik Kognitif Terhadap Pemahaman Konsep Matematis Siswa Di Smp Negeri 7 Kota Serang*. [Application of the Cognitive Conflict Approach to the Understanding of Students' Mathematical Concepts at SMP Negeri 7 Serang City]. *Jurnal Ilmiah Pendidikan Matematika*, 4 (1), 20–27..
- Li, M., Zheng, C., Liang, J. C., Zhang, Y., & Tsai, C. C. (2018). Conceptions, Self-Regulation, & Strategies Of Learning Science Among Chinese High School Students. *International Journal of Science & Mathematics Education*, 16(1), 69–87.
- Michalisková, R., & Prokša, M. (2018). The Level Of Mastery Of The Concept Of Chemical Reaction Rate By 9 Th Grade Students . *Chemistry-Didactics-Ecology-Metrology*, 23 (1–2), 81–95.
- Nadelson, L. S., Heddy, B. C., Jones, S., Taasobshirazi, G., & Johnson, M. (2018).

- Conceptual Change In Science Teaching & Learning, Introducing The Dynamic Model of Conceptual Change. *International Journal of Educational Psychology*, 7 (2), 151–95.
- Nugroho, G. N., Waluya, B., & Wardono. (2022). A Study of Student's Mathematical Literacy Based On Their Selfregulated Learning Ability. *International Journal of Education & Research*, 10 (1), 79–91.
- Oktavia, H., Sadiana, I., M., & Asi, N. B. (2019). *Profil Penguasaan Konsep Sistem Periodik Unsur Pada Siswa Kelas X Mipa Sma Negeri 1 Palangka Raya Tahun Ajaran 2018/2019*. [Profile of Mastery of the Periodic System Concept of Elements in Class X Mathematics and Natural Sciences at Sma Negeri 1 Palangka Raya for the 2018/2019 Academic Year]. *Kanderang Tingang Scientific Journal*, 10 (02), 321–40.
- Parwati, I., Makhrus, M., & Ganada, I. W. (2019). *Pengaruh Pendekatan Konflik Kognitif Terhadap Penurunan Miskonsepsi Peserta Didik Pada Materi Usaha Dan Energi*. [The Effect of a Cognitive Conflict Approach on Reducing Students' Misconceptions on Business and Energy Materials]. *Journal of Physics and Technology Education*, 5 (2), 278–88.
- Puspasari, R. (2017). *Strategi Konflik Kognitif Dalam Mengatasi Miskonsepsi Siswa*. [Cognitive Conflict Strategies in Overcoming Students' Misconceptions]. *Jurnal Pendidikan Dan Pembelajaran Matematika*, 3 (1), 1–14.
- Ryeson, R. (2017). Creating Possibilities, Studying The Student Experience. *Educational Research*, 59 (3), 297–315.
- Sawalhah, A. M., & Al Zoubi, A. (2020). The Relationship Of Academic Self-Regulation With Self-Esteem & Goal Orientations Among University Students In Jordan. *International Education Studies*, 13 (1), 111–23.
- Suralaga, F., S.N. Azkiyah, B. Dhowi, Y.F. Nisa, & Y Rahmawati. (2021). The Role Of Moral Self-Regulation In Mediating The Effect Of Goal Orientation On Academic Integrity. *Cypriot Journal Of Educational*, 16 (2), 902–15.
- Wahyu, D., Suharno, & Triyanto. (2019). The Influence Of Active Learning On The Concept of Mastery Of Sains Learning By Fifth Grade Students At Primary School. *International Journal of Educational Methodology*, 5 (1), 177–81.
- Wahyuni, T., Anggoro, B. S., & Komarudin. (2019). *Pemahaman Konsep Matematis Melalui Model Wee Dengan Strategi Qsh Ditinjau Dari Self Regulation*. [Understanding Mathematical Concepts Through Wee Model With Qsh Strategy Viewed From Self Regulation]. *Aksioma, Jurnal Program Studi Pendidikan Matematika*, 8 (1), 65–72.
- Widiatmoko, M., & Herlina, I. (2021). *Studi Deskriptif Profil Self-Regulated Learning Siswa*. [Descriptive Study of Student Self-Regulated Learning Profiles]. *Jurnal Selaras, Kajian Bimbingan Dan Konseling Serta Psikologi Pendidikan*, 2(1), 43–50.
- Wilujeng, I., Suryadarma, I. G. P. & Ertika. (2020). Local Potential Integrated Science Video To Improve Sps & Concept Mastery. *International Journal Of Instruction* 13 (4), 197–214.
- Yerdelen, S., & Sungur, S. (2019). Multilevel Investigation Of Students' Self-Regulation Processes In Learning Science, Classroom Learning Environment & Teacher Effectiveness. *International Journal of Science & Mathematics Education*, 17(1), 89–110.

- Yuliati, L., Sutopo, & Huda, M. N. (2016). *Perubahan Konseptual Fisika Dengan Authentic Problem Melalui Integrative Learning Pada Topik Gerak Lurus Pada Sma Suryabuana Malang*. [Changes in Conceptual Physics with Authentic Problems Through Integrative Learning on the Topic of Straight Motion at Sma Suryabuana Malang]. *Jurnal Inspirasi Pendidikan*, 6 (1), 733–43.