

**THE IMPLEMENTATION OF INQUIRY LEARNING ON STUDENTS' LEARNING
OUTCOMES AND CRITICAL THINKING SKILLS IN THE DIGESTIVE SYSTEM
MATERIAL**

Nurlaili ¹, Ruqiah Ganda Putri Panjaitan ², Laili Fitri Yeni ³

**^{1,2,3} Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Tanjungpura
Pontianak, 78124, Indonesia
ruqiah.gpp@fkip.untan.ac.id**

Accepted: April 26, 2021

Published: April 30, 2021

DOI: 10.21107/jps.v8i1.10316

ABSTRACT

*This research aimed to determine the students' achievement and critical thinking on the digestion system topic. This study was conducted using a quasi-experiment with a control group pre-test and post-test design. Furthermore, the samples were chosen using the purposive sampling technique. The instrument consisted of 20 multiple-choice tests. Findings indicate that the average student achievement is 16.71 in the experiment and 12.92 in the control class. The *t*-test also can be known as *t*-count > *t*-table (1.71 > 1.68), which means a significant difference between experiment average and control average. Based on the test result in the experiment class, it can be assumed that there is an enhancement of the average percentage of students' critical thinking from 63% to 84%. Thus, it can be concluded that inquiry learning model can increase the students' achievement and critical thinking.*

Keywords: Critical Thinking, Inquiry, Students Achievement.

² Corresponding Author

Introduction

Quality education serves to prepare students to face the challenges of change in local, national, and global life through active, innovative, creative, and fun learning. Education in the present era is life support for the nation and humans themselves. Therefore, the world of education is required to further improve the quality and quality of its education in line with the development of science and technology in an increasingly advanced era of globalization (Nofendra, 2019); (Saputri et al. 2020); (Manik & Simatupang, 2017). The student learning process cannot be done by simply transferring knowledge, but learning must emphasize students' skills (Titin et al., 2012).

Based on the results of interviews with the biology teacher, it was found that the percentage of student completeness on the digestive system material in class VIII had not yet reached completeness with a value of 68.94, while the minimum completeness was 70. Based on the results of the interview, it was also known that the learning model used for the digestive system material was the lecture model and questions and answers accompanied by the use of 2-dimensional media in the form of images. According to Amaliah et al. (2014), Tambak (2014), Utami (2016) states that the lecture method has been prevalent for teachers since ancient times because the use of the lecture method is felt to be easier to do and does not require much equipment. However, this method is considered boring over time, making students passive in participating in learning, getting bored quickly, and are not interested in learning. It seems to be one of the causes of incomplete student scores on the digestive system material.

The digestive system is one of the materials studied in grade VIII. The digestive system material consists of food and health sub-material, the digestive tract and glands, and disorders and diseases of the digestive system. This material demands students' understanding, especially when discussing the process of digesting food and the organs it goes through. According to Ulfa and Rozalina (2019), the digestive system material has an abstract concept, while this material is related to everyday life. According to the observations, student learning outcomes are low because most students just memorize and understand while studying. After that, they forget. It is different if students learn by finding their way so that the resulting experience can be understood and takes place continuously. This situation can be overcome by offering engaging learning for students, where

they can be involved in conducting experiments and drawing conclusions, for example, by using an inquiry model.

Inquiry means investigating or asking for information (Anam, 2016). According to Suhada (2017), the inquiry learning model is a series of learning activities that emphasize students' activeness to have learning experiences in finding material concepts based on existing problems. Various studies on inquiry learning models, including Sulawanti et al. (2019), examined the effect of the application of laboratory-based inquiry learning models on students' psychomotor abilities, and Taghulihi et al. (2017) examined the improvement of students' thinking skills on the digestive system material with inquiry learning strategies. Based on these previous studies, the inquiry model affects student learning outcomes.

Activities carried out in the laboratory can be used to train and develop students' science process skills. Students' science process skills provide direct experience of the material they are working on (Pio et al., 2019). The laboratory facilities supporting and student learning outcomes on the digestive system material almost close to the KKM support the inquiry. Throughout the inquiry process, teachers and students are encouraged to think critically, openly, and most importantly, curiosity about the learning environment (Usdalifat et al., 2016). Students need critical thinking to prepare themselves for advances in science and technology in the 21st century (Maryam et al., 2019). Critical thinking can be defined as students who are "able to think" logically and deeply, seeking and evaluating data systematically as a result of the learning process (Johan, 2013). Critical thinking can be trained by questioning what was seen and heard, followed by asking why this was happened (Ariyati, 2010).

Therefore, it is necessary to research the application of inquiry learning to encourage students' critical thinking skills. It is to improve students' ability to solve problems critically and can be applied in real life. Furthermore, this research can be an alternative to increase higher-order thinking skills.

Research Methods

This research is a quasi-experiment. The experimental design used is the control group pre-test and post-test design, which refers to Sugiyono (2012).

The population in this study were all students of class VIII SMP Negeri 2 Pontianak

consisting of six classes. The sample used 26 students of class VIII A and VIII B of 21 students using a purposive sampling technique. The class to be sampled had previously been determined by the school, namely class VIII A and VIII B. Determination of the experimental class and the control class was carried out by drawing two selected sample classes. From the results of the draw, it was found that class VIII B is the experimental class and class VIII A is the control class.

The procedure in this study consists of 2 stages: 1) the preparation stage, namely preparing the research instrument, validating the instrument, testing the instrument, and analyzing the results of the test trial, 2) the implementation stage, which is giving a pre-test, giving the experimental class teaching and the control class, providing post-tests, analyzing data, and describing data.

Learning outcome data is measured by giving 20 multiple choice test questions. The questions made measure the cognitive aspects of students from C2 to C5, where these questions are also used to measure critical thinking skills, which include seven indicators of critical thinking by Ennis (Ennis, 1996). Based on the reliability test results, the reliability coefficient of the test was 0.436, and it was included in the sufficient criteria. It means that the questions made are reliable and can be used as a research instrument.

The data obtained were then analyzed using several statistical tests. The data normality test was carried out using the Liliefors test because the sample size was less than 30. Because the pre-test data were not normally distributed, the Mann-Whitney test was used to prove the hypothesis. The post-test data were normally distributed, followed

by the F test to see homogeneity. Data and t-test to prove the hypothesis.

Result and Discussion

Control class learning with conventional methods, namely lectures and questions and answers, accompanied by 2-dimensional media in the form of images where the teacher acts as a learning center. The teacher provides materials to students. If there is material that students do not understand, they are allowed to ask the teacher. However, most students were silent, which was started by the teacher. Moreover, after seeing the completeness in the control class is lower than the experimental class (Table 1).

Table 1. Scores for the Pre-Test and Post-Test for the Experiment Class and the Control Class

Data	Experiment class		Control Class	
	\bar{x} skor	SD	\bar{x} skor	SD
Pre-test	11,95	2,60	12,17	2,28
Post-test	16,71	2,10	12,92	2,28

For the normality test of the pre-test and post-test data for the experimental class and control class, the Liliefors test was used (Table 2). From the pre-test results, it can be seen that the data of the two classes are not normally distributed, so hypothesis testing is carried out using a nonparametric statistical test with the Mann-Whitney U test (Table 3). Post-test data in the experimental and control classes were normally distributed so that the homogeneity test could be continued (Table 4).

Table 2. Liliefors Test Data Pre-test and Post-test for Experiment Class and Control Class

Data	Class	\bar{x}	SD	L	count L_{table}	Conclusion
Pre-test	Experiment	11,95	2,60	0,22	0,19	Data not normally distributed
	Control	12,17	2,28	0,25	0,18	Data not normally distributed
Post-test	Experimetn	16,71	2,10	0,14	0,19	Data normally distributed
	Control	12,92	2,28	0,15	0,18	Data normally distributed

Table 3. Post-test Data Homogeneity Test for Experiment Class and Control Class

Data	Class	Varian	t_s F_{count}	Conclusion
Post-test	Experiment	4,41	1,18	2,01
	Control	5,21		

Table 4. Mann-Whitney U Test Data Pre-test for Experiment Class and Control Class

Data	Class	\bar{x}	Z	count	
Pre-test	Experiment	11,95	-0,46	1,96	H ₀ Accepted
	Control	12,17			

Table 5.Table t-test data for the experimental class and control class post-test

Data	Class	\bar{x}	t	count	
Post-test	Experiment	16,71	1,71	1,68	Ha Accepted
	Control	12,92			

The results of the t-test with a significance level of 5% indicate that there is a significant difference between the average learning outcomes of students taught by the inquiry learning model. The average learning outcomes of students taught with conventional learning models on the digestive system material in class VIII SMP Negeri 2 Pontianak.

In the inquiry class, students learn to find essential concepts on their own in the digestive system material through practical work assisted by student worksheets. If there is something that the student does not understand, they can discuss it with their group friends. If their friends also do not understand, the teacher comes to the group to provide guidance and input until the student finally finds the answer to his question. This method allows students to remember longer about the concepts they learn; according to Trianto (2007), learning is generally more effective if students are actively involved in organizing and finding material information (knowledge).

Following the concept of inquiry learning, students are directly involved in learning activities with a practicum to create more meaningful learning, and students are active by doing experimental activities. Besides that, guidance from the teacher is an integral part so that students carry out experiments and discussions in a guided and procedural manner. Sukrorini (2014) said that assessing student learning outcomes is emphasized on development practices and basic knowledge that measures simple skills and complex skills. The active involvement of students in this learning is an attempt to increase their understanding of the concepts being studied.

Inquiry learning that is applied positively affects increasing student understanding of learning material, both value and completeness. This positive influence in increasing student understanding is the development of student skills in conducting experiments/inquiries. The

unification of concepts in the discussions and experiments carried out will impact the development of student mastery of the learning material. This is consistent with what Dimiyati & Mujiono (2006) stated that the primary purpose of the inquiry model is to develop intellectual skills, critical thinking, and solve problems scientifically. Pio et al. (2019) state that laboratory activities through guided inquiry learning models can improve students' science process skills. Working in groups in the laboratory teaches students to work cooperatively. In line with Kurniati et al. (2017), the cooperative learning model provides students with opportunities to interact openly and pleasantly to create positive interdependence and develop relationships between groups.

The ability to think critically in this study can be interpreted as a series of thinking skills to understand the concept of material in inquiry learning. Critical thinking in learning is essential because critical thinking is an asset for students to develop knowledge widely (Nurmayani et al., 2018). Finding concepts is carried out through interaction between students, either with small group discussions, questions, and answers, or class/significant group discussions in concluding learning outcomes. It is a means of training students to evaluate other students and provide reasons for the answers given. Analysis of the pre-test and post-test data of the experimental class regarding students' critical thinking skills showed an increase in the average indicator of critical thinking skills (Table 6).

The seven indicators are selected based on their suitability with what the researcher wants to achieve. In indicator 1 (focusing on a question), there is an increase in the percentage of critical thinking skills from pre-test to post-test by 19%. This increase is because one of the stages in the inquiry model is asking a question or problem. Here students are required to make questions from the food ingredients shown by the teacher. It can encourage students to think critically to find questions that are relevant to the instructions given by the teacher. So the questions that will be solved later are questions that come from students, not from the teacher. In line with the research results of Pujianto et al. (2013) regarding Inquiry Learning to Improve Critical Thinking Ability, which states that inquiry learning can improve students' critical thinking skills in each learning cycle.

In indicator 2 (asking and answering clarifying and challenging questions), there is an increase the percentage of critical thinking skills by 34% from pre-test to post-test. It is in line with

research conducted by Pertiwi et al. (2018), which states that students who are given guided inquiry learning with carousel feedback type cooperative learning in the experimental class have higher critical thinking skills. At the stage of analyzing the data, students are given worksheets. Students are given time to answer the questions on the student worksheet under the guidance of the teacher. This stage helps students learn to answer questions, resulting in an increase in the percentage of completeness on the post-test.

In indicator 3 (observing and considering the results of observations), there is an increase the percentage of critical thinking skills by 21%. Students observe a problem related to the digestive system. Also supported by worksheets during the discussion process, making students face problems more often, and learning to observe a problem. The percentage of completeness increases when given the post-test. Jayanti & Amin (2018), students are more active in thinking and discussing through student worksheets that require analysis. Conventional learning in the control class educators is more active in providing descriptions of material. It will be challenging to develop students' abilities in socialization skills, interpersonal relationships, and critical thinking skills.

In indicator 4 (making induction and considering induction), there is an increase in the percentage of critical thinking skills by 14%. To prove a hypothesis, students must experiment. After getting the results, students can find out the truth of the hypotheses they have made and make conclusions based on their experiments. The results of research conducted by Warianti et al. (2019) state that students have high critical thinking skills in learning using the inquiry learning model.

In indicator 5 (making and considering the value of decisions), there is an increase the percentage of critical thinking skills by 45%. The most considerable increase occurred in this indicator. At the stage of designing an experiment, students must be good at sorting and choosing tools and materials suitable for the experiments they are doing and determining what substance tests are suitable for a food ingredient. It is in line with the research results by Megasari et al. (2014), which states that using group activity sheets with a guided inquiry model can stimulate students to carry out activities relevant to learning. From this, students can learn to make decisions so that when

given the post-test, the percentage of critical thinking skills also increases.

Critical thinking skills are related to analytical skills. In indicator 6 (defining terms and considering definitions), the percentage value is relatively high, namely 90%, increasing to 95%. Students can analyze the statements listed in the questions regarding the food consumption of the Indonesian people. In the practicum, it can be seen from the students' analysis of what happens when the body is deficient in a nutrient. In the learning process of the digestive system material, the practicum method can train students to think critically because, in the process, students are led gradually to lead to critical thinking. It is in line with the statement of Nainggolan et al. (2018), which states that critical thinking skills are not a given ability but an ability that can be trained and must be learned in school.

In indicator 7 (deciding on an action), there is an increase in critical thinking skills by 5%. Student ability is an intellectual ability that they have. This ability will be formed if students always study, diligently read and write teacher explanations to understand the concept of learning. It is consistent with what Lisminingsih (2008) stated that reading and writing could improve critical thinking skills, while other factors such as gender, ethnicity, and age do not affect critical thinking skills.

Inquiry learning applied in this study has a positive effect on increasing students' understanding of learning material, both in value and incompleteness. This positive influence in increasing student understanding is the development of student skills in conducting experiments/inquiries. Learning outcomes are assessed from the level of understanding possessed by students and the attitudes and skills possessed by students (Jayantri, 2019). The unification of concepts in the discussions and experiments carried out will impact the development of student mastery of the learning material, along with Hadi & Rasmawan, 2016 that the inquiry-based learning model starts from a problem then resolves the problem through scientific investigation. The process of scientific inquiry is a complex mental operation consisting of many interrelated components.

Table 6. Percentage of Each Student's Critical Thinking Ability Indicator on Digestive System Material in the Experiment Class

No.	Critical Thinking Indicators	<i>Pre-test</i>		<i>Post-test</i>	
		Number of Tests	Percentage (%)	Number of Tests	Percentage (%)
1.	Focusing on a question	3, 15, 18, 20	75	1, 7, 9, 11	94
2.	Asking and answering clarifying and challenging questions	1, 2, 8, 9, 19	50	3, 4, 5, 6, 12	84
3.	Observing and considering the results of observations	6, 10, 13, 16	55	8, 16, 18, 20	76
4.	Making induction and considering induction	4, 5, 7	70	2, 15, 17	84
5.	Making and considering the value of decisions	12, 14	24	10, 14	69
6.	Defining terms and considering definitions	17	90	13	95
7.	Deciding on an action	11	81	19	86

The inquiry learning design in this study was made in the form of a group practicum. In group practicum, students will actively discuss finding answers and unifying learning concepts to make learning more meaningful. In addition, the material taught will be recorded and remembered by students for a long time. This condition is because what students discuss in the experiment is attempting to solve the given inquiry problem. It is consistent with what Siswono (2005) stated. The inquiry learning approach makes knowledge more meaningful and relevant to students, allows students to find and apply their ideas, makes them aware of their learning strategies, and carries out inquiry activities (discovering). Wirtha & Rapi (2008) further stated that students' mastery of concepts could be improved through the implementation of the inquiry learning model.

In this study, the implementation of inquiry learning provides an opportunity for students to construct their knowledge, using existing concepts to solve problems faced; in other words, students can associate new information with existing cognitive structures so that meaningful learning occurs. The inquiry learning model also provides opportunities for students to work like scientists, namely formulating hypotheses, gathering information, designing/conducting experiments, and communicating experimental results.

Students who learn through inquiry learning carry out a series of learning activities like a scientist. Wirtha & Rapi (2008) states that the implementation of the inquiry learning model allows students to work as scientists, including formulating hypotheses, testing hypotheses

through experiments, and informing investigations. It is intended so that learning is more meaningful, and the learning results obtained are the results of the students' findings. A series of activities such as scientists encourage students' critical thinking skills to be developed. Inquiry learning conditions students to think critically. Therefore, doing a thinking process to find learning concepts helps students understand the concepts that have been obtained to be more meaningful.

Inquiry in this study is a learning model that provides opportunities for students to think critically. The process of students finding a concept for themselves is the student's ability to think critically. It was coupled with worksheets designed to be filled in by students according to their thinking. The teacher's role is only as a facilitator, providing directions that can lead students to find ideas to prove the truth of a hypothesis. It is in line with Afandi (2011) statement, which states that one of the factors that influence learning achievement is independent learning and critical thinking skills. In addition, Prasetyowati & Suratno (2016) state a significant positive relationship between critical thinking skills and students' mastery of concepts in learning that applies the inquiry learning model.

Discussion is the right choice to develop students' critical thinking. In discussion, students can express their respective ideas then weigh each other which idea is better. Lambertus (2009) states that discussion is an effective way to train and develop students' critical thinking skills. Through discussion, students can share opinions, think perspectives, and gain experiences in learning. In

group discussion activities in this study, students can consider, reject, or accept their own opinions or the opinions of other students to match the group's answers or opinions. Students can also make adjustments to other students in terms of freedom of thought and action. It is supported by Ennis (Pratiwi, 2015) that critical thinking is a process that involves the ability to make rational decisions about what to do and what to believe. Then further, according to Lambertus (2009), the interactions built by fellow students or students with teachers in scientific discussions are very influential on the growth and development of students' critical thinking skills.

Conclusion

There is a significant difference between the average student learning outcomes taught by the inquiry learning model and the average student learning outcomes taught by conventional learning models on the digestive system material in class VIII SMP Negeri 2 Pontianak. The t-test indicates a significance level of 5% obtained $t_{count} > t_{table}$ ($1.71 > 1.68$). There is an increase in the average percentage of critical thinking skills in class VIII students of SMP Negeri 2 Pontianak. They are taught with an inquiry model on the digestive system material from 63% to 84%. It is necessary to do further research on the inquiry learning model on other materials, especially in improving students' critical thinking skills.

References

- Afandi. (2011). Pembelajaran Biologi Menggunakan Pendekatan Metakognitif melalui Model Reciprocal Teaching dan Problem Based Learning Ditinjau dari Kemandirian Belajar dan Kemampuan Berpikir Kritis Mahasiswa. *Jurnal Pendidikan Matematika dan IPA*, 2(2). DOI: 10.26418/jpmipa.v2i2.2182
- Amaliah, R. R., Fadhil, A., Narulita, S. (2014). Penerapan Metode Ceramah dan Diskusi Dalam Meningkatkan Hasil Belajar PAI di SMA Negeri 44 Jakarta. *Jurnal Studi Al-Quran; Membangun Tradisi Berfikir Qurani*, 10(2). E-ISSN: 2239-2614
- Ariyati, E. (2010). Pembelajaran Berbasis Praktikum untuk Meningkatkan Kemampuan Berpikir Kritis Mahasiswa. *Jurnal Pendidikan Matematika dan IPA*, 1(2). DOI: 10.26418/jpmipa.v1i2.194
- Anam, K. (2016). *Pembelajaran Berbasis Inkuiri; Metode dan Aplikasi*. Yogyakarta: Pustaka Pelajar
- Dimiyati dan Mujiono. (2006). *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta
- Ennis, R. (1996). *Critical Thinking*. United States of America: The New York Times Company
- Hadi, L. dan Rasmawan, R. (2016). Penerapan Model Pembelajaran Berbasis Inkuiri untuk Memberdayakan Keterampilan Kerja Ilmiah dan Pemahaman Konsep Mahasiswa. *Jurnal Pendidikan Matematika dan IPA*, 7(1). DOI: 10.26418/jpmipa.v4i2.10684
- Jayantri, Y. (2019). Penerapan Model Inkuiri untuk Meningkatkan Hasil Belajar Tematik. *Jurnal Ilmiah Pendidikan Dasar Indonesia*, DOI: 10.28185
- Jayanti, A., Amin, B.D. (2018). Pengaruh Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Berpikir Kritis Peserta Didik Kelas XI MIA SMA Negeri 2 Barru. *Jurnal Sains dan Pendidikan Fisika (JSPF)*, 14(1), 23-28
- Johan, H. (2013). Pengaruh SSCS Problem Solving untuk Meningkatkan Keterampilan Berpikir Kritis Mahasiswa pada Pembelajaran Konsep Listrik Dinamis. *Jurnal Pendidikan Matematika dan IPA*, 4(1), 13-19. DOI: 10.26418/jpmipa.v4i1.6202
- Kurniati, T., Rizmahardian, dan Kurniawan, A. (2017). Pengaruh Pembelajaran Kooperatif Tipe TGT dan Gaya Belajar Model VARK terhadap Hasil Belajar Kimia Sekolah pada Mahasiswa Program Studi Pendidikan Kimia. *Jurnal Pendidikan Matematika dan IPA*, 8(2), 41-49. DOI: 10.26418/jpmipa.v8i2
- Lambertus. (2009). Pentingnya Melatih Keterampilan Berpikir Kritis dalam Pembelajaran Matematika di SD. *Jurnal Forum Kependidikan*, 28(2)
- Manik, N. Y., dan Simatupang, Z. (2017). Analisis Kemampuan Berpikir Kritis dan Hasil Belajar Siswa Pada Pembelajaran Biologi di Kelas X Madrasah Aliyah Negeri 1 Medan. *Jurnal Pelita Pendidikan*, 5(3)
- Maryam, Kusmiati, Merta, I. W., dan Artayasa, I. P. (2019). Pengaruh Model Pembelajaran

- Inkuiri terhadap Keterampilan Berpikir Kritis Siswa Kelas XI MIA MAN 2 Mataram. *Jurnal Pijar MIPA*, 14(3)
- Megasari, Achmad A., dan Pramudiyanti. (2014). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Berpikir Kritis Siswa. *Jurnal Bioterdidik: Wahana Ekspresi Ilmiah*, 2(5)
- Nainggolan, S. D., Suriani, C., dan Sianturi, E. (2018). Analisis Kemampuan Berpikir Kritis Siswa pada Materi Pokok Sistem Pencernaan Manusia di Kelas XI IPA SMA Swasta Yapim Biru-Biru. *Jurnal Pelita Pendidikan*, (6)3, 174-178
- Nofendra. (2019). Upaya Meningkatkan Pemahaman Konsep dan Aktivitas Belajar Menggunakan Model Jaring Makanan. *Jurnal Pendidikan Matematika dan IPA*, 10(2), 259-270. DOI: 10.26418/jpmipa.v10i2.27627
- Nurmayani, L., Doyan, A., dan Verawati, N. N. S. P. (2018). Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Kemampuan Berpikir Kritis Peserta Didik. *Jurnal Pendidikan Fisika dan Teknologi*, 4(1)
- Pertiwi, M., Yuliati, L., dan Qohar, A. (2018). Kemampuan Berpikir Kritis Siswa dengan Inkuiri Terbimbing dipadu Carousel Feedback pada Materi Sifat-sifat Cahaya di Sekolah Dasar. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 3(1)
- Pio, K. T. P., Yuwono, C. S. M., dan Puspawati, D. A. (2019). Kegiatan Laboratorium dengan Model Pembelajaran Inkuiri Terbimbing Untuk Meningkatkan Keterampilan Proses Sains Peserta Didik. *Jurnal Biologi Kontekstual*, 1 (1)
- Prasetyowati, E.N., dan Suyatno. (2016). Peningkatan Penguasaan Konsep dan Keterampilan Berpikir Kritis Siswa Melalui Implementasi Model Pembelajaran Inkuiri pada Materi Pokok Larutan Penyangga. *Jurnal Kimia dan Pendidikan Kimia (JKPK)*, 1(1)
- Pratiwi, D. (2015). Analisis Keterampilan Berpikir Kritis Mahasiswa Calon Guru Biologi melalui Pembelajaran Kooperatif Pada Mata Kuliah Desain Pembelajaran 2014/2015. *Jurnal Pendidikan Matematika dan IPA*, 6(2). DOI: 10.26418/jpmipa.v1i2.200
- Pujiyanto, A., Darsono, dan Pujiati. (2013). Pembelajaran Inkuiri untuk Meningkatkan Kemampuan Berpikir Kritis dan Prestasi Belajar IPS. *Jurnal Studi Sosial*, 1(4)
- Saputri, R., Nurlela, N., dan Patras, Y. E. (2020). Pengaruh Berpikir Kritis terhadap Hasil Belajar Matematika. *Jurnal Pendidikan dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, 3(1)
- Siswono, T.Y.E. (2005). Upaya Meningkatkan Kemampuan Berpikir Kreatif Siswa Melalui Pengajua Masalah. *Jurnal Pendidikan Matematika dan Sains*, 10(1)
- Sugiyono. (2012). *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Bandung: Alfabeta
- Sukrorini, W. (2014). Peningkatan Hasil Belajar Matematika dengan Menggunakan Model Direct Instruction. *Jurnal Pendidikan Matematika dan IPA*, 5(1), 27-36. DOI: 10.26418/jpmipa.v5i1.18640
- Tambak, S. (2014). Metode Ceramah: Konsep dan Aplikasi dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Tarbiyah*, 21(2)
- Titin, Yeni, L. F., dan Fauziah, S. (2012). Penerapan Model Inkuiri untuk Meningkatkan Aktivitas dan Pemahaman Konsep Siswa. *Jurnal Pendidikan Matematika dan IPA*, 3(2), 15-19. DOI: 10.26418/jpmipa.v3i2.23768
- Trianto. (2007). *Model-Model Pembelajaran Inovatif Berorientasi Konstruktivistik*. Jakarta: Prestasi Pustaka Publisher
- Usdalifat, S., Ramadhan, A., dan Suleman, M.S. (2016). Pengaruh Model Pembelajaran Inkuiri terhadap Kemampuan Berpikir Kritis dan Keterampilan Proses Siswa pada Mata Pelajaran IPA Biologi Kelas VII SMP Negeri 19 Palu. *Jurnal Sains dan Teknologi Tadulako*, 5 (3), Agustus 2016, 1-10
- Utami, D. A., Ramalis, T. R., dan Saepuzaman, D. (2016). Penerapan Model Pembelajaran Inkuiri Abduktif untuk Meningkatkan Keterampilan Berpikir Kritis dan Penguasaan Konsep Siswa pada Materi Dinamika. *Jurnal Penelitian dan Pembelajaran IPA*, 2(2)
- Warianti, A., Rusijono, dan Nasution. (2019). Pengaruh Model Pembelajaran Inkuiri

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Terhadap Kemampuan Berpikir Kritis dan Hasil Belajar Siswa Kelas IV SD Pada Subtema Keindahan Alam Negeriku. *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian*, 5(2)

Wirtha, I. M. dan Rapi, N. K. (2008). Pengaruh Model Pembelajaran dan Penalaran Formal Terhadap Penguasaan Konsep Fisika dan Sikap Ilmiah Siswa SMA Negeri 4 Singaraja. *Jurnal Penelitian dan Pengembangan Pendidikan*, 1(2)