
The Effect of Active Learning Integrated with Everyone Is A Teacher Here Strategy Based on Questioning and Answering on The Critical Thinking Skills and Biology Learning Retention of Class XI Senior High School Students In The Industrial Agriculture Area

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ABSTRACT

KEYWORDS:
*Critical Thinking,
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This study aimed to improve student's critical thinking skill and student retention in learning biology through active learning strategy innovation Everyone Is A Teacher Here (ETH) based on Questioning and Answering (Q&A). Moreover, the type of research used is a quasi-experimental research using a pre-test, post-test, and re-test research pattern. In addition, the research was conducted at SMAN 3 Jember in the even semester of the 2022/2023 academic year. The XI MIPA 2 class was selected as the experimental class and XI MIPA 4 as the control class. Based on the results of this study, the ETH strategy based on Q&A has a significant effect on students' critical thinking skills and retention in biology class XI. This is evidenced by the results of the significance of the Anakova test using SPSS, critical thinking skills have a significance of 0.000 ($p < 0.05$) and student retention has a significance of 0.000 ($p < 0.05$). The innovative learning strategy used in this study can be applied in class because it can increase student focus and motivation, especially in biology.

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1. INTRODUCTION

The revised 2013 curriculum in its implementation emphasizes affective, cognitive, and psychomotor aspects that are in accordance with the characteristics of students and integrates 4 important things namely Strengthening Character Education (PPK), Literacy, (basic literacy, library, media, technology, and visual), 21st Century Skills (4C), and *Higher Order Thinking Skills* (HOTS) (Sholekah, 2020; Effendi et al., 2021).

Student's critical thinking skills in Indonesia are in the low category, as evidenced by data from the *Program for International Student Assessment* (PISA) which stated that in 2015, student's critical thinking skills in Indonesia had a score of 397, which was 62nd place out of 72 countries, while in 2018 it had a score of 371, which was 74th place out of 79 countries, (Agnafia, 2019; Hewi dan Shaleh, 2020). One way to hone students' thinking skills is through learning activity that involves critical thinking processes. According to research by Kartimi & Liliarsari (2012) that to improve critical thinking there needs to be a training process, such as getting students used to work on questions that develop critical thinking (Susilawati et al., 2020).

Retention is the ability to remember material that has been studied. It is related to memory, which the output is student learning outcomes (Sudirman and Yusnaeni, 2022). The ability to remember previously learned material is one of the student problems found in classroom. According to Astuti and Muldayanti (2018) that some of all students in the class have low memory,

this was proven during the next meeting only a few students could answer the teacher's questions when reviewing the material with simple questions and answers.

Student's critical thinking skills and learning retention must be improved, one of which is by making changes from Teacher-Centered Learning to Student-Centered Learning through active learning. The principle of active learning is student-centered (Hartikainen et al., 2019). One of the active learning strategies is Everyone is A Teacher Here (ETH). Students get a card containing questions, then the student is given the opportunity to answer questions that behave like teachers to other students in their own style and language (Pratama and Pratiwi, 2019). Questioning and Answering (Q&A) activities are method in the form of reciprocity between teachers and students or students and students (Syahrir, 2018). According to Sulfemi (2017) and Sadariya (2021) that the question-and-answer (Q&A) method for students can increase thinking stimulus, learning motivation, and adding insight, communication strengthening between teachers and students, which can train learning independence. Research by Pratama and Pratiwi (2019) used questions from students. This is less effective because the questions are still basic. So, researchers innovate by preparing critical question cards that are displayed through a projector so that all students can focus and follow the learning process properly.

Biology subjects requires students to be able to find a scientific fact through the process of observing, analyzing, comparing with theory, and concluding (Senisum, 2021). Biology subject is classified as a difficult material for students at SMAN 3 Jember. Based on the observation results, the UAS average score for biology class XI MIPA has not reached the KKM, which is still below 75. Therefore, innovation is needed in the learning process to improve students' critical thinking skills and biology learning retention. The material used by researchers were in accordance with what is being taught at the beginning of the even semester, namely the human respiratory system. Respiratory system material is one of the difficult materials, because during the learning process students cannot see directly the organs of the respiratory system and the processes that occur in the respiratory system (Panjaitan et al., 2020). Biology learning at SMAN 3 Jember, which is an industrial agricultural area, can be connected to phenomena in the surrounding environment to trigger students' thinking stimulus.

Based on the background above, the authors conducted a study entitled The Effect of Active Learning with Everyone is A Teacher Here Strategy Based on Questioning and Answering on Critical Thinking Ability and Retention in Learning Biology for Class XI High School Students in Industrial Agricultural Areas.

2. MATERIALS AND METHODS

The type of research used was quasi-experimental. This study used a pre-test, post-test, and re-test research pattern on 2 classes, one class as the control class and the other class as the experimental class.

Table 2.1 Research design pre-test, post-test, and re-test

E	O1 →	X1 →	O2 →	O3
K	O1 →	X2 →	O2 →	O3

Information:

E : experimental class

K : control class

O1 : pre-test results

O2 : post-test results

O3 : re-test result

X1 : using Q&A based ETH strategy

X2 : using the lecture method

Research in the experimental class applied The ETH learning strategy based on Q&A. While the control class used the lecture method learning model. The material used in this study is the human respiratory system. The research was conducted at SMAN 3 Jember in the even semester

of the 2022-2023 academic year, in January-March 2023. The meetings were held 3 times, both in the control class and the experimental class. The research population were all students of grade XI at SMAN 3 Jember. The research sample was selected through equality test of the classes that would be sampled using the ANOVA test, so XI MIPA 2 and XI MIPA 4 classes were selected as sample classes.

The data collection techniques used in this study were interview, observation, documentation, and test (pre-test, post-test, and re-test). Interview and observation activity were held at SMAN 3 Jember. The data collection techniques of this study can be seen in the following table:

Table 2.2 Data Collection Techniques

Data	Data Collection Technique	Instrument
Validity of ETH learning strategy based on Q&A	Expert validity (validated by lectures)	Validation Sheet
Critical Thinking Ability and Retention	Test	Test Questions
Implementation of learning	Observer response	Observation Sheet

In this study, all samples were tested using the normality and homogeneity tests first. Then, test the equality of the classes that will be sampled using the Anova test. The analysis of covariance (anakova) data analysis approach was applied in this study. Critical thinking skills in control and experimental classes were measured by using the pre-test and post-test. The questions tested used multiple choice questions and essays. The test results then were analyzed by using anakova. The following was the formula for scoring students' critical thinking skills:

$$\text{Skor} = \frac{\text{score obtained}}{\text{skor maximum}} \times 100\%$$

Student retention in the experimental and control classes measured through post-test and re-test scores and then analyzed using anacova. The test results are calculated by the following formula:

$$\text{Skor} = \frac{\text{score obtained}}{\text{skor maximum}} \times 100\%$$

3. RESULTS AND DISCUSSION

3.1. *The impact of Everyone is A Teacher Here Based on Questioning and Answering for Student's Critical Thinking Skills*

The results of the hypothesis test for critical thinking skills can be seen in the following table.

Table 3.1 Hypothesis Test Results of Students' Critical Thinking Skills

Class	N	Average		Sig.
		Pretest	Posttest	
Control Class	31	64,77± 6,88	73,54± 9,88	0,00
Experiment Class	31	66,06± 7,65	87,09± 8,24	

Based on the table 3.1 of data analysis results of students' critical thinking skills, the significance value was 0.00 ($p < 0.05$) which indicated that the Everyone is A Teacher Here strategy based on Questioning and Answering had a significant impact on students' critical thinking skills. This was in accordance with Sari's research, (2014) that the ETH strategy is able to optimize learning independence and students' ability to think critically. This research was also supported by

Liasari, Sudjarwo & Purnomo, (2017) that the ETH strategy has a significant effect on learning outcomes and students' critical thinking skills.

The implementation stages of the ETH strategy based on Q&A were as follows. The first step was orientation by showing video and introduction according to the material. This stage triggers students to explore a phenomenon that can increase students' curiosity (Jeffery et al., 2016; Arsal, 2017; Mcnew-birren & Kieboom, 2017). Then students formed groups of 4-5 people. Group activities involved students to discuss so they can explore, explain, and refute opinions and consider the most reasonable answers to solve the problems given (Wood and Shirazi, 2020). Fauzan et al., (2022) stated that group discussion activities were effective in increasing critical thinking skills in high school students.

The second step was the teacher chooses one student randomly to answer the question by selecting question cards randomly. According to Usman et al., (2020) stated that asking questions can stimulate students to answer and express opinions. So, through this stage students had carried out the basis of the critical thinking process.

The third step was students conducted discussion sessions under the guidance of the teacher in conducting investigation and gathering information. According to Kurniahtunnisa (2016) learning that involves students to understand, formulate problems, search for and analyze data to find alternative solutions to a problem can improve students' critical thinking skills.

The fourth step was the questioning and answering session where the selected students had to answer questions in front of the class, then the teacher gave an opportunity to one of the students from a different group to provide feedback. This stage trained students' communication skills. According to Andriyani (2020), communication skills are one of the aspects in 4C so it needs to be trained to improve. The last step was that students summarized and concluded the material followed by a reflection from the teacher regarding the material that students had learned. Self-reflection based on Dewey's reflective thinking theory and Marzano's opinion, can train students to control themselves and is a process that aims to encourage students to know how effective the learning process for them (Saputri et al., 2019).

The results of the frequency distribution of student's critical thinking skills can be seen in the following table :

Table 3.2 Frequency Distribution Table of Critical Thinking Skills

No.	Critical Thinking Indicators	Experiment Class			Control Class		
		Pre-Test Average	Post-Test Average	Average Difference	Pre-Test Average	Post-Test Average	Average Difference
1	Provides a simple explanation	2.87	4.32	1.45	3.88	4.30	0.42
2	Building basic skills	3.48	4.68	1.20	2.97	3.03	0.06
3	Building conclusions	3.48	4.39	0.91	2.87	3.68	0.81
4	Make further explanations	2.77	4.35	1.58	2.97	3.52	0.55
5	Organize strategies and tactics	3.84	4.03	0.19	3.48	3.84	0.36
Total				5.33			2.20

Based on table 3.2 of data frequency distribution of students' critical thinking skills, it can be seen that the experimental class got better scores than the control class. Assessment of critical thinking skills were also measured through 5 critical thinking indicators. The maximum point for

each indicator was 5. The first indicator was to provide a simple explanation, the experimental class scored 4.32 (very high) and the control class got 4.30 (very high). This score was in the very high category because students were able to identify problems in the questions and the answers they write aligned with the answer key (Putri and Latisma, 2022).

The second indicator was building basic skills, in the experimental class got a score of 4.68 (very high) and in the control class got a score of 3.03 (enough). Students in the experimental class obtained very high scores, meaning that they were able to examine information through relevant sources and then process and analyze problems using the information they found (Putri and Latisma, 2022). Whereas in the control class students were still have difficulty in analyzing and finding evidence relevant to the problems given. This was characterized by thinking that was not according to proper standards, irrelevance and limited thinking stages (Nugraha et al., 2017).

The third indicator was making conclusions, in the experimental class got a score of 4.39 (very high) and in the control class got a score of 3.68 (high). Students in the experimental class got very high scores because they were able to find solutions and draw conclusions appropriately based on existing facts. Students in the control class were able to conclude problems but could not explain in detail about the analysis of the answers they found. One of the characteristics of someone with optimal critical thinking skills were being able to draw conclusions and provide alternative solutions with valid arguments and evidence (Nugraha et al., 2017).

The fourth indicator was making further explanations, in the experimental class got a score of 4.35 (very high) and in the control class got a score of 3.52 (high). This indicated that students in the experimental class had been able to think comprehensively in solving a problem. Characterized by being able to solve problems using an open, broad, and detailed mind consistently and being able to use their instincts for existing concepts and then linking these concepts to solving problems (Nugraha et al., 2017). Students in the control class obtained lower scores because they were able to think deeply and solve problems, but they were still could not explain completely.

The fifth indicator was organizing strategies and tactics, in the experimental class got a score of 4.03 (very high) and in the control class got a score of 3.84 (high). Students got very high scores because they had been able to find the right alternative answers and describe conclusions according to the problem (Putri and Latisma, 2022). Students with high critical thinking skills can consider the several options provided to determine the most effective problem solving solutions (Nugraha et al., 2017). Meanwhile, students in the control class obtained lower scores because they were able to explain answers correctly, but they were incomplete in finding alternative answers. As a result, additional information is required. (Putri and Latisma, 2022).

The implementation of the ETH strategy based on Q&A created interaction between students that helped students to understand the material in their own way. The understanding that was 'self-created' through students' own language can make it easier for students to remember what they had learned so that they can complete evaluation questions and have better cognitive learning outcomes (Yusuf, 2018). In addition, questions at the beginning of learning can hone students' critical thinking skills to a higher level.

3.2. The impact of Everyone is A Teacher Here Based on Questioning and Answering for Student's Retention

The results of the student learning retention hypothesis test can be seen in the following table.

Table 3.3 Student Learning Retention Hypothesis Test Results

Class	N	Average		Sig.
		Posttest	Retest	
Control Class	31	82,54± 4,65	64,35± 11,46	0,00
Experiment Class	31	87,03± 6,14	80,93± 8,38	

Based on table 3.3 of student learning retention results, the significance value is 0.00 ($p < 0.05$). It can be interpreted that the implementation of ETH strategy based on Q&A had a significant effect on student learning retention. Retention of students' knowledge using an active learning approach in class can increase long-term retention of students than the lecture approach (Wood and Shirazi, 2020). Learning using the ETH strategy in the experimental class manifested a better change in students compared to conventional methods (lectures) in the control class. According to Kurniawan (2014) that conventional learning which is usually teacher-centered can lead to low retention (memory) of students on the material being studied.

The implementation stages of the ETH strategy based on Q&A were as follows. The first step was orientation by showing the video and introduction. This can be the first step to train students' memory because students can use their minds to explore a phenomenon that can increase students' curiosity (Saputri et al., 2021).

Then students formed groups of 4-5 people. Group activities involved students in discussing so they can explore, explain, and refute each other's opinions and consider the most reasonable answer to solve the given problem (Wood and Shirazi, 2020). This can increase student retention because they go through the learning process by experiencing directly so that information can last longer in their minds and learning becomes meaningful (Candra and Yanto, 2020).

The second step was the teacher chose one student randomly to answer the question by selecting question cards randomly. Giving questions can stimulate students to think scientifically, understand problem-based concepts, and make them into hypotheses. Students will also plan alternative solutions based on previously understood concepts (Pedaste et al., 2015; Lotter et al., 2016). Well-trained questioning skills will develop higher-order thinking skills, curiosity, creativity, critical thinking skills, and one's character as a lifelong learner (Yang et al., 2005; Tofade et al., 2013). This means that these stages can help students to store material in long-term memory.

Discussion activities were still guided by the teacher in conducting investigations and gathering informations. The information exploration stage trained students to analyze and develop several attitudes such as being honest, conscientious, polite, communicative, and increasing good learning habits so that they got learning experience from the discussion activities that had carried out (Musfiqon & Nurdiansyah, 2015; Maybee et al., 2016). The more often students took an active role in learning, the more they will maximize their memory of the material being studied.

The third step was the questioning and answering (Q&A) session so that the selected students had to answer questions in front of the class, then the teacher invited other group members to present their arguments. Discussion and Q&A activities between groups can train students' communication skills with one to another. In addition, this stage trained students' analytical skills, those who were able to analyze well mean that they were able to process information well. According to Widayati et al., (2015) that students' memory abilities will be good if they are able to understand information well.

The final step was that students concluding the material followed by a reflection from the teacher regarding the material that had been learned. Based on Dewey's reflective thinking theory, explaining activities in front of the class can train students to conclude the results of information findings to answer questions or problems presented. Self-reflection based on Dewey's reflective thinking theory and Marzano's opinion, can train students to control themselves and is a process that aims to encourage students to know how effective the learning process for them (Saputri et al., 2019).

The syntax of the ETH strategy based on Q&A had a high impact because students were trained to use their thinking power and memory to solve problems through the questions given. According to Wahyuni et al., (2019) that someone who is able to remember well will trigger a cognitive process stimulus to develop critical thinking skills. Critical thinking skills were related to students' memory in biology learning. The ETH strategy based on Q&A attracted more students' attention

to focus while studying, triggered student stimulus to hone thinking and memory, then can increase students' courage and skills to express opinions.

4. CONCLUSIONS

Based on the description of the results of the data analysis that had been carried out, the ETH strategy based on Q&A on critical thinking skills had a Sig value. 0.00 ($p < 0.05$), meaning that it had a significant effect on students' critical thinking skills. The ETH strategy based on Q&A on student retention had a Sig. 0.00 ($p < 0.05$), meaning that it had a significant effect on student retention.

5. REFERENCES

- Agnafia, D. N. 2019. Analisis kemampuan berpikir kritis siswa dalam pembelajaran biologi. *Florea: Jurnal Biologi dan Pembelajarannya*. 6(1): 45-53).
- Arsal, Z. 2017. The impact of inquiry-based learning on the critical thinking dispositions of pre-service science teachers. *International Journal of Science Education*. 1–11.
- Astuti, S., dan N. D. Muldayanti. 2018. Studi komparasi round club dan tai menggunakan media audio visual terhadap hasil belajar dan retensi pada materi kingdom animalia di kelas X SMA Negeri 1 Sungai Kakap. *Jurnal Bioeducation*. 5(2): 53-58.
- Candra, O. dan D. T. P. Yanto. 2020. The active learning strategy “everyone is a teacher here” to improve student learning outcomes. *Jurnal PAJAR (Pendidikan dan Pengajaran)*. 4(3): 616-623.
- Effendi, I., M. Prawitasari, dan H. Susanto. 2021. Implementasi pembelajaran pada kurikulum 2013 mata pelajaran sejarah. *Prabayaksa: Journal of History Education*. 1(1): 21-25.
- Eriawan, P. E., M. Yusuf Q, dan S. Sanuddin. 2017. Pengaruh pertanian, industri, dan jasa terhadap peningkatan pertumbuhan ekonomi di Kota Palopo. *Jurnal Manajemen*. 3(2): 13-20.
- Fauzan, M. F., L. A. Nadhir, S. Kustanti, Suciani, S. Kamilah. 2022. Pembelajaran diskusi kelompok kecil: seberapa efektif kah dalam meningkatkan keterampilan berfikir kritis pada siswa?. *AKSARA: Jurnal Ilmu Pendidikan Nonformal*. 8(3): 1805-1814.
- Hartikainen, S., H. Rintala, L. Pylväs, dan P. Nokelainen. The concept of active learning and the measurement of learning outcomes: a review research in engineering higher education. *Journal Education Sciences*. 9(4): 1-19.
- Hewi, L., dan M. Shaleh. 2020. Refleksi hasil PISA (*The Programme For International Student Assessment*): upaya perbaikan bertumpu pada Pendidikan anak usia dini. *Jurnal Golden Age*. 4(1): 30-41.
- Jeffery, E., K. Nomme, T. Deane, C. Pollock, & G. Birol. 2016. Investigating the role of an inquiry-based biology lab course on student attitudes and views toward science. *CBE-Life Sciences Education*. 1–12.
- Kurniahtunnisa., N. K. Dewi, dan N. R. Utami. 2016. Pengaruh model *problem based learning* (PBL) terhadap keterampilan berpikir kritis siswa. *Jurnal Pendidikan Hayati*. 5(1): 31-38.
- Kurniawan, A. 2014. Penerapan model pembelajaran inkuiri terbimbing berbantuan cmaptools dalam pembelajaran fisika untuk meningkatkan kemampuan kognitif dan mempertahankan retensi siswa. *Jurnal Penelitian Pendidikan*. 14(1): 17-26.
- Liasari, V., Sudjarwo, S., dan Purnomo, E. 2017. Perbandingan hasil belajar menggunakan model *everyone is a teacher here* dan *make a match*. *Jurnal Studi Sosial*. 5(2).
- Lotter, C. R., S. Thompson, T. S. Dickenson, & W. F. Smiley. 2016. The impact of a practice-teaching professional development model on teachers’ inquiry instruction and inquiry efficacy beliefs. *International Journal of Science and Mathematic Education*. 1–19.
- Maybee, C., C. S. Bruce, M. Lupton, & K. Rebmann. 2016. Designing rich information experiences to shape learning outcomes. *Studies in Higher Education*. 5079: 1–16.
- Mcnew-birren, J., & L. A. Van Den Kieboom. 2017. Exploring the development of core teaching practices in the context of inquiry-based science instruction : an interpretive case study. *Teaching and Teacher Education*. 66: 74–87.
- Menéndez, M. H., A. V. Guevara, J. C. T. Martinez, D. H. Alcántara, dan R. M. Menendez. 2019. Active learning in engineering education: a review of fundamentals, best practices and experiences. *International Journal on Interactive Design and Manufacturing (IJIDeM)*. 13: 909-922.
- Musfiqon & Nurdiansyah. 2015. *Pendekatan saintifik (Scientific Approach)*. Sidoarjo: Nizamia Learning Center.
- Nugraha, A. J., H. Suyitno, dan E. Susilaningsih. 2017. Kemampuan berpikir kritis ditinjau dari keterampilan proses sains dalam motivasi belajar melalui PBL. *Journal of Primary School*. 6(1): 35-43.
- Panjaitan, R. G., Titin, dan N. N. Putri. 2020. Multimedia interaktif berbasis game edukasi sebagai media pembelajaran materi sistem pernapasan di kelas XI SMA. *Jurnal Pendidikan Sains Indonesia*. 8(1): 141-151.

- Pratama, R. A. dan I. M. Pratiwi. 2019. Hasil belajar sejarah Indonesia melalui pembelajaran aktif tipe *everyone is a teacher here* berdasarkan kemandirian belajar. *Sosial Horizon: Jurnal Pendidikan Sosial*. 6(1): 96-107.
- Pedaste, M., M. Mäeots, L. A. Siiman, T. D. Jong, Z. C. Zacharia, & E. Tsourlidak. 2015. Phases of inquiry-based learning: definitions and the inquiry cycle. *Educational Research Review*. 14: 47–61.
- Putri, W. A., dan Latisma DJ. 2022. Deskripsi kemampuan berpikir kritis siswa dalam menyelesaikan soal-soal kimia pada materi laju reaksi di kelas XI IPA 1 SMAN 7 Padang. *Entalpi Pendidikan Kimia*. 3(2): 9-16.
- Sadariya. 2021. Penerapan metode pembelajaran tanya jawab dengan variasi media pembelajaran untuk meningkatkan hasil belajar PPKn materi idiologi pancasila bagi siswa kelas X IPA 2 SMAN 3 Baubau tahun pelajaran 2019/2020. *Jurnal Akademik FKIP Unidayan*. 10(1): 19-29.
- Saputri, A. C., Sajidan, Y. Rinanto, Afandi, dan N. M. Prasetyanti. 2019. Improving student's critical thinking skills in cell-metabolism learning using stimulating higher order thinking skills model. *International Journal of Instruction*. 12(1): 327-342.
- Sari, D. I. 2014. Penerapan strategi pembelajaran *everyone is a teacher here* untuk meningkatkan kemandirian belajar ekonomi siswa kelas VIII C SMP Negeri 2 Colomadu tahun ajaran 2013/2014. Universitas Muhammadiyah Surakarta.
- Senisum, M. 2021. Keterampilan proses sains siswa SMA dalam pembelajaran biologi. *JKPM: Jurnal Pendidikan dan Kebudayaan Missio*. 13(1): 76-89.
- Sholekah, F. F. 2020. Pendidikan karakter dalam kurikulum 2013. *Childhood Education: Jurnal Pendidikan Anak Usia Dini*. 1(1): 1-6.
- Sudirman., dan Yusnaeni. 2022. Korelasi metakognitif dengan retensi belajar siswa SMA Negeri di Kabupaten Rote Ndao Nusa Tenggara Timur. *Jurnal Riset Pendidikan Kimia*. 12(1): 1-9.
- Sulfemi, W. B., dan A. Qodir. 2017. Hubungan kurikulum 2013 dengan motivasi belajar peserta didik di SMK Pelita Ciampea. *Jurnal Ilmiah Edutecno*. 17(2): 1-12.
- Susilawati, E., Agustinasari, A. Samsudin, dan P. Siahaan. 2020. Analisis tingkat keterampilan berpikir kritis siswa SMA. *Jurnal Pendidikan Fisika dan Teknologi (JPFT)*. 6(1): 11-16.
- Syahrir. 2018. Pengembangan pola berpikir siswa kelas XI tentang pengoprasian dasar pada matriks identitas melalui metode pembelajaran tanya jawab. *Jurnal Ilmu Sosial dan Pendidikan*. 2(1): 358-360.
- Tofade, T., E. Jamie, & S. T. Haines. 2013. Best practice strategies for effective use of questions as a teaching tool. *American Journal of Pharmaceutical Education*. 77(7): 155.
- Usman., E. Utari, dan N. Yulita. 2020. Hubungan berpikir kritis dengan kreativitas siswa melalui mind map pada pembelajaran biologi. *BIO-Lectura: Jurnal Pendidikan Biologi*. 7(2): 143-152.
- Widayati, T. U., B. A. Prayitno, dan J. Ariyanto. 2015. Perbedaan kemampuan memecahkan masalah dan retensi menggunakan model PBL (*problem based learning*) dan ceramah bervariasi pada materi keanekaragaman hayati Indonesia siswa kelas X SMA Negeri 2 Surakarta tahun pelajaran 2014/2015. *BIO-PEDAGOGI: Jurnal Pendidikan dan Pembelajaran Biologi*. 4(1): 53-58.
- Wahyuni, V. A., E. Surahman, dan R. F. Musthofa. 2019. Pengaruh pembelajaran *guided inquiry* terhadap kemampuan berpikir kritis dan retensi peserta didik pada konsep sistem indera manusia. *Bioedusiana: Jurnal Pendidikan Biologi*. 4(2): 72-79.
- Wood, R., dan S. Shirazi. 2020. A systematic review of audience response systems for teaching and learning in higher education: the student experience. *Computer & Education*. 153.
- Yang, Y. C., T. J. Newby, & R. L. Bill. 2005. Using socratic questioning to promote critical thinking skills through asynchronous discussion forums in distance learning environments. *American Journal of Distance Education*. 19(3): 163–181.
- Yusuf, M. 2018. Peningkatan keterampilan berpikir kritis dan hasil belajar siswa SD dengan menerapkan strategi *everyone is a teacher here* pada model pembelajaran kooperatif. *Jurnal Ilmiah Sekolah Dasar*. 2(1): 18-30.