UNESA Journal of Chemical Education *ISSN: 2252-9454*
Vol.12,No.2, pp.132–140, May 2023

THE EFFECTIVENESS OF STAD COOPERATIVE LEARNING MODELS ON CRITICAL THINKING ABILITY AND STUDENT LEARNING OUTCOMES ON CHEMICAL EQUILIBRIUM

Deni Ainur Rokhim[1,2], Hayuni Retno Widarti[1], Anggun Permatasari[1]

[1]Jurusan Pendidikan Kimia, FMIPA, Universitas Negeri Malang
[2]Kimia dan Prakarya, SMAN 3 Sidoarjo

e-mail: hayuni.retno.fmipa@um.ac.id

Abstrak

Penelitian empiris telah menginformasikan bahwa pembelajaran kesetimbangan kimia di kelas kimia termasuk mata pelajaran yang sulit bagi siswa sekolah menengah atas, dan pendekatan pembelajaran yang dapat menantang kompleksitas tersebut dalam konteks persekolahan di Indonesia tampaknya masih jarang. Oleh karena itu, penelitian ini dirancang untuk mengetahui: (1) penerapan model pembelajaran STAD pada mata pelajaran kimia materi kesetimbangan kimia dan (2) perbedaan kemampuan berpikir kritis dan hasil belajar bahasa Indonesia siswa SMA setelah diajarkan dengan menggunakan model pembelajaran STAD dan konvensional. Untuk mengumpulkan dan menganalisis data, Posttest Only Control Design digunakan. Hasil penelitian menunjukkan bahwa (1) penerapan model pembelajaran STAD rata-rata 93% dan pembelajaran konvensional 90%, (2) terdapat perbedaan kemampuan berpikir kritis siswa yang dibelajarkan dengan model STAD (86,14%) lebih tinggi dari yang diajar dengan model pembelajaran konvensional (71,14%), dan (3) terdapat perbedaan siswa yang diajar dengan model STAD (86,00%) lebih tinggi dibandingkan dengan yang diajar dengan model pembelajaran konvensional (81,76%). Berdasarkan hasil tersebut dapat disimpulkan bahwa model pembelajaran STAD dapat meningkatkan kemampuan berpikir kritis dan hasil belajar siswa secara efektif.
Kata kunci: Divisi Prestasi Tim Siswa; Kemampuan Berpikir Kritis; Hasil Belajar; Kesetimbangan Kimia

Abstract

Empirical research has informed that chemical equilibrium learning in chemistry class includes as a difficult subject for senior high school students, and the learning approach that can challenge this complexity in the Indonesian schooling context seems sparse. Therefore, this present study was designed to find out: (1) the implementation of STAD learning model in the chemistry class discussing chemical equilibrium topic and (2) the differences in the ability to think critically and learning outcomes of Indonesian senior high school students after being taught using STAD and conventional learning models. To collect and analyze the data, Posttest Only Control Design was employed. Findings suggested that (1) the implementation of STAD learning model had an average of 93% and conventional learning of 90%, (2) there are differences in the critical thinking abilities of students who were taught using STAD model (86.14%) higher than those taught using conventional learning model (71.14%), and (3) there are differences of students who were taught using STAD model (86.00%) higher than those taught using conventional learning model (81.76%). Based on these results, we can infer that STAD learning model could enhance students' critical thinking abilities and learning outcomes effectively.
Key words: *student teams achievement divisions; critical thinking ability; learning outcome; chemical equilibrium*

INTRODUCTION

One of the goals of the 21st century education is to develop students' critical thinking abilities in learning so that they can solve problems encountered in real life [1]. Rosen (2020) stated that in the 21st century, students are required to have collaborative and communicative abilities in teams so that they can compete in the workplace [2]. The success of students in constructing knowledge is not only from the achievement of predetermined learning goals [3], but also from applying the concepts of knowledge obtained at school to solve problems faced in everyday life in a relevant, meaningful, and contextual way [4].

The 21st century is marked by the rapid development of science and technology. Thus science and technology are essential domains in developing countries. One branch of science that explains the phenomena in the surrounding environment is chemistry [5]. In studying chemistry, it is not merely solving mathematical calculation problems that require algorithmic abilities but also exploring natural events in daily life, terms, and special rules, as well as abstract concepts that require critical thinking abilities [6]. According to Sirhan, vast chemical substances cause chemistry to have a high degree of difficulty [7]. This is because chemistry includes an abstract and continuous concept.

A recent study carried out by Adaminata revealed that myriad students encountered difficulties in understanding chemical equilibrium material [1]. This is because the concept involves mathematical calculations such as the equilibrium constants Kc and Kp, the results of reactions, reversible reactions, and equilibrium shifts. For example, in solving a problem, students are not only required to memorize but also to understand the rules that are relevant to the understanding of the chemical equilibrium concept obtained. This is also supported by research conducted by Indriani, showing that students experience three complexities such as (1) the dynamic equilibrium included in the high category, (2) about the equilibrium constant included in the low category, and (3) about the factors that affect the equilibrium shift included in the low category [4], [8], [9]. Consequently, an attentive action to help students with these difficulties in the concept of chemical equilibrium is necessary. One of which is through the application of effective pedagogy in learning. According to Suyono, effective learning is a learning activity that makes it easy for students to achieve learning objectives optimally [10].

According to the Great Dictionary of the Indonesian Language (KBBI), effective learning can be achieved if benefits and effects can be felt so that it is not only focused on the final result but also on how effective learning can provide understanding and perseverance to students. To do so, inviting students to think critically would serve the purposes. Theoretically, critical thinking abilities consist of several aspects, including observing problems, finding solutions to solve problems, finding information, analyzing data, and drawing conclusions [11]. According to Choy and Cheah (2009) Critical thinking abilities require a high level of cognitive knowledge to process information, and concepts [3]. The role of critical thinking abilities is very central for science learning because of the growing times and technology students are more demanded to analyze and solve complex problems effectively [12]. Previously, a study done by Nafiah and Wedakaningish (2014) showcased that student learning outcomes improve when their critical thinking abilities increase[12]. Critical thinking can be measured from 12 indicators of critical thinking according to Ennis (2015), which contain the scope of analyzing, evaluating, and synthesizing, or can also use the cognitive level of bloom taxonomy[7]. Students should be given a lot of experience to solve problems so that their critical thinking abilities develop well. Teachers are to guide students and provide them with the ability to gather information so that they can effectively solve complex problems.

Based on our classroom observation during the Field Practice Study (KPL) at one public senior high school in Malang, coupled with the observations done by Subhan, et al (2018), learning activities carried out by teachers were performed conventionally, in which teacher-centered approach was mostly dominant in the classes[13]. This learning enactment leads to a teacher-centered information provider. In addition, the observations also showed that students paid less attention to the explanations from the teacher and were busy with their respective activities, such as chatting with friends. To overcome this problem, teachers enacted classroom discussions and invited students to be actively engaged in the classes. The model of discussion requires students to work in groups (tentor peers). They were grouped based on their abilities, where high, medium, and low ability students are included in one group so that each group is heterogeneous, which allows students to discuss, share knowledge, abilities, understandings, and correct each other. As a result, the atmosphere of learning that takes place in the groups provides opportunities for students to trust each other, be open, and relax among group members.

In learning chemistry, it is expected that the teacher will not only provide as much information as possible to students, but the teacher will also play an active role to stimulate thinking, be scientific, and foster student creativity and responsibility in daily life that is relevant to chemistry [14], [15]. Felder argued that the learning activities needed an appropriate learning model so that students can be motivated to learn and explore the capabilities they have so that the reliance on teachers is reduced [16]. According to the constructivist learning theory, learning is a process of forming knowledge, so students ought to actively engage in learning activities, actively think and ask questions and answer questions, as well as construct concepts. Meanwhile, the teacher plays a role in helping the process of constructing students' knowledge so that it runs smoothly [17].

One effort to shape the process of constructing students' knowledge is through constructivist learning theories. Practically, the suggested learning approach is a cooperative learning model, where students are required to work together, exchange opinions, and tolerate in completing group assignments to achieve common goals so that each group member has the same responsibility for the success of the group [11], [18]–[20]. Slavin contends that in cooperative learning each student in the discussion group learns from one another so that differences of opinion would arise and develop an attitude of cooperation that later students would be motivated to look for as many sources of information and cause the quality of their knowledge to increase [21]. From these opinions, it can be inferred that cooperative learning requires students to participate in interacting between students and students in group discussion activities so that each group member has a personal responsibility that is manifested in active contributions to the group. This is intended so that group goals can be achieved, one of which is in the successful completion of group assignments given by the teacher.

One model of cooperative learning is STAD (Student Teams Achievement Divisions). Theoretically, STAD learning model has been prevalent in an educational context because this model provides opportunities for students to think, discuss, argue, and cooperate. It was also supported by research carried out by Khalistyawati and Muhyadi [22], revealing that the application of the STAD significantly influences critical thinking abilities, activeness, and student cognitive learning outcomes. STAD also requires students to discuss together with a group of friends consisting of 4-5 heterogeneous students. This will undoubtedly make students more active in interacting and exchanging ideas with group peers [23].

The strength of the STAD learning model is that it changes the habits of teacher-centered learning activities to become student-centered learning activities. Khalistyawati and Muhyadi (2018) further found that the experimental class applying the STAD learning model experienced an increase in the average score of critical thinking abilities (70.24) than the control class (62.70) [22]. Given the fact that STAD learning model is a potential approach to teaching and learning processes in chemical equilibrium class, we have observed that very little has been undertaken to explore STAD in the teaching and learning of chemistry subject in an Indonesian schooling context. Therefore, anchored by this inconclusive study, the present study attempts to 1) investigate the implementation of STAD learning model and 2) explore the difference of students’ critical thinking abilities and learning outcomes after being taught using STAD and conventional learning models.

METHODS

Posttest Only Control Design under the quantitative framework was used in this study in which the samples used in the control class and experimental class were chosen randomly. The experimental class was taught with the Student Teams Achievement Divisions (STAD) learning model, while the control class was taught using conventional approach. The two classes were selected from the class that had the same initial ability where both of them were taught with the same learning method in the previous material, namely the reaction rate which was then analyzed using the T-two tailed test with the help of SPSS 16.0 for Windows.

RESULT AND DISCUSSION

Learning Enactment

The implementation of the research and control class learning processes was observed using observation monitoring tools. Assessment of the implementation of learning using two instruments in this research. The treatment instruments consisted of syllabus, lesson plans, worksheets, and quizzes, while the measurement instruments were used.

We use both treatment and measurement include observation sheets for the implementation of the Learning Implementation Plan (RPP), instruments for evaluating critical thinking abilities, and instruments for learning outcomes. Data on critical thinking abilities of students were obtained from the results of overall student answers in answering quizzes on chemical equilibrium material, where the type of questions was a matter of description developed by researchers. The test tool used refers to the five aspects of critical thinking skills which are described in 12 indicators of critical thinking according to [5], [24]. The following explanation according to Ennis can be seen in **Table 1.**

Table 1. Indicators of Critical Thinking on the Assessment Instrument

No.	Critical Thinking Ability Aspects	Critical Thinking Indicators
1.	Giving simple clarification	Focusing questions
		Analyzing argument
		Asking and answering important questions
2.	Shaping basic abilities	Considering credible sources
		Doing observation and assessing it
3.	Making conclusion	Doing deduction
		Doing induction
		Doing evaluation
4.	Giving continous clarification	Defining terms
		Identifying assumption
5.	Making prediction and integration	Making a decision
		Doing interaction with other people

observers who are chemistry students at the State University of Malang. The score is presented in average and accumulated as a percentage. Data on the percentage of lesson plan implementation in the experimental and control classes can be seen in **Table 2.**

Table 2. Percentage Data of Experimental and Control Classes

Lesson Plan	Performance Percentage (%) Experimental Class	Control Class
Meeting 1	93	88
Meeting 2	92	87
Meeting 3	95	94
Meeting 4	91	90
Average	**93**	**90**

In Table 2, the implementation of learning activities shows that at meetings 1, 2, and 4 tends to decrease because at the beginning of the meeting students are very enthusiastic, but at the next meeting students begin to get bored and less enthusiastic in participating in learning activities, whereas at meeting 3 learning activities have increased because students conduct experiments, so they tend to be active in learning activities.

Based on the data in Table 2, the average percentage of the feasibility of the experimental class learning activities is 93%, while the control class is 90%, so it can be concluded that the learning activities of the two classes are going very well. From the results of observations made, the learning activities of the experimental class are more active and responsive in the question and answer activity than the control class. This is indicated by students who are taught with the STAD model to pay more attention to the teacher's explanation and try to find various references from books and the internet to be able to do worksheets. As stated by Rianto, learning in the research class is carried out by students in an independent inquiry manner in developing the ability to think through problem solving for get rational and authentic answers to problems [24]. In addition, the atmosphere of the experimental class is more conducive than the control class, one of which is in the execution of more timely quiz questions.

The implementation of learning in this study there are several factors that support and hinder learning. Factors that support the implementation of this learning is that students can work well together during the learning process and students are enthusiastic about the learning done, besides that it is also supported by good classroom management by the teacher. The inhibiting factor during the research is students who still feel unfamiliar with new ways of learning, so students need time to adapt [2].

Critical Thinking Abilities

The ability to think critically in the experimental class and control class can be viewed from the results of students' answers to the quiz questions that refer to the 12 indicators of critical thinking [6]. The instrument used was quiz questions at each meeting, where at meeting I consisted of 4 questions, meeting II consisted of 4 questions, and meeting IV consisted of 3 questions so that the total quiz questions were 11 items. Before being classified into the criteria of critical thinking ability, it is necessary to analyze the data by calculating the percentage of students' correct answers in the experimental class and the control class. The percentage of students' answers on quiz questions for the critical thinking ability test has been classified into 12 indicators of critical thinking [6] which is listed in **Table 3.**

Table 3. The percentage of students' answers on quiz questions

No.	Critical Thinking Indicators	Number	(%) Answer/Class	
			Experimental	Control
1.	Focusing question	1, 3 (quiz III)	81	57
2.	Analyzing argument	-	-	-
3.	Asking and answering important questions	1, 3, 4 (quiz I)	90	74
4.	Considering credible sources	-	-	-
5.	Doing observation and assessing it	2 (quiz I)	92	90
6.	Doing deduction	3 (quiz I); 1, 2, 4 (quiz II)	80	66
7.	Doing induction	2 (quiz III)	91	76
8.	Doing evaluation	-	-	-
9.	Defining terms	-	-	-
10.	Identifying assumption	2 (quiz II), 3 (quiz III)	77	44
11.	Making a decison	4 (quiz II)	92	91
12.	Doing interaction with other people	-	-	-
Average (%) Answers	86.14	71.14		

Based on Table 3, it shows that the critical thinking questions instrument that refers to 12 indicators according to Ennis is known as the largest percentage of the two classes are in the indicators of observing and evaluating the results of observations, as well as the indicators deciding an action. This is because the experimental class students are able to identify observations through images and can decide the alternative of a problem through a mathematical formula. Meanwhile, the smallest percentage of the two classes contained in the indicators identify assumptions because students have not been able to reason to strengthen answers in solving quiz questions. From Table 3, it can be seen that the average total percentage of the answers of the experimental class is greater than

 ISSN: 2252-9454

the control class, where the experimental class is 86.14% (very high category) and the control class is 71.14% (high category). Finally it was concluded that learning by applying the STAD learning model can improve students' critical thinking skills. The percentage results were then analyzed using the help of SPSS technology. The following hypothesis is put forward.

H0: There is no difference in students' critical thinking abilities who were taught using the STAD learning model from those taught using the conventional learning model on the chemical equilibrium material.

H1: There is a difference in students' critical thinking abilities who were taught using STAD learning models from those taught using conventional learning models on the chemical equilibrium.

Hypothesis test results of students' critical thinking abilities can be seen **in Table 4.**

Table 4. Hypothesis Testing Results of Students' Critical Thinking Abilities

Classes	Average	Sig.Value	t_{count}	Df	½ α	Conclusion
Experimental	87.00	0.05	2.048	14	0.025	H_0 rejected and H_1 accepted
Control	71.36					

Table 4 shows that the Table with df = 14 and the significance level of 0.05 is 2.160, while the resulting t_{count} is 2.048. If t_{count}> t_{Table} then H0 is rejected and H1 is accepted, which means there is a difference in the critical thinking abilities of tudents who apply STAD learning models with conventional learning models in the chemical equilibrium class XI MIPA SMAN 4 Malang. In Table 4, the average critical thinking ability of the experimental class students is greater than the control class, where the average experimental class is 87.00 and the control class is 71.36. Based on the results of the analysis, it can be concluded that the STAD learning model can improve students' critical thinking abilities rather than conventional learning. This is likely because students who are taught with the STAD learning model have been trained to solve varied problems in group discussion activities and are active in question and answer activities than students who are taught with conventional learning, so that they are able to answer questions correctly with the right reasons [25].

The critical thinking abilities of the experimental class students based on the recapitulation results in Table 3 were categorized very high, while the control class was categorized high [26]. From the analysis of these data it can be concluded that learning that applies the STAD model can train students to think critically better in order to correlate concepts with facts and phenomena in the surrounding environment. This is likely because students who are taught with the STAD learning model are required to think critically and deeply in order to solve problems. In addition, when learning activities take place students who are taught with the STAD learning model are more active in question and answer activities and can find concepts independently in group activities, so that they will be better able to solve complex and varied problems because they are accustomed to facing problems right [18]. This certainly makes students who are taught with the STAD learning model have higher critical thinking abilities than students who are taught with conventional learning.

Students Learning Outcomes

Learning outcomes data used is the total score of students in working on the instrument development results from Dewi (2019) consisting of 25 multiple choice questions [27]. Student learning outcomes data for the experimental class and the control class can be seen in **Table 5.**

Table 5. Student Learning Outcome

Classes	Number of Students	Lowest Score	Highest Score	Average
Experimental	34	80	96	86.00
Control	34	72	96	81.76

Table 5 shows that the average value of the experimental class is greater than the control class, where the average experimental class is 86.00 and the control class is 81.76. From these data it is necessary to analyze in order to find out whether there are differences in student learning outcomes between the experimental class and the control class. The following hypothesis is proposed.

H0: There is no difference in student learning outcomes who were taught using the STAD learning model from those taught using the conventional learning model on the chemical equilibrium material.

H1: There are differences in student learning outcomes who were taught using the STAD learning model from those taught using conventional learning models on the chemical equilibrium.

Hypothesis test results of student learning outcomes can be seen in **Table 6.**

Table 6. Hypothesis Testing Results of Students Learning Outcomes

Classes	Average	Sig. Value	t_{count}	Df	½ α	Conclusion
Experimental	86.00	0.05	2.926	66	0.025	H_0 rejected and H_1 accepted
Control	81.76					

Table 6 shows that the Table with df = 66 and the significance level of 0.05 was 1.997, while the resulting tcount was 2.926. If tcount> tTable then H0 is rejected and H1 is accepted which means that there is a difference between the STAD learning model and the conventional learning model on chemical equilibrium material in improving student learning outcomes. In Table 6, the average student learning outcomes of the experimental class are greater than the control class, where the average experimental class is 86.00 and the control class is 81.76. Based on the results of the analysis, it can be concluded that the STAD learning model can improve student learning outcomes compared to conventional learning models. This is because students who are taught with the STAD learning model are constructivist in nature that require students to actively engage in learning activities, actively think and ask questions, and develop concepts where student-centered learning activities (student-centered). Students are asked to do each stage in STAD learning to the maximum, one of them is at the stage of group discussion which requires students to understand the problem in order to solve problems independently in the group, so students do not easily decide on an answer before understanding the problem on the problem. This stage is not implemented in students who are taught with conventional learning so that the average learning outcomes of students who are taught with conventional learning are lower than students who are taught with STAD learning.

CONCLUSION

This study has attempted to document 1) the implementation of STAD learning model and 2) explore the difference of students' critical thinking abilities and learning outcomes after being taught using STAD and conventional learning models. The findings of this study suggest that students who are taught using STAD and conventional learning models on the subject of chemical equilibrium are categorized into well-implemented. This is indicated by the results of the percentage of lesson plan implementation in the experimental class by 93% and control class by 90%. There is a difference in students' critical thinking abilities who were taught using STAD learning model from students who were taught using conventional learning model on the chemical equilibrium topic. This is shown from the results of the average percentage of answers to the critical thinking abilities of experimental class students by 86% which is higher than the critical thinking ability of the control class by 71%. Also, there are differences in student learning outcomes who were taught using STAD learning model from students who were taught using conventional learning models on chemical equilibrium material. This is indicated by the average value of student learning outcomes in the experimental class at 86.00 which is higher than the learning outcomes of the control class students at 81.76.

REFERENCES

1. Adaminata, M. A. dan Marsih, I. N. 2011. Analisis Kesalahan Konsep Siswa SMA pada Pokok Bahasan Kesetimbangan

Kimia. *Prosiding Simposium Nasional Inovasi Pembelajaran Dan Sains*.

2. Ahyar, l. M., Ibnu, S. dan Affandy, D. 2017. Penerapan Stad Dalam Pembelajaran Inkuiri Terbimbing Dan Pengaruhnya Terhadap Hasil Belajar Peserta Didik. *J-PEK (Jurnal Pembelajaran Kimia)*. Vol. 2. No. 1.

3. Choy, S. C. dan Cheah, P. K. 2009. Teacher Perceptions of Critical Thinking Among Students and its Influence on Higher Education. *International Journal of Teaching and Learning in Higher Education*. Vol. 20. No. 2.

4. Effendy. 2016. *Ilmu Kimia Untuk Siswa SMA dan MA Kelas X Jilid 1A*. Malang: Indonesian Academic Publishing.

5. Ennis, R. H. 2013. The Nature of Critical Thinking: An Outline of Critical Thinking Disposition and Aboloties. *University of Illinois.*

6. Ennis, R. H. 2013. Critical thinking across the curriculum (CTAC).

7. Ennis, R. H. 2015. The Nature of Critical Thinking: Outlines of General Critical Thinking Disposition and Abilities. *MIT, Cambrigde: Presentation at Sixth International Conference on Thinking.*

8. Indriani, A., Suryadharma, I. B. dan Yahmin, Y. 2017. Identifikasi Kesulitan Peserta Didik Dalam Memahami Kesetimbangan Kimia. *J-PEK (Jurnal Pembelajaran Kimia)*. Vol. 2. No. 1.

9. Talanquer, V. 2006. Commonsense Chemistry: A Model for Understanding Students' Alternative Conceptions. *Journal of Chemical Education*. Vol. 83. No. 5.

10. Suyono, H. 2014. *Belajar dan Pembelajaran: Teori dan Konsep Dasar*. Bandung: Remaja Rosdakarya.

11. Surayya, L., Subagia, I. W. dan Tika, I. N. 2014. Pengaruh Model Pembelajaran *Think Pair Share* terhadap Hasil Belajar IPA Ditinjau dari Keterampilan Berpikir Kritis Siswa. *Jurnal Pendidikan dan Pembelajaran IPA Indonesia*. Vol. 4. No. 1.

12. Nafiah, Y. N. dan Suyanto, W. 2014. Penerapan model problem-based learning untuk meningkatkan keterampilan berpikir kritis dan hasil belajar siswa. *Jurnal Pendidikan Vokasi*. Vol. 4. No. 1.

13. Subhan, P. dan Salempa, M. D. 2018. Pengaruh Media Animasi dalam Model Pembelajaran Inkuiri Terbimbing terhadap Keterampilan Berpikir Kritis dan Aktivitas Belajar Peserta Didik Pada Materi Kesetimbangan Kimia. *Chemistry Education Review (CER)*. Vol. 1. No. 2.

14. Jusniar, J., Effendy, E., Budiasih, E. dan Sutrisno, S. 2020. Developing a three-tier diagnostic instrument on chemical equilibrium (TT-DICE). *Educación Química*. Vol. 31. No. 3.

15. Nugrahaeni, A., Redhana, I.W. dan Kartawan, I. M. A. 2017. Penerapan Model Pembelajaran Discovery Learning untuk Meningkatkan Kemampuan Berpikir Kritis dan Hasil Belajar Kimia. *Jurnal Pendidikan Kimia Indonesia*. Vol. 1. No. 1.

16. Felder, R. M. dan Brent, R. 2005. Effective Strategies for Cooperative Learning. *Journal of Cooperation & Collaboration in College Teaching.* Vol. 10. No. 2.

17. Hamdayana, J. 2016. *Metodologi pengajaran*. Jakarta: Bumi Aksara.

18. Ling, W. N., Ghazali, M. I. dan Raman, A. 2016. The Effectiveness of Student Teams Achievement Division (STAD) Cooperative Learning on Mathematics Comprehension Among School Students. *Internasional Journal of Advanced Research and Development*. Vol. 1. No. 3.

19. Van Wyk, M. M. 2013. The Effect of Student Teams Achievement Divisions as a Teaching Strategy on Grade 10 Learners' Economics Knowledge. *International Journal for Cross-Disciplinary Subjects in Education*. Vol. 4. No. 2.

20. Van Wyk, M. M. 2012. The Effects of the STAD-Cooperative Learning Method on Student Achievement, Attitude and Motivation in Economics Education. *Journal of Social Sciences*. Vol. 33. No. 2.

21. Slavin, R. E. 2005. *Cooperative Learning.* Bandung: Nusamedia.

22. Khalistyawati, M. dan Muhyadi, M. 2018. Pengaruh Model STAD dan Jigsaw Terhadap Karakter Kerja Sama, Kemampuan Berpikir Kritis, dan Hasil Belajar Kognitif. *Jurnal Pendidikan Karakter*. Vol. 9. No. 2.

23. Tiantong, M. dan Teemuangsai, S. 2013. Student Team Achievement Divisions (STAD) Technique through the Moodle to Enhance Learning Achievement. *International Education Studies*. Vol. 6. No. 4.

24. Saputro, A. D., Rohaeti, E. dan Prodjosantoso, A. K. 2018. Promoting critical thinking and Problem Solving Skills of Preservice Elementary Teachers through Process-Oriented Guided-Inquiry Learning (POGIL). *International Journal of Instruction*. Vol. 11. No. 4.

25. Romanowski, M. H. dan Nasser, R. 2012 Critical Thinking and Qatar's Education For a New Era: Negotiating Possibilities. *The International Journal of Critical Pedagogy.* Vol. 4. No. 1.

26. Sugiyono. 2017. Metode Penelitian Kuantitatif, Kualitatif, Dan R&D. Bandung: Alfabeta.

27. Dewi, D. T. K. 2019. Pengaruh Tingkat Pendidikan Orang Tua Terhadap Motivasi Belajar Siswa Di Sd Negeri Winong Mirit Kebumen. *Doctoral dissertation, IAIN.*