CHEMISTRY EDUCATION PRACTICE

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THE EFFECT OF TEAM GAMES TOURNAMENT (TGT) ASSISTED BY QUIZIZZ APPLICATION ON STUDENT LEARNING OUTCOMES IN REDOX REACTION TOPIC

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Abstract

This research aims to analyze students' learning achievement in the topic of redox reactions between two classes with different teaching methods. The study was conducted at SMAN 7 Mataram using two classes as the research sample. The sampling technique employed cluster random sampling, as the large population had to be divided into subgroups/classes, and only those subgroups/classes were randomly selected. The sample for this study consisted of class X IPA 3 as the control group, treated with conventional teaching methods, and class X IPA 4 as the experimental group, treated with the Team Games Tournament (TGT) teaching model assisted by the Quizizz application.

Keywords: team games tournament, quizizz application, learning outcomes

INTRODUCTION

Chemistry is one of the branches of science that specifically studies the material, properties, changes, and the energy associated with those changes (Fadly et al., 2020). Chemistry is crucial in the learning process, aiming for students to achieve grades above the minimum passing criteria (KKM) as evidence that they have attained the learning objectives in chemistry (Sulistyanti et al., 2019). According to Abdullah (2017), chemistry involves abstract concepts and numerous calculations and formulas, making it challenging for students to understand. The abstract nature of the concepts in chemistry, coupled with the abundance of formulas, creates difficulty for students to grasp the subject within a relatively limited timeframe (Suyanti, 2013).

These constraints are caused by factors like the teacher directly discussing theoretical things without looking at student understanding so that students have difficulty absorbing theory which is displayed. Students memorize knowledge without understanding the concepts of chemical material, so they cannot build their concepts (Gunawan et al., 2019). Even though the teacher's explanation was complete, the students remembered only a few words. These circumstances and situations make student learning outcomes less than optimal in chemistry subjects, likewise with the subject matter of redox reaction (Hasniyah & Muchtar, 2021).

Redox reactions are chemistry that studies reducing substances. These are substances that release or donate electrons or undergo oxidation, whose oxidation number increases, and oxidizing agents, which gain electrons oxidation number (NARICT, 2013). The development of redox reactions consists of the definition of oxygen transfer at the start of the topic. It turns to electron transfer on the topic continued after discussing the material structure of an atom. The subject matter of redox reactions changes the concept's meaning four times. Redox reactions are based on the transfer of oxygen, hydrogen, electrons and change in oxidation number. Changes in the meaning of concepts and solving redox problems that require many stages make it difficult for students to solve problems and redox reactions so that students' chemistry scores are below the minimum completeness (Anshory et al., 2016).

One of the causes of failure in learning chemistry can be seen in the learning outcomes of students who still need to improve their completeness. It happens due to the need for teacher innovation in conditioning the learning

atmosphere, decreasing student learning motivation. It can be seen from the student's lack of focus during learning and the need to prepare for learning the material to be taught (Sukardi, 2019). Learning conditions often found in schools include students needing to pay more attention to lessons because they are bored, sleepy, or busy doing other things that can interfere with the learning process (Sumiati et al., 2019).

The results of observations at SMAN 7 Mataram, especially class X Science, show that student learning outcomes are low because student scores tend to be below the KKM, which is 75. Hints of low learning outcomes for chemistry students can also be seen from the calculations of classical completeness in all class X IPA which is still below 40% (Ardiyansyah et al., 2019). It was also supported by an interview with a chemistry teacher who stated that students' responses to teaching and learning activities were still ordinary and could have been more active. This problem is caused by the learning model and methods used tend to be monotonous and the need for more utilization of learning media so that student learning outcomes are not optimal. Most teachers teach using the lecture method and PowerPoint to deliver the material.

The research findings of Utami et al. (2020) indicate that low learning motivation in the learning process leads to students' lack of activity. The data on learning completion obtained in the topic of redox reactions amount to 20.09% of the total percentage across four classes, indicating that the desired learning outcomes do not align with the expectations. This shows that the mastery of the topic is not optimal, and students' motivation remains low. Mulatsih's research (2019) indicates various factors suspected to cause students' lack of motivation in learning chemistry, one of which is the chemistry teaching model applied during the learning activities. However, many students still face difficulties in understanding and engaging with chemistry lessons. Therefore, for learning the topic of redox reactions, an appropriate and effective teaching model is necessary to increase students' motivation. According to Aini (2021), students' motivation and interest in learning significantly influence the learning outcomes they achieve. If students have high learning motivation, their learning outcomes are also high, and vice versa.

These problems must be addressed by paying attention to the factors that influence learning success, for example, using models and methods in learning activities (Irawan & Suharmanto, 2014). Teachers can use more varied learning models and media to encourage students to be more active. One solution to these problems is implementing a learning model and media that can involve students directly in learning, namely, type cooperative learning model Team Games Tournament (TGT) and Quizizz application.

The Team Games Tournament (TGT) cooperative learning model is a method that enhances social interaction among students during the learning process (Muldayanti, 2013). The TGT model consists of five stages: class presentation, group learning, games, tournaments, and group rewards (Tyasning et al., 2014). Learning through this model can be conducted in a playful manner to promote the active participation of all students in the classroom. Games can captivate students' interest, encouraging their active involvement and motivation to learn (Yolageldili and Arikan, 2013). Furthermore, Ahriani (2013) asserts that the inclusion of games and tournaments fosters cooperation and mutual assistance among students, thereby enhancing their activity levels. The TGT model is particularly effective in helping students grasp challenging concepts and also influences individual attitudes, bridging differences in race and cultural diversity (Wiwit and Putra, 2014). The TGT model is well-suited for teaching redox reactions as the topic requires both understanding and memorization. Integrating the TGT model can enhance student interactions and mastery of the material.

Another factor that can support the teaching and learning activities is the use of instructional media (Wardani et al., 2019). The instructional media referred to here is the Quizizz application. Quizizz is an educational application in the form of an online quiz game. It can be used for team-based or individual gameplay, making students more active and encouraging collaboration within their teams to outperform other teams. Teachers can utilize Quizizz to integrate instruction, discussion, and learning assessments. Moreover, Quizizz can be used anywhere, without being restricted by physical space or time, thanks to its time settings that allow quizzes to be opened and closed at any time. Students only need to enter a password or game code to start the quiz, without having to be in the same location as the teacher or their peers (Sitorus and Santoso, 2022).

The implementation of the cooperative learning model, Team Games Tournament (TGT), assisted by the Quizizz application, is expected to enhance students' learning outcomes because previous studies have shown that the TGT learning model with the Quizizz application can increase student participation and learning outcomes. According to Annisa & Erwin (2021), the Team Games Tournament (TGT) model is more effective in improving students' achievements, memory abilities, and activeness. Additionally, Maharani (2023) also suggests that the use of the Quizizz application is highly effective in enhancing students' learning outcomes. Based on these findings, as a solution to address the issues at SMAN 7 Mataram where students have low learning outcomes and lack active engagement in chemistry lessons, research titled "The Influence of Cooperative Learning Model Team Games Tournament (TGT) Assisted by Quizizz Application on Students' Learning Outcomes in the Topic of Redox Reactions" is conducted.

RESEARCH METHODS

This research was conducted at SMAN 7 Mataram from February to March 2023. The type of research in this study falls under quasi-experimental design, which includes both a control group and an experimental group. A quasi-experimental design was used because, in this research, the sample cannot be fully controlled for external variables that may affect learning outcomes. The hypothesis in this study is that the implementation of the cooperative learning model, specifically the Team Games Tournament (TGT) with the assistance of the Quizizz application, can influence the learning outcomes of students in the topic of redox reactions in the 10th-grade science class at SMAN 7 Mataram.

The research design used in this study is a pretest-posttest control group design. The sample in this research consists of 35 students from class X IPA 3 as the control group and 35 students from class X IPA 4 as the experimental group. The sample selection was carried out using the cluster random sampling technique or a technique for determining samples by class clusters (Sugiyono, 2014). Two research sample classes were randomly selected from the six available classes (Suji et al., 2017).

This research was conducted with teaching interventions in the control group using a conventional teaching model, which includes lectures, question and answer sessions, discussions, and experiments. In contrast, the experimental group utilized the cooperative learning model known as Team Games Tournament (TGT) with the assistance of the Quizizz application. The implementation of the teaching model occurred over the course of three sessions, covering the topic of oxidation numbers in the concept of redox reactions and a practical experiment on oxidation reactions, with a total time allocation of 3 instructional hours (3 × 45 minutes). The TGT model was applied in each session to enhance student engagement and interaction. Additionally, a pre-test was administered in the first session, and a post-test was conducted in the fourth session.

Data analysis was conducted using Aiken's V index to assess the content validity of the 20 multiple-choice test items obtained from lecturers and chemistry teachers. The point-biserial correlation formula was used to determine the item validity, and the Kuder-Richardson (KR-20) formula was employed to assess the instrument's reliability. Additionally, a pooled variance t-test statistic was used to test the research hypotheses based on the pre-test and post-test scores of the students. Normality was assessed using the chi-square test formula, and homogeneity was tested using the F-test formula.

RESULTS AND DISCUSSION

This study aims to analyze the effect of type cooperative learning model Team Games Tournament (TGT) assisted by Quizizz application on student results in the cognitive domain achieved in redox reaction material for class X IPA at SMAN 7 Mataram after participating through the learning process by taking samples from class X IPA 3 as the control class and X IPA 4 as the experimental class.

The TGT (Team Games Tournament) model is quite effective when used for conceptual and numerical topics such as redox reactions. Redox reactions involve both reduction and oxidation processes. Reduction is a reaction in which the oxidation state decreases, accompanied by an increase in electrons, or it can be said that reduction is a reaction in which a substance loses oxygen. Oxidation, on the other hand, is a reaction in which the oxidation state increases, leading to a decrease in electrons, or it can be said that oxidation is a reaction in which a substance binds with oxygen. Reduction and oxidation reactions are common in our daily lives, for example, in combustion reactions, the production

of vinegar from alcohol, the breakdown of glucose in the body, rusting of iron, and various other processes.

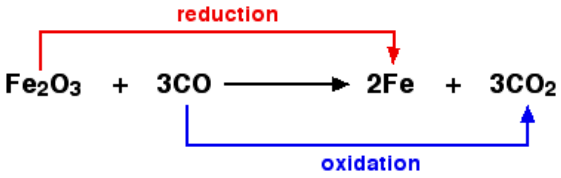

Figure 1 Example of Redox Reaction

The assessment of student learning outcomes in this research consists of the cognitive domain, which is obtained from the pre-test and post-test results. The purpose of conducting pre-tests and post-tests is to determine the difference in students' abilities or learning outcomes before and after the intervention. The results of the pre-test and post-test are included in the hypothesis calculations. After conducting the research by implementing the TGT learning model with the assistance of the Quizizz application for the topic of redox reactions, the research findings indicate that there is a difference in chemistry learning outcomes between students taught using the conventional teaching model. The average pre-test and post-test scores for the control group and the experimental group are presented in **Figure 2**.

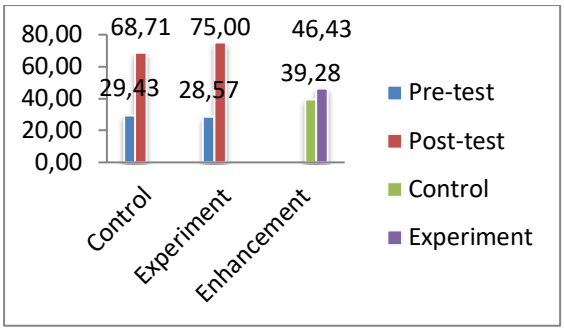

Figure 2 Comparison Pretest-Posttest

Based on **Figure 2**, there is a noticeable difference in student learning outcomes between the control group and the experimental group. The average pre-test score in the control group is 29.43 points, while in the experimental group, it is 28.57 points. Meanwhile, the average post-test score for both groups is 68.71 points for the control group and 75.00 points for the experimental group. This indicates that the increase in the average pre-test to post-test scores (gain) in the control group is 39.28 points, whereas in the experimental group, it is 46.43 points. This difference can be attributed to several factors that enhance the learning process, namely, the cooperative learning using the Team Games Tournament (TGT) model with the assistance of the Quizizz application in this research. One of these factors is that students can develop and discover their own learning methods, which leads to long-lasting retention of the acquired knowledge and prevents easy forgetting. This aligns with the opinion of Drayatun & Rahmawati (2017), who state that the TGT cooperative learning model can strengthen students' memory of the material they have studied because the academic games experienced by students in tournaments aim to review and reinforce their understanding of the learned material. Additionally, Moningka et al. (2022) also argue that the TGT learning model can make students more actively engaged in learning and lead to improved student learning evaluation results.

The use of the Quizizz application as a learning tool can also enhance students' interest and motivation to learn because Quizizz is a game-based application that includes educational games to make learning more engaging. This aligns with the research conducted by Aprianis (2022), which found that the use of the Quizizz application significantly influences students' interest in learning chemistry. Quizizz has attractive features such as colorful themes, avatars, and background music for the games. According to Dewi (2018), learning through educational games can boost students' learning potential due to the stimulation of both verbal and visual components.

The improvement in learning outcomes is reinforced by the data obtained from the n-gain test. According to Lestari & Mujib (2018), n-gain testing is conducted to measure the improvement in students' learning outcomes before and after the learning process. Based on the test results, if there is a difference in the average learning outcomes, it indicates a significant improvement, which is calculated using the n-gain score to determine the criteria for the improvement that occurred. The analysis of normalized gain score data is performed to test the hypothesis, to determine if there is a significant difference in the learning outcomes of the control group and the experimental group. The comparison of the average n-gain scores in the control group and the experimental group can be seen in **Figure 3**.

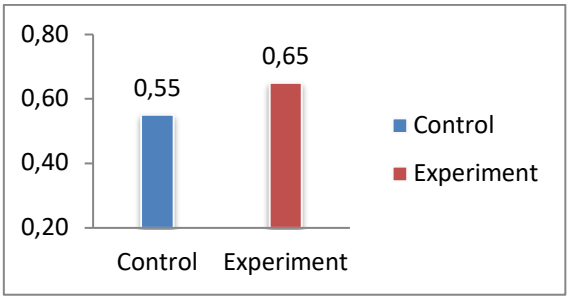

Figure 3 Comparison N-Gain

Based on the gain score calculations, in the control group, the average pre-test score was 29.43, and the post-test score was 68.71. The data from the control group calculations show that 1 student falls into the low category, 27 students into the medium category, and 7 students into the high category, resulting in a gain score of 0.55, which means that the control group experienced a moderate level of improvement in learning outcomes. In the experimental group, the average pre-test score was 28.57, and the post-test score was 75.00. The gain score calculations in the experimental group indicate that 1 student falls into the low category, 21 students into the medium category, and 13 students into the high category, resulting in a gain score of 0.65, which means that the experimental group also experienced a moderate level of improvement in learning outcomes. Based on the increased average gain scores, it is evident that the learning outcomes in the experimental group are higher than those in the control group. Therefore, it can be concluded that the comparison of n-gain scores between the control group and the experimental group shows that the cooperative learning model TGT with the assistance of the Quizizz application is more effective in improving student learning outcomes compared to the conventional teaching model, as it has a higher gain score. This is because the research results and observations conducted show that the experimental group taught with the TGT model using the Quizizz application made students much more active, leading to higher scores. Additionally, this aligns with the opinion of Moningka et al. (2022), who state that the TGT learning model can make students more active in learning, resulting in improved student learning evaluation outcomes.

According to Kristianty and Sulastri (2021), the low learning outcomes of students using the conventional teaching model in the control group can be attributed to several factors, including 1) the predominant use of lecture methods in teaching by the teacher can lead to student boredom; 2) students in the control group may not pay close attention to the teacher's explanations due to noise and talking with their peers; 3) he lack of use of additional learning resources or media can result in a lack of motivation among students to study the chemistry material being discussed; 4) in the experimental group, there were challenges such as some students not fully understanding how to use the Quizizz application, which required additional explanations until they grasped it. Additionally, when comparing the TGT-Quizizz model with the TGT model using flashcards, the TGT-Quizizz model was preferred by students because it was more engaging and practical.

The pre-test and post-test scores of the students were further analyzed using a t-test, where the t-test analysis results indicated that the calculated t-value was 2.70. Meanwhile, for the critical value (t-table) at a 5% significance level with degrees of freedom (df), the value obtained was 1.67. Based on these values, it is known that the calculated t-value is greater than the critical t-value, indicating that the application of the cooperative learning model, specifically the Team Games Tournament (TGT) with the assistance of the Quizizz application, has an influence on the learning outcomes of the 10th-grade science students at SMAN 7 Mataram in the topic of redox reactions. The analysis conducted in this study is consistent with the research done by Atikah (2020), which also found a positive impact of implementing the Team Game Tournament learning model on learning outcomes, with a calculated t-value greater than the critical value, and at a 5% significance level, i.e., 2.095 > 2.060, which means that the alternative hypothesis (H_1) is accepted. Additionally, according to Astuti et al. (2017), the TGT model is highly suitable for chemistry education because it can enhance students' interest and learning achievement through the games incorporated within the TGT model.

CONCLUSION

Based on the research data and discussion, it can be concluded that the implementation of the cooperative learning model, specifically the Team Games Tournament (TGT) with the assistance of the Quizizz application, has an impact on the learning outcomes of 10th-grade science students at SMAN 7 Mataram in the topic of redox reactions.

Based on the research conducted, the following recommendations are proposed for the

continuation of this study 1) student learning outcomes should be measured to include the affective and psychomotor domains using the same approach and teaching model; 2) The Quizizz application is expected to be used in other research endeavors with more innovative and creative approaches; 3) The Team Games Tournament (TGT) teaching model can be considered as an alternative teaching model to enhance students' chemistry learning outcomes in other topics; 4) The Quizizz application can serve as a supporting tool for teachers to increase student engagement in learning.

REFERENCES

Abdullah, R. (2017). The Effect of Cooperative Learning Model Jigsaw on Chemistry Subject in Madrasah Aliyah. *Lantanida Journal, 5*(1), 34–38.

Ahriani, F. (2013). The Influence of Cooperative Learning Model and Learning Styles on Chemistry Learning Outcomes of 10th-Grade Students at SMK Negeri 2 Bantaeng. *Jurnal Chemica, 14*(1), 19.

Aini, V. N. (2021). The Effect of Quizizz in Improving Students' Learning Outcomes in Science Subjects for 8th-Grade Students at MTsN 1 Surabaya. *Jurnal Pendidikan Indonesia: Teori, Penelitian, dan Inovasi, 1*(3), 1–8.

Annisa, R., & Erwin, E. (2021). The Effect of Quizizz Application Usage on Elementary School Students' Science Learning Outcomes. *Jurnal Basicedu, 5*(5), 3660–3667.

Anshory, A. F., Muntholib, & Kusumaningrum, I. K. (2016). Identifying Students' Difficulties in Solving Redox Reaction Problems Based on Oxidation Number Changes using Step-by-Step Problem-Solving Analysis. Proceedings of the National Seminar on Chemistry and Learning (p. 119–122). Malang: FMIPA Universitas Negeri Malang.

Aprianis, C. (2022). The Influence of Quizizz Application Usage on Students' Interest in Learning Hydrocarbons in State Senior High School 9 Mandau. *Skripsi*. UIN Sultan Syarif Kasim Riau.

Ardiyansyah, A., Junaidi, E., & Hadisaputra, S. (2019). The Effect of Cooperative Learning Model Student Team Achievement Division (STAD) Assisted by Student Worksheets (LKS) on Chemistry Learning Outcomes. *Chemistry Education Practice, 2*(2), 44.

Astuti, S. P., Mulyani, B., & Utami, B. (2017). The Application of Teams Games Tournament (TGT) Learning Model to Enhance Students' Interest and Learning Achievement in Solubility and Solubility Product Material for 11th-Grade Science Students at SMA Al Islam 1 Surakarta in the Academic Year 2015/2016. *Jurnal Pendidikan Kimia (JPK), 6*(2), 109-118.

Atikah, H. J. (2020). The Effect of Teams Game Tournament Cooperative Learning Model on Mathematics Learning Outcomes. *Jurnal Pendidikan Guru Sekolah Dasar, 9*(1), 34.

Dewi, C. K. (2018). Development of Evaluation Tools using the Hakoot Application in 10th-Grade Mathematics Learning. UIN Raden Intan Lampung.

Drayatun, S., & Rahmawati, A. (2017). The Application of TGT Cooperative Learning Model to Enhance Students' Activity and Motivation in Learning for 7th-Grade Students at SMPN 1 Kokop. *Jurnal Pena Sains, 4*(1), 75-76.

Fadly, R. D., Sulastry, T., & Side, S. (2020). The Effect of Quizizz Application Usage on Cooperative Learning Model Teams Games Tournament Learning Outcomes for 11th-Grade Science Students at SMAN 1 Gowa. Chemica: *Jurnal Ilmiah Kimia dan Pendidikan Kimia, 21*(1), 100.

Gunawan, L. A., Sukib, & Hakim, A. (2019). The Effect of Cooperative Learning Model Team Assisted Individualization (TAI) Assisted by Study Cards on Chemistry Learning Outcomes. *Chemistry Education Practice, 2*(2), 2-3.

Hasniyah, F., & Muchtar, Z. (2021). Development of a Three-Tier Instrument with CRI to Detect Misconceptions in Redox Reactions. *Jurnal Inovasi Pembelajaran Kimia, 3*(2), 123.

Irawan, Z., & Suharmanto, A. (2014). Differences in Learning Outcomes for Competency in Explaining the Energy Conversion Machine Process using the Snowball Throwing Learning Model compared to Direct Learning. Universitas Negeri Semarang. *Journal of Mechanical Engineering Learning, 3*(1), 28-30.

Kristiany, D., & Sulastri, S. (2021). The Effect of Lecture and Dialogue Methods on

Learning Motivation. *Jurnal Manajemen & Keguruan, 3*(1), 21-30.

Lestari, Y., & Mujib. (2018). Mathematical Critical Thinking Ability through the Education Coins of Mathematics Competition (E-COC) Model. *Jurnal Manajemen dan Keguruan, 1*(3), 265-274.

Maharani, F., Erlisnawati, & Alpusari, M. (2023). The Effect of Quizizz Application Usage on 4th-Grade Elementary School Students' Learning Outcomes. *Kiprah Pendidikan, 2*(1), 1-8.

Moningka, N. C., Salajang, S. M., & Sulistyaningsih, M. (2022). The Effect of the TGT Cooperative Learning Model on Student Learning Outcomes in Algebraic Form Material. *Jurnal Riset Sosial Humaniora & Pendidikan, 1*(4), 01–12.

Mulatsih, B. (2019). Increasing Learning Motivation and Learning Outcomes in Chemistry for 11th-Grade Students with the STAD Cooperative Learning Model. *Jurnal Ideguru, 4*(2), 11–15.

Muldayanti, N. D. (2013). Biology Learning with STAD and TGT Models in terms of Student Curiosity and Interest. *Jurnal Pendidikan IPA, 2*(1), 12-17.

National Research Institute for Chemical Technology. (2013). Training Manual for Secondary School Chemistry Teachers and Technologists Zaria. Author.

Sitorus, D. S., & Santoso, T. N. B. (2022). Utilization of Quizizz as a Game-Based Learning Media during the Covid-19 Pandemic. *Jurnal Pendidikan dan Kebudayaan, 12*(2), 81–88.

Sugiyono. (2014). *Statistics for Research*. Alfabeta.

Suji, S., Nirawati, R., & Mariyam, M. (2017). The Application of TGT Cooperative Learning Model to Enhance Students' Mathematical Problem-Solving Abilities in Triangle Material. *JPMI (Jurnal Pendidikan Matematika Indonesia), 2*(2), 63.

Sukardi, T. (2019). Revitalizing Social Studies Education in Indonesia. Pustaka Pelajar.

Sulistyanti, L., Siahaan, J., & Junaidi, E. (2019). The Effect of Two Stay Two Stray (TSTS) Learning Model Combined with Demonstration Method on Chemistry Learning Outcomes. *Chemistry Education Practice, 2*(1), 17-23.

Sumiati, S., Andayani, Y., & Al-Idrus, S. W. (2019). The Effect of TGT (Team Games Tournament) Cooperative Learning Model Assisted by Mol Card Media on Chemistry Learning Outcomes. Chemistry Education Practice, 2(1), 12.

Suyanti, R. D. (2013). Chemistry Learning Strategies. Yogyakarta: Graha Ilmu.

Tyasning, D. M., Haryono, & Nurhayati. (2014). The Application of TGT (Teams Games Tournaments) Model with Student Worksheets (LKS) to Enhance Activity and Learning Outcomes on Petroleum Material for 10th-Grade Students at SMA Batik 1 Surakarta in the 2011/2012 Academic Year. Universitas Sebelas Maret. *Jurnal Pendidikan Kimia, 1*(1), 20.

Utami, T. S., Kusasi, M., & Bakti, I. (2020). Enhancing Motivation and Learning Outcomes in Redox Reactions and Compound Naming Material using the Rotating Trio Exchange (Rte) Model Assisted by Audiovisual Media. *Journal of Chemistry And Education (JCAE), 4*(2), 52-57.

Wardani, N., Muntari, Hadisaputra, S., & Loka, I. N. (2019). Comparative Study of Chemistry Learning Outcomes between the Team Quiz and Course Review Horay Models for 11th-Grade Science Students at SMAN 1 Lingsar. *Chemistry Education Practice, 1*(2), 14-19.

Wiwit, H. A., & Putra, D. D. (2014). The Application of TGT Model with and without the Use of Animation Media on Learning Outcomes of SMAN 9 Bengkulu Chemistry Students. Universitas Bengkulu. *Jurnal Exacta, 10*(1), 72.

Yolageldili, G., & Arikan, A. (2013). Effectiveness of Using Games in Teaching Grammar to Young Learners. *Elementary Education Online, 10*(1), 219-229.