



Developing Discovery Learning-Based Assessment Module to Stimulate Critical Thinking and Creativity of Students' Speaking Performance

Roni Wahyudi✉, Dwi Rukmini, Dwi Anggani Linggar Bharati

Universitas Negeri Semarang, Indonesia

Article Info

Article History:

Received 19 October 2018

Accepted 15 February 2019

Published 20 June 2019

Keywords:

Assessment, speaking, discovery learning, critical thinking, creativity

Abstract

In the teaching and learning process, Assessment is considered a critical component of curriculum design to determine whether the goals of education have been achieved. In fact, many teachers still have difficulties to design a suitable assessment instrument. To complicate the matter, it should align with the teaching and learning objectives of the 2013 curriculum which requires the teacher to foster the students' critical and creative thinking. This study aimed to explain the development of discovery-based speaking assessments to stimulate students' critical thinking and creativity at the tenth graders of MIPA 3 at SMA Sultan Agung 1 Semarang in the academic year of 2017/2018. Research and Development (R&D) was applied in this study. This study utilized quantitative and qualitative data through the questionnaire, interview, observation, and test as the instrument in collecting the data. The teacher collaborated with the researcher in developing the discovery-based speaking assessments module. After that, the module was revised based on the experts' suggestions before conducting the main field testing. The result of the study showed that there were improvements in the students' score after they were taught using the discovery-based speaking assessments module. A paired sampled test result yield that there were significant improvements in the students' mean score in the post-test compared to their pre-test. The significant improvements indicated that discovery-based speaking assessments were effective to improve the students' speaking skill, critical thinking, and creativity.

© 2019 Universitas Negeri Semarang

Correspondence Address:

Kampus Pascasarjana Unnes, Jl. Kelud Utara Iii Semarang
5023, Indonesia

E-Mail: roniwahyudi@students.unnes.ac.id

P-ISSN 2087-0108

E-ISSN 2502-4566

INTRODUCTION

The emergence of the 2013 curriculum requires the teacher to use the scientific approach in the teaching and learning process. Discovery learning is one of the suggested teachings methods in this curriculum. This method requires the learners to find the target information or conceptual understanding independently through the provided materials with minimal guidance such as manuals, simulations, feedback, example problems (Alfieri et al, 2011). Similarly, Gholamian (2013) stated that in this method, teachers do not directly teach the subjects, instead, they facilitate the students to find and discover themselves. Furthermore, Ramdhani (2017) argued that principally, in discovery learning, the teacher delivers the material not in the final form to encourage the students to find the knowledge by themselves. Then, they combined it to their already existing knowledge to achieve final understanding. Rahmi and Ratmida, (2014) concluded that discovery learning expects the students to discover the facts or the contents of the topic through observing and experimenting activities because the teacher does not present them at the beginning of the lesson directly.

The implementation of the teaching approach requires the teacher to apply appropriate assessment instruments as well. Brown (2004) stated Assessment, as an inextricable part of the teaching-learning process, are necessary components of a successful curriculum. Accordingly, the teacher must have a sophisticated understanding of assessment literacy to help them in creating and using the assessment properly. By doing so, the teacher can help the learners to achieve the learning objective and guide them in performing the specific skills. In contrast, the lack of this competency might affect the teacher to neglect the importance of assessment as an aid to improve the instructions and students' achievement. Moreover, teachers might have difficulties to design and implement assessments according to the curriculum requirements. Zaim, (2017) found that English teachers were not

ready to implement the scientific approach into the teaching and learning process, particularly in the assessment part. (Wijayanti, 2015). The main reason for teachers' difficulties is the lack of teachers' comprehensive understanding of Curriculum 2013, including the implementation of assessment, such as planning, conducting and reporting the result of students' achievements (Retnawati et al, 2016). Hence, it is important for the teacher to have adequate assessment literacy to tailor the curriculum requirements.

Nowadays, high order thinking skills become the requirements of the most curriculum, including the 2013 curriculum in Indonesia. As Hassan et al (2016) stated that there is stronger awareness about the importance of higher-order thinking skills triggered by the changes in education at the international level, so the students must be equipped with the knowledge and skills requires in solving their daily life problem. However, the result of his study showed that teachers were reluctant to implement HOTS in their teaching due to their limited competency.

Teachers, as an important aspect in the successful learning process, need to understand, practice and apply HOTS in order to teach the skills effectively (Azis et al, 2017; Barak & Dori, 2009). There are some strategies that can be used to enhance HOTS in the classroom such as (a) take the mystery away and teach the concept of concepts, (b) name and categorize concepts, (c) move from concrete to abstract and back, (d) teach inference and connect concepts, (e) teach question-answer relationships, (f) include brainstorming activities in the lessons, (g) use teaching techniques that provokes higher thinking levels, (h) Emphasize feedback generation for students. (Chinedu and Kamin, 2015).

The development of students HOTS occurs as a result of continuous practice involving tasks to stimulates the thinking skills in analyzing information to determine the problem, evaluating the problem and creating new workable solutions (Chinedu & Kamin, 2015; Hassan et al, 2017). These tasks are in accordance with the characteristics of HOT

assessment proposed by Widana (2017): (a) measuring the high-level thinking skills (analyzing, evaluating and creating), (b) based on contextual issues (typically in the form of cases), and (c) is not routine (not familiar).

The incorporation of HOTS in the teaching and learning process can encourage students to think critically and help students develop more innovative and imaginative ideas (Miri et al, (2007); Smith & Darvas, 2017). However, Ku (2009) argued that teaching critical thinking is not a simple task to do because the students should learn to enhance skills in judging information, evaluating alternative evidence and arguing with solid evidence. This competency is both vital for students to perform well in school and also a requirement in future workplaces, social and interpersonal contexts involving careful and independent decision making.

However, a study by Dwee et al (2016) revealed that even though the teachers are aware that students lack critical thinking skills, they do not really emphasize these skills. They prefer to focus on the subject matter because of their insufficient knowledge on how to integrate critical thinking skills into the courses. So, teacher instructional competence is important in integrating critical thinking skills into their teaching (Leon-abao, 2014). In teaching for critical thinking, Heijltjes et al (2014) stated that explicit instruction combined with practice is required such as the use of task (Zhou et al, 2013; Shehab & Nusbaum, 2015; Rahman & Samanhudi, 2010) and question (Cojocariu & Butnaru, 2014).

In conclusion, the teacher preference of assessment model in the teaching and learning process can affect the students' learning outcomes. Thus, in this study, the researcher is interested to conduct the research about the existing assessment model used by the teacher and in developing a discovery-based speaking assessment to stimulate the critical thinking and creativity of the students' speaking performance.

METHODS

This study used the Research and Development (R&D) design in developing the discovery-based speaking assessment model to stimulate students' critical thinking and creativity. The steps of R&D that applied in this research as the following: information collecting, need analysis, planning and developing, expert validation, doing the first revision, trying out, doing the second revision, and producing the final product.

To get the data, the researcher used questionnaires, interview, observation, and tests. The data were both qualitative and quantitative. The qualitative data was gathered through observation, interview, and questionnaire. Whereas the quantitative data was gathered through tests.

RESULT AND DISCUSSIONS

In this phase, the researcher presents the findings and discussions of the developing discovery-based speaking assessment module to stimulate students' critical thinking and creativity. The sections in this part will follow the statement of the research objectives.

Teacher's Assessment on Students' Speaking Performance

The research finding revealed that the teacher neither used discovery learning in his teaching nor developed the assessment based on this approach. As an alternative, he preferred to use the scientific approach. However, the teacher did not implement it properly, he still dominated the teaching and learning process. Actually, the learning process was teacher-centered because he explained the material directly to the students instead of being a facilitator who helps the students to learn through the steps of the scientific approach. The teacher also tended to focus his teaching more on the subject matter and reading skill. He involved them in a lot of reading activities related to the subject matter such as content, generic structure, and language feature of the

text. Since speaking skill was neglected, the students had limited opportunity to practice their speaking ability. Consequently, they were reluctant to speak English in the discussion because they had difficulties to express their ideas in English.

Another finding showed that the teacher had difficulties in implementing High order thinking skills (HOTS). The teacher did not implement HOTS in the speaking assessment practice. He merely asked the students to retell a narrative story without any additional HOT tasks as a guidance. In this type of assessment, the students tend to memorize the text to perform the task. Besides, the teacher only employed criteria such as pronunciation, intonation, grammar, and content as guidance in scoring the students' performance. As the teacher did not involve HOTS in the assessment, the researcher could not find the critical thinking and creativity scoring rubric in the teacher' teaching document.

The above findings indicated that the limitation of the teacher knowledge about high order thinking and its implementation affected the teacher in his teaching. In this case, the teacher preferred to exclude HOTS in his speaking assessment and he also did not provide critical thinking and creativity scoring rubrics. This finding is in accordance with a study by Zaim (2017) that found the English teachers were not ready to implement the scientific approach in their instructions, especially in the assessment process (Wijayanti, 2015). Additionally, Retnawati et al (2016) also found that the teacher had difficulties in developing the instrument of attitude, implementing the authentic assessment, formulating the indicators, designing the assessment rubric for the skills, gathering the scores from multiple measurement techniques, and finding feasible application for describing the students' learning achievements because they were confused with the assessment system.

Type of assessment to stimulate the students' Critical Thinking

Usmeldi et al (2017) stated that critical thinking is a complex form of thinking activity in analyzing, differentiating, choosing, identifying, assessing, and developing more specific ideas to make rational decisions. Similarly, Dwee et al (2016) concluded that critical thinking is a skill that helps learners to achieve a better understanding by actively evaluating different perspectives to discover a problem solution. Based on this statement, the teacher can enhance the students critical thinking by using high order thinking questions. These questions should make the students to conduct a thorough analysis to provide a conclusion, such as asking the students to find out the similarity of two narrative stories.

Furthermore, Snyder and Snyder (2008) suggested that education instructors can enhance students' critical thinking skills by making students active in the learning process using instructional strategies. One of the strategies is a group discussion called Expert Group. During the discussion, the students should play a role as an expert in delivering specific information to the other groups. As Walker (2003) stated that the classroom discussion can promote critical thinking. Besides, Rashid and Qaisar (2017) alleged that role play develops critical thinking by engaging students in different case scenarios to demonstrate real-life situations. They also explained some benefits when using role play such as (a) removing the students' ambiguities of question at issue, (b) improving their language skills through the exchange of dialogues with each other, (c) helping them in exploring and presenting new perspectives by imagining the real-life characters, (d) learning new knowledge while exchanging dialogues with each other to represent a specific character.

Type of assessment to stimulate the students' creative thinking

In order to stimulate the students' creative thinking, the teacher can use HOTS questions which require the students to propose possible actions if they become the characters in the story and change part of the story based on their imagination. Through this kind of questions, the

students can practice exploring the story with a different sight. This will give them an opportunity to explore their mind and having tremendous imagination. Indeed, it will stimulate their creativity in retelling the story by offering different actions and resolutions based on their imagination.

Rahman (2018) argued that developing the learning model to train the students to discover from their learned problem and the previous experiences can facilitate the students developing a creative way of thinking. Additionally, Hassan et al (2016) stated that the usage of HOTS item in the assessment can test the students' cognitive ability in using the information to generate or think of new ideas and new ways.

Developing Discovery-Based Speaking Assessment to Stimulate the Students' Critical Thinking and Creativity

The researcher collaborated with the teacher to develop the discovery-based speaking assessment module to stimulate the students critical thinking and creativity. The first step was to define the basic competencies that were 3.8 and 4.8., then developed it into the indicators. After that, the teacher allocated six meetings to implement the assessment module. The module consisted of a lesson plan, teaching materials, and critical thinking and creativity scoring rubrics. Before the researcher applied the developed assessment in the classroom, the researcher asked the experts to validate the discovery-based speaking assessment that had been developed. After some revision as suggested by the expert, the discovery-based assessment was ready to be implemented. The implementation of discovery-based speaking assessment initiated by giving pre-test to the students in the first meeting to measure their critical thinking before the treatments. Finally, after several treatments, the students did their post-test in the last meeting to measure their critical thinking after the treatments.

This module used high order thinking questions to stimulate the students' critical thinking. The HOTS questions required the

students to find the similarity of two narrative texts. To answer the questions, the students should comprehend and analyze the text thoroughly to form a conclusion. Walker (2003) stated that questions should be designed to promote the evaluation and synthesis of facts and concepts. Furthermore, Iakovos (2011) argued that teachers can develop the students' critical thinking by asking questions which require students not only to seek or retrieve information, but also to analyze, logically process, apply, and evaluate it. She also suggested that students should work together in pairs or groups, with or without guidance from the teacher, in order to negotiate answers to questions. In addition, Hakim (2018) stated that the implementations of the learning process, which provide a construction process, trained in reasoning and thinking critically by focusing on active learning.

Whereas to stimulate the students creative thinking, the students were involved in the activities which require the students to change the part of the story based on their imaginative thinking such as asking the students to develop different resolution to the story and asking the students to offer alternative actions as if they were the characters in the story. As Hamza and Griffith (2006) suggested that presenting open-ended, obscure questions for which there are no obviously right or wrong answers fostered the students creative thinking. Similarly, Ritter and Mostert (2017) argued that the students produce a novel solution when they are forced to think of possible changes to an existing idea or product. Further, creativity happens as a result of the imaginative thinking process of the students (Tan et al, 2016; Zabihi et al, 2013)

The Effectiveness of discovery-based Speaking Assessment to Stimulate Students' Critical thinking and creativity.

The result of the students' scores on the pre-test and post-test showed that there were improvements in the students' achievement. On the pretest, the students mean score was 56,3. whereas, on the post-test, the students mean score improved to 77,6. the improvements on

the students score then analyze thoroughly using a paired sample test. The result of t-test showed that the sig (2 tailed) value (0.00) is lower than 0.05. This indicated that the improvement was significant. Thus, it can be assumed that discovery-based assessment was effective to improve the students speaking skill.

The effectiveness of the discovery-based assessment module to improve the students speaking skill should be in accordance with the improvements in the students' critical thinking and creativity. Hence, the researcher analyzed the students critical thinking score in pre-test and post-test. The mean score of the students' in the pre-test was 56,8, whereas in the post-test was 76.8. Apparently, there were improvements in the students critical thinking score. Then, to prove whether the improvements were significant or not, the researcher used a paired sample test. The result of the t-test showed that the sig (2 tailed) value (0.00) is lower than 0.05. So, it can be said that there was a significant improvement in students critical thinking skills after they were taught using the discovery-based speaking assessment module. As Ramdhani et al (2017) found that there were improvements in the students' achievement score after they were taught using the Discovery learning method. Likewise, Ahour and Mostafee (2009) argued that discovery learning enhances the performance of EFL learners speaking ability. Further, discovery learning is effective to improve the students' critical thinking (Kistian et al, 2017; Martaida et al, 2017; Yuliani & Saragih, 2015).

Finally, the researcher also analyzed the students creative thinking score in the pre-test and post-test. The mean score of the students' creativity score in the pre-test was 56,3. After the treatments, the students mean score in the post-test was 76.81. Thus, it can be said that there was an improvement in the students' score after they were taught using the discovery-based speaking assessment module. Afterward, the researcher conducted a paired sample test, the result of t-test showed that the sig (2 tailed) value (0.00) is lower than 0.05. It means that there was a significant improvement in the students'

creativity after they were taught using the module. To conclude, the discovery-based speaking assessment module is effective to improve students' creativity. Rahman (2017) also concluded that the discovery learning model had the opportunity to motivate the students to think creatively in the learning and teaching strategy subject. Similarly, Istiqomah et al (2018) concluded that using the discovery learning model can improve the students' creativity attitude. In addition, Rambe et al (2018) stated that the developed discovery learning device increase the students creative thinking.

CONCLUSION AND SUGGESTION

The result of the preliminary result showed that the English teacher did not implement the discovery learning method because he had limited knowledge to implement it in the teaching and learning process. Consequently, he preferred to use the scientific approach in his teaching plan. However, the researcher did not find the proper assessment instruments to stimulate the students critical thinking and creativity in his teaching documents. Further, the researcher also noticed the teacher tendency to neglect the speaking skill because the teacher more focused on the subject matter and other skills such as reading. So, it can be concluded that the teacher did not use HOTS assessment to stimulate the students' critical thinking and creativity in his teaching, especially when he assessed the students speaking performance.

Accordingly, the researcher and the teacher collaborated to develop the discovery-based speaking assessment module. This assessment module aimed to stimulate the students' critical thinking and creativity through various ways. Firstly, the students' critical thinking was stimulated by asking the students to find the similarity of two stories and also answering HOTS questions which require implied answers. Secondly, the students' creative thinking was stimulated by asking the students to change the story by providing a different

resolution of the story. Finally, they should present their answer through oral performance.

Afterward, the researcher conducted pretest and post-test to prove the effectiveness of the discovery-based speaking assessment module to stimulate the students' critical thinking and creativity. The result of the analysis on the students' mean score showed that there were improvements in the post-test compared to the pre-test. Then, the result of the paired sample test indicated that the improvements were significant. The significant improvements prove that the discovery-based assessment module is effective to improve the students' speaking skill, critical thinking, and creative thinking.

In conclusion, the result of this research shows that the discovery-based speaking assessment module can improve the students' critical thinking and creativity. Further, the researcher encourages English teachers to develop their own assessments to stimulate students' critical thinking and creativity. Finally, the researchers hope this study will inspire future research of the same field in the different educational levels.

REFERENCES

- Ahour, T., & Mostafae, L. (2015). The Impact of Form-Focused Discovery Approach on EFL Learners' Speaking Ability. *Modern Journal of Language Teaching Methods*, 5(1), 10-19.
- Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does Discovery-Based Instruction Enhance Learning? *Journal of Educational Psychology*, 103(1), 1-18.
- Aliningsih, F., & Sofwan, A. (2015). English Teachers' Perceptions and Practices of Authentic Assessment. *Language Circle: Journal of Language and Literature*, 10(1), 19-27.
- Aziz, A. A., Ismail, F., Ibrahim, N. M., & Samat, N. A. (2017). Investigating the Implementation of Higher Order Thinking Skills in Malaysian Classrooms: Insights from L2 Teaching Practices. *Sains Humanika*, 9(4-2), 65-73.
- Barak, M., & Dori, Y. J. (2009). Enhancing Higher Order Thinking Skills among Inservice Science Teachers via Embedded Assessment. *Journal of Science Teacher Education*, 20(5), 459-474.
- Brown, H. D. (2003). *Language Assessment: Principles and Classroom Practices*. New York: Pearson Education, Inc.
- Chinedu, C. C., Kamin, Y., & Olabiyi, O. S. (2015). Strategies for Improving Higher Order Thinking Skills In Teaching And Learning Of Design And Technology Education. *Journal of Technical Education and Training*, 7(2), 35-43.
- Cojocariu, V. M., & Butnaru, C. E. (2013). Asking questions-critical thinking tools. *Social and Behavioral Sciences*, 128, 22-28.
- Dwee, C. Y., Anthonya, E. M., Salleha, B. M., Kamarulzamana, R., & Kadir, Z. A. (2016). Creating Thinking Classrooms Perceptions and Teaching Practices of ESP Practitioners. *Social and Behavioral Sciences*, 232, 631-639.
- Gholamian, A. (2013). Studying the Effect of Guided Discovery Learning on Reinforcing the Creative Thinking of Sixth Grade Girl Students in Qom during 2012-2013 Academic Year. *Journal of Applied Science and Agriculture*, 8(5), 576-584.
- Hakim, M. F., Sariyatun, & Sudiyanto. (2018). Constructing Student's Critical Thinking Skill Through Discovery Learning Model. *International Journal of Multicultural and Multireligious Understanding*, 4(6), 175-183.
- Hamza, M. K., & Griffith, K. G. (2006). Fostering Problem Solving & Creative Thinking in the Classroom: Cultivating a Creative Mind. *National Forum of Applied Educational Research Journal*, 19(3), 1-30.
- Hassan, M. N., Mustapha, R., Yusuff, N. A., & Mansor, R. (2017). Development of Higher Order Thinking Skills Module in Science Primary School: Needs Analysis. *International Journal of Academic Research in Business and Social Sciences*, 7(2), 624-628.
- Hassan, S. R., Rosli, R., & Zakaria, E. (2016). The Use of i-Think Map and Questioning to Promote Higher-Order Thinking Skills in Mathematics. *Creative Education*, 7, 1069-1078.
- Iakovos, T. (2011). Critical and Creative Thinking in the English Language Classroom. *International Journal of Humanities and Social Science*, 1(8), 82-86.
- Ilimi, A. E., & Rachmadiarti, F. (2017). Ecology Textbook Based on Science, Technology, Environment, Society-

- Literacy (Stesl) Strategy to Train Students' Critical Thinking Skills. *BioEdu.*, 6(3), 368-373.
- Istiqomah, R., Prasojo, L. D., & Arifa'i, A. M. (2018). Improving Senior High School Student's Creativity Using Discovery Learning Model in Islamic Senior High School 1 Jambi City. *European Journal of Multidisciplinary Studies*, 3(2), 108-115.
- Joolingen, W. V. (1999). Cognitive tools for discovery learning. *International Journal of Artificial Intelligence in Education*, 10, 385-397.
- Kistian, A., Armanto, D., & Sudrajat, A. (2017). The Effect of Discovery Learning Method on The Math Learning of The V Sdn 18 Students of Banda Aceh, Indonesia. *British Journal of Education*, 5(11), 1-11.
- Ku, K. Y. (2009). Assessing Students' Critical Thinking Performance Urging for Measurements Using Multi-Response Format. *Thinking Skills and Creativity*, 4, 70-76.
- Leon-Abao, E. D. (2014). Teachers' Instructional Competence in Students' Comprehension Skills and Critical Thinking Ability. *Open Journal of Social Sciences*, 2, 334-339.
- Martaida, T., Nurdin, B., & Ginting, E. M. (2017). The Effect of Discovery Learning Model on Student's Critical Thinking and Cognitive Ability in Junior High School. *Journal of Research & Method in Education*, 7(6), 01-08.
- Miri, B., David, B.-C., & Uri, Z. (2007). Purposely Teaching for the Promotion of Higher-order Thinking Skills: A Case of Critical Thinking. *Research in Science Education*, 37(4), 353-369.
- Rahman, M. H. (2017). Using Discovery Learning to Encourage Creative Thinking. *International Journal of Social Sciences & Educational Studies*. 4(2), 98-103.
- Rahman, S. T., & Samanhudi, U. (2010). Designing an EFL Speaking Class with a View to Critical Thinking Development. *Asian EFL Journal*, 10, 35-39.
- Rahmi, Y., & Ratmanida. (2014). The Use of Discovery Learning Strategy in Teaching Reading Report Texts to Senior High School Students. *Journal of English Language Teaching*, 3(1), 179-188.
- Rambe, J. A., Sinaga, B., & Yusnadi. (2018). The Development of Learning Devices Based on Discovery Learning to Improve Mathematical Creative Thinking Ability of Students Class V at SD Negeri 060827 Medan Amplas. *Journal of Education and Practice.*, 9(9), 72-79.
- Ramdhani, M. R., Usodo, B., & Subanti, S. (2017). Discovery Learning with Scientific Approach to Geometry. *Journal of Physics: Conf. Series*, 895(1), 1-6.
- Rashid, S., & Qaisar, S. (2017). Role Play: A Productive Teaching Strategy to Promote Critical Thinking. *Bulletin of Education and Research*, 39(2), 197-213.
- Retnawati, H., Hadi, S., & Nugraha, A. C. (2016). Vocational High School Teachers' Difficulties in Implementing the Assessment in Curriculum 2013 in Yogyakarta Province of Indonesia. *International Journal of Instruction*, 9 (1), 33-48.
- Ritter, S. M., & Mostert, N. (2017). Enhancement of Creative Thinking Skills Using Cognitive-Based Creativity Training. *Journal of Cognitive Enhancement*, 1, 243-253.
- Shehab, H. M., & Nussbaum, E. M. (2015). Cognitive Load Of Critical Thinking Strategies. *Learning and Instruction*, 35, 51-61.
- Smith, V. D., & Darvas, J. W. (2017). Encouraging Student Autonomy Through Higher Order Thinking Skills. *Journal of Instructional Research*, 6, 29-34.
- Snyder, L. G., & Snyder, M. J. (2008). Teaching Critical Thinking and Problem Solving Skills. *The Delta Pi Epsilon Journal*, L(2), 90-99
- Tan, L. S., Lee, S. S., Ponnusamy, L. D., Koh, E. R., & Tan, K. C. (2016). Fostering Creativity in the Classroom for High Ability Students: Context Does Matter. *education sciences*, 6(36), 1-17.
- Usmeldi, Amini, R., & Trisna, S. (2017). The Development of the Research-Based Learning Model sets to Improve Critical Thinking of Students. *Indonesian Journal of Science Education*, 6 (2), 318-325.
- Walker, S. E. (2003). Active Learning Strategies to Promote Critical Thinking. *Journal of Athletic Training*, 38(3), 263-267.
- Wijayanti, Y. R. (2015). An Evaluation Model of Problem-Based Learner Assessment in Curriculum 2013. *Indonesian Journal of English Language Studies*, 1(2), 207-219.
- Yuliani, K., & Saragih, S. (2015). The Development of Learning Devices Based Guided Discovery Model to Improve

- Understanding Concept and Critical Thinking Mathematically Ability of Students at Islamic Junior High School of Medan. *Journal of Education and Practice*, 6(24), 116-128.
- Zabihi, R., Rezazadeh, M., & Ansari, D. N. (2013). Creativity and Learners' Performance on Argumentative and Narrative Written Tasks. *The Journal of Asia TEFL*, 10(1), 69-93.
- Zaim, M. (2017). Implementing Scientific Approach to Teach English at Senior High School in Indonesia. *Asian Social Science*, 13(2), 33-40.
- Zhou, Q., Huang, Q., & Tian, H. (2013). Developing Students' Critical Thinking Skills by Task-Based Learning in Chemistry Experiment Teaching. *Creative Education*, 4(12A), 40-45.