

THE IMPLEMENTATION OF DISCOVERY LEARNING MODELS IN ENHANCING SPEECH SCRIPT WRITING SKILLS FOR STUDENTS

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Received: 24th April 2019/Revised: 10th June 2019/Accepted: 25th June 2019

How to Cite: Sarimanah, E., Dewi, F. I., Efendi, R., Suhendra., Nurul, M., & Soeharto. (2019). The implementation of discovery learning models in enhancing speech script writing skills for students. *Lingua Cultura*, 13(2), 145-150. <https://doi.org/10.21512/lc.v13i2.5613>

ABSTRACT

This research investigated the use of discovery learning models to enhance students' speech script writing skills. This research aimed to focus on the study of the effectiveness and difficulties of discovery learning models to improve students' speech script writing skills. The research applied an experimental method by using test, observation, and questionnaires for collecting data techniques. The population of this research was students of MTs Syarikal Islam 2 Kalapanunggal. The class of IX-B was the experimental class, and a class of IX-A was control class. The use of the discovery learning model is proven to enhance students' speech script writing skills. The effectiveness of this experimental model is shown that the average score of the pretest of the experimental class is 53,5, and the post-test score is 84,3. By comparing the control class without treatment, it indicates the effectiveness of the intervention in the experimental class. The research shows a meaningful comparison of the experimental class and control class, which gain 2,56 by using the t-test. The data obtains that t-count is higher than t-table or significant is the value of t-table < t-count, namely 1,68 < 2,56 > 2,42. Therefore, it can be concluded that the discovery learning model has shown the improvement for students' speech script writing skills effectively.

Keywords: learning modul, writing skilss, speech script writing

INTRODUCTION

Language skills are the ability to master the elements of language, both orally and in writing that consist of listening skills, speaking skills, reading skills, and writing skills (Aydoğan & Akbarov, 2014). These four language skills provide benefits, and there is a relationship between one and another (Hulme & Snowling, 2014; Zhao & Hirvela, 2015). This relationship is characterized by the continuity of the stages of these four language skills. These stages begin from the stage of listening, speaking, reading, and writing. Writing skill becomes one of the essential skills for students. It is an important part of the ability to daily use. Good writing skills allow students to improve speaking skills that are useful for clarifying and facilitating communication.

There needs to be an effort for students to improve their writing skills in writing a text. Students must be able to find information and ideas to be able to write texts,

especially speech texts. Therefore, the researchers intend to use the discovery learning model to improve students' ability to write a text with a learning model. The learning model is a plan or pattern that is used as a guide in planning classroom learning or tutorial learning. Separately, the word learning comes from the term instructions, which means conveying thoughts. Instructions or instructional is the delivery of thoughts or ideas that have been processed meaningfully through learning. Instructions are a learning term that places students as a source of activity. This term seeks to encourage a change in the role of educators in managing the learning process (Karjalainen et al., 2017).

Learning is also defined as information processing. This process can be analogous to the thinking process or human's brain that acts like a computer with the input and storage of information in it. The thing that is done by the brain is how to regain the information material in the form of pictures and writing. Thus, in learning, someone needs to

be involved in reflection and use of memory to track what must be absorbed, stored in memory, and how to assess information (Browne, Glass, & Holyoak, 2016). Based on the description, the learning model can be defined as a concept that contains a process of how to give a thought or idea to students. The process of transferring thoughts and ideas has a particular reference according to the learning model used. Educators can choose the learning model that will be applied. However, the learning model used must be appropriate to apply.

The role of educators in the application of learning models should not dominate. Educators must be facilitators, and students are given the widest opportunity in learning activities. The learning model is also a process of information processing. This information is in the form of knowledge learned that must be absorbed and stored in memory by students. Various information stored then must be analyzed to an understanding of information. Abrahamson and Kapur (2018) have stated that discovery learning is a learning theory that is defined as a learning process that occurs when students are not presented with final lessons but are expected to organize themselves. The presentation of lessons emphasizes the discovery of unknown concepts or principles. A concept is a form of time that is faced by students with expert educators.

Wenning (2010) has stated that Cisco learning model is a learning model that helps students develop a concept based on the first experience given by educators. The goal is that students can think actively and discover new knowledge independently. Discovery learning is a teaching model that regulates teaching in such a way that the child acquires knowledge that he does not yet know or not pass through notification, partially or entirely found on his/her own. Based on the explanation, it is a discovery-based model. The discovery in question is a process to obtain learning outcomes. Therefore, educators must encourage students to think critically about unknown concepts. Students must be able to organize a variety of new knowledge learned. Furthermore, students can draw final conclusions from the concepts that have been found.

The role of educators in discovery learning model is a guide. They must be good learning facilitators with a new concept to students in unfinished form. Educators intentionally manipulate this in order to direct students to think independently. However, educators must still provide direction when students organize the new concept. This is to remain in accordance with the learning objectives.

Van Merriënboer & Kirschner (2017) have stated that discovery learning includes stages of stimulation; students are faced with something that raises questions and the desire to investigate themselves. The problem statement of this research is educator gives an opportunity to students to identify as many problems as possible that are relevant to the subject matter, then one of them is chosen and formulated in the form of a hypothesis (temporary answer to the problem question).

In the data collection stage, students perform experiments or explorations. Students gather relevant information to prove the correctness of the hypothesis. Data can be obtained through reading literature, observing objects, interviews, and own trials. The data obtained is then taken to the data processing stage, where students' processing data to be interpreted. Then the verification becomes a follow up of data that has been processed. At this stage, students examine the results of data processing to prove the correctness or failure of a predetermined hypothesis, linked to the results

of data processing. Finally, students should carry out generalization (drawing conclusions/generalizations). At this stage, students draw conclusions that can be used as general principles and apply to all events or problems with regard to the results of verification.

Language skills are important because, in daily activities, it requires interaction between one another. Establishing good communication means having to be skilled in listening, speaking, reading, and writing. With regard to education, one of the language skills that must be mastered by students is writing (Javid & Umer, 2014). Writing can be defined as the language output and aims to share ideas, thoughts, opinions, attitudes, feelings, persuades, and convince others (Alfaki, 2015; Klein & Boscolo, 2016). This is in accordance with the contents of the 2013 curriculum on Indonesian language subjects, especially junior high school level. Twenty-two texts will be studied by students (Kemdikbud, 2016). Students will experience a variety of text writing to be a good writer (Mukminin et al., 2015). Different texts will also have different ideas that must be written. Disclosure of this idea is a transformation from the abstract form into real form, namely writing. Writing can be considered good if it has a concept of a whole idea. In addition to ideas, the level of difficulty in writing text also varies depending on the type of text. In addition, linguistic accuracy, linguistic fluency, and lexical compatibility are also very important components in writing skills (Engin, 2014). Therefore, writing activities must be trained continuously.

Writing skills also train students to be able to choose words that must be used. Words in the text must be in accordance with good and correct spelling. Knowledge of students about the words that must be used in writing is an indicator of a broader set of language skills that individuals have increased and ingredient in composing ideas (Paola et al., 2015). The written ideas will be meaningful and easy to understand when using the word correctly.

One type of text that must be mastered by students in junior high school is writing a speech text. Speech text is a text that contains ideas or thoughts that will be conveyed in front of many people. Writing speech texts will provide opportunities for students to pour out all forms of ideas that are known both from books, experiences, and observations that later can be known by others. The submission of this idea is not arbitrary, and students must also determine who the recipient of the idea is used in learning.

Based on the process and benefits in writing, the students will be productive in learning (Alharbi, 2015). Various knowledge can be explored by giving birth to written ideas. However, the condition of students in each school, especially Indonesian language learning, has not even been able to master writing skills, such as writing speech texts. The researchers get information about this condition from one of the educators at Citra Nusa Bogor middle school. The constraint in writing learning is caused by the difficulty of the participants in making a text because of the lack of reading that has an impact on the amount of information and vocabulary that is known. In addition, it makes students cannot develop independent writings. This condition is also caused by a learning strategy that is not appropriate to apply, less guided training, and low writing motivation. Therefore, to improve language skills such as writing skill, teachers have to use a certain learning model in the learning process, such as discovery learning model.

Discovery learning model is a teaching method that regulates teaching in such a way that the child acquires

knowledge that he/she does not know yet and it is not through notification, partially or entirely found on his/her own. Discovery learning activities are designed so that students can find concepts and principles through their own mental processes. In finding concepts, students make observations, classify, make guesses, explain, draw conclusions, and so on to find some concepts or principles. Discovery learning model has several advantages namely; (1) supporting learners' active participation in the learning process; (2) fostering learner's curiosity; (3) enabling the development of lifelong learning skills from learners; (4) making the learning experience more personal; (5) making learners highly motivated because it gives them the opportunity to experiment and find something for themselves; (6) building knowledge based on the initial knowledge that the learner already has so that they can have a deeper understanding; (7) developing self-reliance and autonomy in learners; (8) making learners accountable for mistakes and the results they make during the learning process. Overall learning using discovery learning models improve student reasoning and the ability to think freely. Specifically learning discovery trains students' cognitive skills to find and solve problems without the help of others so that this model is very suitable to be used to improve students' writing skills independently.

There needs to be an effort for students to write a text. Students must be able to find information and ideas in order to be able to write texts, especially speech texts. Based on the research conducted by Sofeny (2016), it shows that there is a relationship between the implementation of the discovery learning model on students' writing skills. Therefore, researchers intend to solve this problem through research by conducting discovery learning in improving speech text writing skills in Class IX students of Islamic secondary school 2 Kalapanunggal Sukabumi regency. Research focuses on the effectiveness of the discovery learning model and the obstacles experienced by students in writing speech texts.

METHODS

The research is conducted using the experimental method. This is a research method that is used to find the effect of certain treatments on others in controlled conditions. The procedure referred to in this research is the application of discovery learning model by Druckman and Ebner (2018). The treatment model for improving speech text writing skills is the students of class IX at Kalapanunggal Islamic Boarding School 2.

The population of this research is the class IX students of Islamic Boarding School 2 of Kalapanunggal, Sukabumi regency, with 40 people spread in class IX A (20 people) and IX B (20 people). The population is a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by researchers to be studied, and the conclusions are drawn (Sugiyono, 2015). The population is not only people but also objects and other natural objects in order to describe the subject matter. Samples are part of the number and characteristics of the population. Based on this amount, the researchers conduct a purposive sampling technique because of the limitation of participants. The relatively small number of population in this research makes the researchers have decided that the whole students in class become the overall research sample.

The data collection techniques used are; (1) using the pre-test and post-test forms. The post-test is conducted

to measure students' ability to write speech texts. When conducting research, researchers take improved data on writing speech text skills through two tests, namely pre-test, and post-test. This step is done as comparison material. (2) Using the questionnaire; questionnaires in this research to assess the extent of students' responses in learning to write speech text with discovery learning models. (3) Using observation. The purpose of the observation in this research is to measure the process and results of the teaching and learning of students in the classroom (Hidayat, Sapani, & Abidin, 1994).

RESULTS AND DISCUSSIONS

Figure 1 shows the pre-test data analysis in the experimental class. The average score of pre-test (knowledge and skills) has amounted to 53,5, which still refers to the low level; the highest is 68, and the lowest is 44. That results are caused by students not being able to explain the meaning of speech texts. They are combining the terms of the opening greeting and closing in general with the contents and closing parts; the linguistic characteristics of students who do not understand the learning.

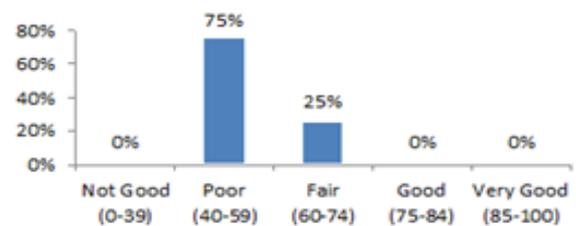


Figure 1 Pre-test Results in Experimental Class

When compiling speech texts, students do not have information that is directly related to the theme of the speech. The message conveyed in the content of the speech text is only the fundamental one. It also has an impact on the use of limited vocabulary, inappropriate or incorrect writing of vocabulary, and spelling that does not match the placement and also the differences in nouns, verbs, adjectives, assignments, word fields, synonyms, antonyms. This finding is positively related to the results of research conducted by Solano et al. (2014) that have shown that writing is one of the problematic language skills and it is often found some errors that are experienced by students in writing.

Figure 2 gives information post-test data analysis in the experimental class. The post-test average score is 84,3 with the level of affordability; the highest is 92, and the lowest is 74.

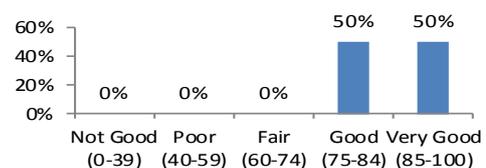


Figure 2 Post-test Result in Experimental Class

The increased post-test score is influenced by learning that has been done using discovery learning models. The researchers provide illustrated images to strengthen students' understanding so that they can explain the concept of understanding speech texts. The structure of the speech text is analyzed according to the characteristics of each part, which consists of opening, content, and closing through the example of speech text. The linguistic characteristics of speech texts are discussed by distinguishing vocabulary based on word class (nouns, verbs, adjectives, assignments), word fields, equations (synonyms), and differences in the meaning of words (antonyms). The score of post-test writing skills in experimental class speech texts has increased. Based on the conducted research, it is found that discovery learning can improve students' writing skills (Cahyani & Yulindaria, 2018; Sobari & Husnussalam, 2019). When compiling a speech text, students have begun to pay attention to things that must be raised in the introduction, contents, and closing sections. Students process the results of the information to be explicitly written in the contents of the speech text from the article. Besides that, students still lack in the use of effective sentences, vocabulary, and spelling that are still incorrectly written.

Figure 3 gives information on the pre-test data analysis in the control class. The average score of pre-test (knowledge and skills) is 51,4 at a low level; the highest is 64, and the lowest is 42. The low pre-test results are caused by students not being able to explain the meaning of speech texts following the concept of speech from experience in daily life both in school and in the community. It means that the ability of the student in control and experimental class before given intervention is equal.

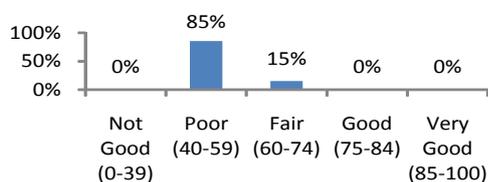


Figure 3 Pre-test Results in Control Class

The term opening and closing greetings are called the same as the opening and closing parts. As for the linguistic characteristics of the speech text, there is still a lack of understanding of students in distinguishing several vocabulary words (nouns, verbs, adjectives, assignments), word fields, synonyms, and antonyms. When compiling speech texts, students do not have information that is directly related to the theme of the speech. The message conveyed in the content of the speech text is only a fundamental one. It also has an impact on the use of limited vocabulary, inappropriate or incorrect writing of vocabulary, and the appropriate spelling of the placement.

Figure 4 shows the post-test data analysis in the control class. The average score of pre-test (knowledge and skills) is 75,2 with a level of ability; the highest is 86, and the lowest is 56.

There are several indicators that cause post-test scores to increase. The definition of speech text can be explained precisely based on examples in school activities such as flag ceremonies and independence days. The opening greeting section is the opening/preliminary part, while the closing greeting becomes part of the conclusion and closing. As for the linguistic characteristics of speech texts, students

can be able to distinguish several vocabularies with word classes (nouns, verbs, adjectives, assignments), word fields, equations (synonyms), and differences in the meaning of words (antonym). However, when compiling speech texts, it is still difficult to process information to be developed into a whole idea. Even though there is already information read and discussed. The written vocabulary is in accordance with the theme discussed. However, there are some writing errors. This is consistent with finding that explains some of the problems experienced by students in writing, such as errors in the use of grammar and vocabulary and difficulties in transferring ideas into writing (Huy, 2015). According to the calculation of the mean coupled with the t-test formula of the experimental class and control class, it is known that t-count is higher than t table or t-count significant because the score of t table <tcount is 1,68 < 2,56 > 2,42. It means that discovery learning models have proven to be effective in improving speech text writing skills.

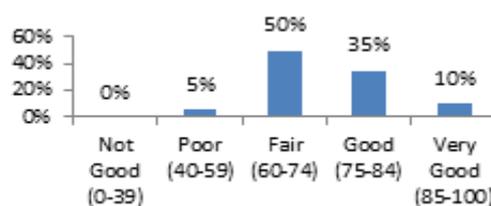


Figure 4 Post-test Results in Control Class

There are several indicators that cause post-test scores to increase. The definition of speech text can be explained precisely based on examples in school activities such as flag ceremonies and independence days. The opening greeting section is the opening/preliminary part, while the closing greeting becomes part of the conclusion and closing. As for the linguistic characteristics of speech texts, students can be able to distinguish several vocabularies with word classes (nouns, verbs, adjectives, assignments), word fields, equations (synonyms), and differences in the meaning of words (antonym). However, when compiling speech texts, it is still difficult to process information to be developed into a whole idea. Even though there is already information read and discussed. The written vocabulary is in accordance with the theme discussed. However, there are some writing errors. This is consistent with finding that explains some of the problems experienced by students in writing, such as errors in the use of grammar and vocabulary and difficulties in transferring ideas into writing (Huy, 2015). According to the calculation of the mean coupled with the t-test formula of the experimental class and control class, it is known that t-count is higher than t table or t-count significant because the score of t table <tcount is 1,68 < 2,56 > 2,42. It means that discovery learning models have proven to be effective in improving speech text writing skills.

Attitude assessment is carried out during learning based on indicators of spiritual and social attitudes with explanation of (a) praying before and after learning; (b) answer greetings when learning begins and ends; (c) discipline (using school uniforms neatly, being on time, following learning in an orderly manner); (d) responsible (completing tasks given during learning); (e) polite (asking permission when leaving class when learning takes place, respecting teachers and friends, respecting each other); (f) mutual cooperation (active when discussing and helping friends if they need help). Attitude data are divided into

experimental and control classes. The attitude of the experimental class is in the good category with an average score of 3,27. As for the control class, the average attitudes of 3,23 are good.

The results of the overall questionnaire analysis have concluded that there are two most dominant obstacles experienced by students in writing speech texts. First is the constraints of finding and gathering information with a percentage of 'yes' answers of 50%. Second is the percentage of 'yes' answers of 55% experienced problems determining the vocabulary according to the content of the speech text discussed. Previous researches have also found some difficulties experienced by students such as finding appropriate vocabularies, using appropriate grammar, and searching words or phrases that could describe their ideas in writing (Sobari & Husnussalam, 2019; Ritchey & Coker, 2014). The researchers argue that in the previous learning, students do not have reading material as a source of ideas in accordance with the theme/topic of the speech text discussed. Therefore, when learning with the discovery learning model, students are given the experience to use the article as an exercise in collecting and processing data.

Based on the results of these data, two hypotheses are proposed to prove the truth. The result is the application of discovery learning models effectively improve speech text writing skills. Besides that, there are obstacles in writing speech texts through the application of discovery learning models.

CONCLUSIONS

Based on the results of research and data analysis from the application of discovery learning models, it improves speech text writing skills researchers. It can be concluded on three main points; First is the application of learning models can improve the speechwriting skills marked by changes in students' scores. The experimental class pre-test score is 53,5, with the highest score is 68, and the lowest score is 44, while the post-test average score is 84,3. The highest post-test experimental class is 90 and the lowest score is 74. As for the control class, the average score of the pre-test is 51,4 with the lowest score is 42 and the highest score 60 while the average score of the post is 75,2 with 56 as the lowest score and 86 as the highest score. The results of the pre-test to post-test experience an increase in the experimental class and the control class. However, the experimental class experiences a higher increase in score than the control class. It is influenced by the stages of discovery learning models, which include stimulation, problem identification, data collection and processing, verification, and conclusions in learning.

The second is based on the results of the calculation of mean coupled with the t-test formula of the experimental class and control class. It is known that t-count is greater than t table or t-count significant because the score of t table <tcount is 1,68 < 2,56 > 2,42. Therefore, the application of discovery learning models has proven to be effective in improving speech text writing skills in class IX students of MTs Syarikat Islam 2 Kalapanunggal, Sukabumi Regency. The third is that students still experience problems writing text speech through the application of discovery learning models. The most dominant obstacle is when determining vocabulary according to the content/topic of discussion in the speech text. The percentage of these students is as much as 55% or eleven people. Besides, ten students with

a percentage of 50% also still have problems finding and collecting information as material in compiling speech texts.

REFERENCES

- Abrahamson, D., & Kapur, M. (2018). Reinventing discovery learning: A field-wide research program. *Instructional Science*, 46(1), 1-10. <https://doi.org/10.1007/s11251-017-9444-y>.
- Alfaki, I. M. (2015). University students' English writing problems: Diagnosis and remedy. *International Journal of English Language Teaching*, 3(3), 40-52.
- Alharbi, F. (2015). Writing for learning to improve students' comprehension at the college level. *English Language Teaching*, 8(5), 222-234. doi:10.5539/elt.v8n5p222.
- Aydoğan, H., & Akbarov, A. A. (2014). The four basic language skills, whole language & intergrated skill approach in mainstream university classrooms in Turkey. *Mediterranean Journal of Social Sciences*, 5(9), 672-680. <https://doi.org/10.5901/mjss.2014.v5n9p672>.
- Browne, S., Glass, C., & Holyoak, G. (2016). Institutional constraints limiting social services for immigrants. *Journal of Immigrant & Refugee Studies*, 14(2), 156-176. <https://doi.org/10.1080/15562948.2015.1066475>.
- Cahyani, I., & Yulindaria, L. (2018). The effectiveness of discovery learning model in improving students fiction writing. *International Journal of Learning and Instruction*, 1(1), 37-46.
- Druckman, D., & Ebner, N. (2018). Discovery learning in management education: Design and case analysis. *Journal of Management Education*, 42(3), 347-374. <https://doi.org/10.1177/1052562917720710>.
- Engin, M. (2014). Extending the flipped classroom model: Developing second language writing skills through student-created digital videos. *Journal of the Scholarship of Teaching and Learning*, 14(5), 12-26. <https://doi.org/10.14434/12829>.
- Hidayat, K., Sapani, S., & Abidin, Z. (1994). *Evaluasi pendidikan dan penerapannya dalam pengajaran bahasa Indonesia*. Bandung: CV Alfabeta.
- Hulme, C., & Snowling, M. J. (2014). The interface between spoken and written language: Developmental disorders. *Philosophical Transactions of the Royal Society: Biological Sciences*, 369(1634), 1-8. <https://doi.org/10.1098/rstb.2012.0395>.
- Huy, N. T. (2015). Problems affecting learning writing skill of grade 11 at Thong Linh high school. *Asian Journal of Educational Research*, 3(2), 53-69.
- Javid, C. Z., & Umer, M. (2014). Saudi EFL learners' writing problems: A move towards solution. *Proceeding of the Global Summit on Education GSE 2014*. Kuala Lumpur, Malaysia. pp. 164-180.
- Karjalainen, K., Pörn, M., Rusk, F., & Björkskog, L. (2017). Classroom tandem – Outlining a model for language learning and instruction. *International Electronic Journal Of Elementary Education*, 6(1), 165-184. Retrieved from <https://www.iejee.com/index.php/>

- Kemdikbud. (2016). *Modul guru pembelajar*. Jakarta: Direktorat Jenderal Guru dan Tenaga Kependidikan Kementerian Pendidikan dan Kebudayaan.
- Klein, P. D., & Boscolo, P. (2016). Trends in research on writing as a learning activity. *Journal of Writing Research*, 7(3), 311–350. doi: 10.17239/jowr-2016.07.
- Mukminin, A., Ali, R. M., Jaya, M., & Ashari, F. (2015). Voices from within: Student teachers' experiences in English academic writing socialization at one Indonesian teacher training program. *The Qualitative Report*, 20(2), 1394–1407. Retrieved from <http://www.nova.edu/ssss/QR/QR20/9/mukminin2.pdf>.
- Paola, U., Barr, C. D., Dobbs, C. L., Galloway, E. P., Meneses, A., & Sanchez, E. (2015). Core academic language skills: An expanded operational construct and a novel instrument to chart school-relevant language proficiency in preadolescent and adolescent learners. *Applied Psycholinguistics*, 36(5), 1077–1109. doi: <https://doi.org/10.1017/S014271641400006X>.
- Ritchey, K. D & Coker Jr, D. L. (2014). Identifying writing difficulties in first grade: An investigation of writing and reading measures. *Learning Disabilities Research & Practice*, 29(2), 54–65. <https://doi.org/10.1111/ldrp.12030>.
- Sobari, M. R., & Husnussalam, H. (2019). The use of discovery learning method to improve students' writing descriptive text. *PROJECT (Professional Journal of English Education)*, 2(2), 133–139.
- Sofeny, D. (2016). The effectiveness of discovery learning in improving English writing skill of extroverted and introverted students. *Edulitics (Education, Literature, and Linguistics) Journal*, 1(2), 111–117.
- Solano, P. A. C., Torres, P. F. G., Beltran, A. L. Q., Cuesta, L. M. C., Jaramillo, L. M. S., Jaramillo, F. O. S., Cordova, M. O. A. (2014). Spanish interference in EFL writing skills: A case of Ecuadorian senior high schools. *English Language Teaching*, 7(7), 40–48.
- Sugiyono. (2015). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Bandung: CV Alfabeta.
- Van Merriënboer, J. J., & Kirschner, P. A. (2017). *Ten steps to complex learning: A systematic approach to four-component instructional design*. London: Routledge.
- Wenning, C. J. (2010). Levels of inquiry: Using inquiry spectrum learning sequences to teach science. *Journal of Physics Teacher education online*, 5(4), 11-19.
- Zhao, R., & Hirvela, A. (2015). Undergraduate ESL students' engagement in academic reading and writing in learning to write a synthesis paper. *Reading in a Foreign Language*, 27(2), 219–241.