



Assimilation: Indonesian Journal of Biology Education
ISSN 2621-7260 (Online)
Journal homepage: <https://ejournal.upi.edu/index.php/asimilasi>



The effectiveness of Jigsaw cooperative learning model in developing students' oral communication skills and cognitive learning outcomes

Median Agus Priadi*, Tri Jalmo, Darlen Sikumbang, Kartika Meilinda

Study Program Biology Education, Faculty Mathematic and Natural Science, Universitas Lampung, Prof. Dr. Sumantri Street, Bandar Lampung, Indonesia.

*Corresponding author: medianagus@fkip.unila.ac.id



ARTICLE HISTORY

Received: 11 February 2022
First Revised: 22 February 2022
Accepted: 19 March 2022
First Available Online: 31 March 2022
Publication Date: 31 March 2022

KEYWORDS

Cognitive learning outcomes
Ecosystem
Jigsaw cooperative learning model
Oral Communication skill

ABSTRACT

This study aims to determine the effectiveness of Jigsaw cooperative learning model in developing communication skills and cognitive learning outcomes of students. This research using the one group pretest-posttest design. The sample is the students of class X MIA 1 who were selected through purposive sampling technique. Data on oral communication skills were carried out by self-assessment, peer assessment and observation which were analyzed using a Likert scale. Meanwhile, data on cognitive learning outcomes were obtained through pretest and posttest scores, then analyzed by performing the n-gain score test. The research data shows that students have oral communication skills in the "high" category, which is as much as 77%. The highest verbal communication skills of students are found in the indicator of delivering detailed information with the "very high" category, while the lowest communication skills are found in the indicator of giving questions in the "enough" category. Then for learning outcomes, statistically student learning outcomes showed a significant difference between initial understanding (pretest) and understanding after learning (posttest) indicated by a significant N-gain value of 0.73 with high criteria. Thus, it can be concluded that the Jigsaw cooperative learning model is effective in developing communication skills and cognitive learning outcomes of students.



INTRODUCTION

Communication skills are one of the four skills that must be mastered in the 21st century, namely critical thinking, collaboration, communication and creativity (Hidrasti, 2020). One of the common skills that employers, academics, employers, and professionals consistently highlight from learners or graduates is communication skills. Rahmah & Rohaendi (2021) revealed that communication skills play an important role in the 4.0 era, both oral and written communication. Communication skills are one of the abilities that must be possessed by students. Graduates will have higher job and career opportunities if they have developed communication skills (Mercer-Mapstone & Kuchel, 2016). Competition in the industrial world is getting tighter, especially in the job market competition. Employers are now focusing more on the skills possessed by graduates rather than just the grades achieved during the education process (Gray et al., 2005). The increasingly intense competition in the world of work is a challenge for the world of education to prepare students to not only be equipped with cognitive knowledge that is reflected in learning outcomes but also equipped with soft skills to be able to compete in the world of work in the future. One of the important soft skills is communication skills. The results of Kurniawan et al. (2021) research regarding the relationship between self-concept, self-confidence and interpersonal communication skills in the learning process in students concluded that interpersonal communication skills have a significant influence on self-concept and student self-confidence. Marfuah (2017) revealed that students' communication skills will also provide an atmosphere that supports active learning where students have confidence in expressing their arguments and become a means of developing an empathetic attitude in appreciating differences of opinion that they will find in the community environment. In addition, Tsay & Brady (2010) in their research explained that communication skills and adaptability are effective and efficient, able to overcome any new challenges in the work environment.

In fact, the communication skills of students in Indonesia are still low. This is in accordance with the results of the 2015 PISA assessment (Program for International Student Assessment), namely the average communication skills of Indonesian students are still at the stage of being able to recognize a number of basic facts, but not yet able to communicate and relate these abilities in various situations, and apply complex and abstract concept. It can also be seen from the data published by Putra & Abdullah (2019) that there has been a decrease in the value of the National Exam at the high school level in Indonesia for the last 3 years, one of which is in the subject of Biology. In 2016 the average UN Biology score was 58.54; while in 2017 the average Biology score was 48.90 and in 2018 the average Biology score was 48.06. This also happened in Lampung, in 2017/2018 the UN Biology score was still relatively low, with an average of 46.16.

According to Ula (2021), the decline in student learning outcomes can be caused by several things, one of which is motivation and enthusiasm for learning. Students do not understand the material conveyed by the teacher and low learning motivation so that the learning taught is less effective. Communication skills have an effect of 59.4% on student learning outcomes. (Ningrum, 2020). Communication skills are closely related to student learning outcomes. With good communication skills, students will easily communicate various matters concerning learning materials orally. In addition, through communication skills, students can provide responses, express their ideas and opinions, and dare to ask well when students have difficulty understanding the subject matter. Thus, good communication skills students will greatly support the achievement of maximum learning outcomes by increasing students' cognitive learning outcomes (Cahyarini, 2022).

Indonesian students' communication skills are often considered low by many, and this can be explained by several reasons. One of the main factors is the lack of emphasis on speaking and writing skills in the education curriculum. Many educational programs in Indonesia are still focused on mastering the subject matter, so the communication aspect is often neglected. In

addition, the lack of supporting facilities and infrastructure, such as adequate libraries and internet access, can also limit students in developing their communication skills (Sukyadi, 2018).

The results of the initial research that has been carried out in this study in six high schools in Bandar Lampung, almost 90% of teachers already know that communication skills must be developed in Curriculum 13, but in the implementation of learning only 20% of teachers can foster students' communication skills. This happens because the other 80% of teachers are not optimal in using learning models that can foster students' communication skills. Most teachers still use the lecture method, so that learning is still centered on the teacher as an information provider.

One way to realize the success of teaching and learning activities is by choosing the right learning model. Various learning models used in learning can affect learning in the classroom, especially for students. To improve students' communication skills, a group-based learning model is applied so that good cooperation between friends is formed. One of the learning models that can improve the cooperation of group members and communication skills both in groups and individuals is the Jigsaw type cooperative learning model which is centered on students, thus providing opportunities for students to be more active in learning and can foster students' communication skills (Mu'minati, 2020).

Jigsaw-type cooperative learning is one of the most commonly used forms of active pedagogy as it is able to develop discussion skills, cooperate, express opinions and improve communication skills (Rizki et al., 2019). While this cooperative learning has also been found to be an effective pedagogical tool in a variety of subjects (Tsay & Brady, 2010). In addition, Fatkhurahman (2018) revealed that the jigsaw cooperative learning model is more appropriate to be used as a model to bring up students' communication skills because the process involves all components of communication skills. This model forces learners to always communicate both internally and externally.

Research on the effect of the Jigsaw learning model on communication skills has been conducted previously by Fatkhurahman (2018). The results of this study showed that there was an increase in students' communication skills but the communication skills, data were only limited through pretest and posttest. In addition, Rizki et al. (2019) have also conducted classroom action research with a spiral model on elementary school students and the results show an increase in communication skills through learning using the jigsaw model. In collecting data, this research only uses tests and observation sheets. While the research conducted in this study, the data collection technique is not only from tests, and observation sheets but also using self-assessment, peer assessment, and LKPD which are analyzed using a Likert scale. In addition, through research conducted by Waniroh (2022) stated that learning by using the jigsaw cooperative model can improve student learning outcomes regarding the material on the digestive system in humans.

METHODS

This quasi-experimental research uses One Group Pretest-Posttest Design, which uses quantitative and qualitative approaches. In this design, the subjects before being given treatment were given a pretest first (William, 2019) shown in Table 1.

Table 1. Experimental design

Pre-test	Treatment	Post-test
Y1	X	Y2

Description:

X = Independent variable (Jigsaw type cooperative learning model)

Y1 = Dependent variable (Oral communication skills and students' cognitive learning outcomes)

Y2 = Dependent variable (Oral communication skills and students' cognitive learning outcomes)

This research was conducted at Al-Kautsar Bandar Lampung High School in the even semester of the 2018/2019 school year. The implementation of this research was in May 2019. Researchers took the X MIA class totaling 204 people as the research population. The sample class used was class X MIA 1 which amounted to 32 people through purposive sampling technique. Data on oral communication skills were carried out by self-assessment, peer assessment and observation. Meanwhile, cognitive learning outcomes data were obtained through pretest and posttest scores.

The instruments used to measure students' oral communication skills are using: self assessment, peer assessment, and LKPD which are analyzed using a Likert scale. Meanwhile, the instrument to measure students' cognitive learning outcomes through tests, namely pretests and post-tests, then analyzed using N-gain.

Indicators of oral communication skills used in this study were taken from (Aulia et al., 2018; Srijati et al., 2018) which include in Table 2:

Table 2. Indicators of oral communication skills

No	Indicators of oral communication skills
1	Conveys understanding verbally
2	Using good language words
3	Respect for the other person
4	Giving an opinion
5	Provide relevant questions
6	Provide examples in explaining
7	Using graphs/pictures in providing explanations
8	Linking explanations with graphs/pictures
9	Using easy-to-understand language
10	Concise, clear, and detailed explanation

The criteria for communication skills in this study were measured by the interpretation of the effectiveness score, namely: 0-45% (very low), 46-59% (low), 60-75% (sufficient), 76-85 (high), 86-100% (very high) Grainger et al. (2019). The Jigsaw type cooperative learning model is said to be effective in fostering students' oral communication skills if at least 75% of the total number of students have communication skills criteria in the moderate category and above (accumulation of moderate, high and very high categories) Grainger et al. (2019).

The effectiveness of learning outcomes was measured by tests, namely pretest and posttest, then analyzed using N-gain, with the following criteria: if it has an N-gain of 0-0.30 (lower), more than 0.31-0.69 (medium) and if it has an N-gain of 0.70-1.00 (high). The Jigsaw type cooperative learning model is said to be effective in improving students' learning outcomes if statistically the learning outcomes show a significant difference between the initial understanding and the understanding after learning (significant gain) and have learning completeness at least 75% of the number of students have obtained a score = 60 in improving learning outcomes (Grainger et al., 2019)

RESULTS AND DISCUSSION

Jigsaw cooperative learning model in fostering oral communication skills

The findings of the self-assessment, i.e. before and after learning, were used to determine the oral communication skills of the students in this study shown in Figure 1.

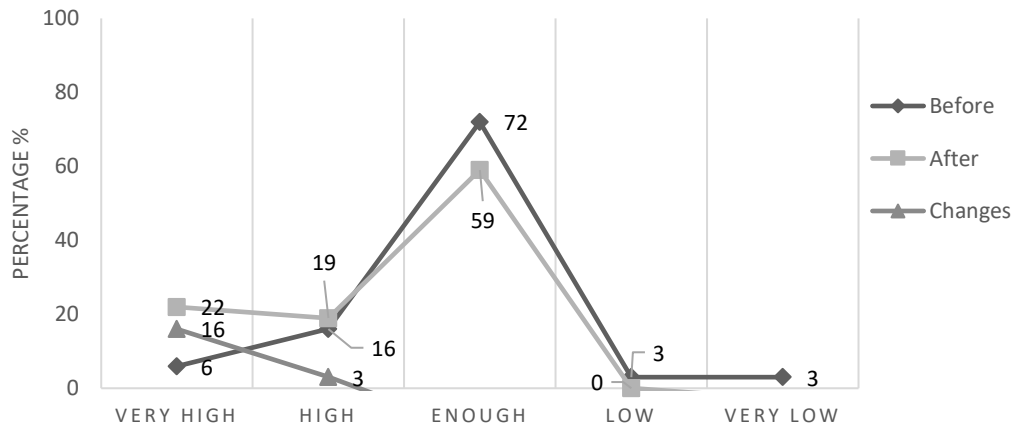


Figure 1. Changes in oral communication skills of class X MIA 1 (n=32)

Based on Figure 1, there was an increase in students' oral communication skills in the very high category by 16%, high category by 3% and a decrease in students' written communication skills in the moderate category by 12%, low by 3%, and a decrease in the very low category by 3%. This is based on the assessment of the learners themselves who feel that they have improved oral communication skills. Data on learners' oral communication skills are taken through self-assessment data, peer assessment, and learner observation sheets which are assessed after learning shown in Figure 2.

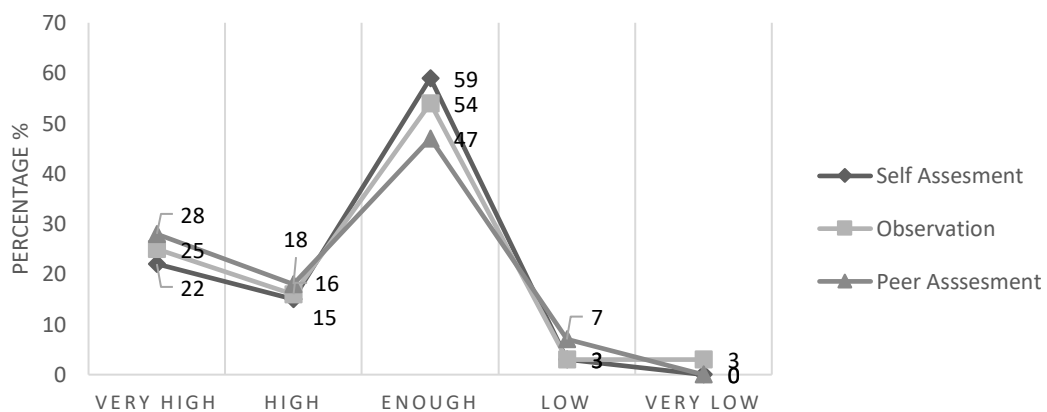


Figure 2. Learners' oral communication skills (n=32).

(Figure 2) shows that more than 75% of students have communication skills criteria in the moderate category and above (accumulation of moderate, high and very high categories), namely based on self-assessment has a percentage of oral communication skills of 96%, observation results of 94% and based on peer assessment of 93%.

Based on the assessment per indicator of oral communication skills, it shows that the highest oral communication skills are found in the indicator of delivering information in detail with the category "very high". While the lowest oral communication skills are found in the indicator of asking questions with the category "sufficient". For more details, see Table 3 below

Table 3. Oral communication skills per indicator

No	Aspects and assessment indicators	Percentage by indicator			
		SA (%)	P (%)	O (%)	X (%)
1	Conveys understanding verbally	92 (ST)	82(ST)	83 (ST)	86(ST)
2	Using good language words	74 (C)	77 (T)	72 (C)	74 (C)
3	Respect for the other person	81 (C)	75 (C)	71 (C)	77 (C)
4	Giving an opinion	77 (C)	83 (T)	72 (C)	77 (C)
5	Provide relevant questions	76 (C)	79 (T)	72 (C)	76 (C)
6	Provide examples in explaining	83 (T)	78 (T)	77 (T)	79 (T)
7	Using graphs/pictures in providing explanations	84 (T)	76 (T)	78 (T)	79 (T)
8	Linking explanations with graphs/pictures	82 (T)	78 (T)	77 (T)	79 (T)
9	Using easy-to-understand language	73 (C)	77 (T)	81 (T)	77 (T)
10	Concise, clear, and detailed explanation	79 (T)	80 (T)	77 (T)	79 (T)
Average Percentage Total		80 (T)	78 (T)	76 (T)	78 (T)

Description:

SA = *Self assessment*

PA = *Peer assessment*

O = Observation

ST = Very high

T = High

C = Enough

X = Average

Table 3 shows that the average oral communication skills of students based on self-assessment is 80% with a "high" category, based on peer assessment of 78% with a "high" category and based on observation of 76% with a "high" category. It can be concluded that the use of the Jigsaw type learning model is effective in fostering students' oral communication skills.

This is in accordance with the criteria for effectiveness according to Grainger et al. (2019) that the learning model is said to be effective in fostering students' communication skills if at least 75% of the total number of students have communication skills in the sufficient category and above (accumulation of sufficient, high and very high categories). This is because during the learning process using the Jigsaw type cooperative learning model trains students' oral communication skills. Because during the learning process, students are divided into small groups consisting of 5-6 people (group of origin), then students with the same LKPD material will gather into the same group (expert group) to discuss questions in the LKPD, then students discuss a lot and ask questions, and provide their respective ideas.

In addition, students are also asked to present the results of the LKPD to their group. This will indirectly train students' oral communication skills. From the results of the students' presentations, it can be seen that students are able to make presentations by using language that is easy to understand, explaining information in detail, with their eyes towards other students, giving examples when explaining, using graphs when explaining, and giving concise and precise explanations. Thus, it can be said that the use of the Jigsaw type cooperative learning model can foster students' oral communication skills.

The Jigsaw type cooperative learning model is able to develop discussion skills, work together, express opinions and improve students' oral communication skills. Cooperative learning models are not only superior in helping learners understand difficult concepts, but also very useful for fostering critical thinking skills, working together, and helping friends. Learners are actively involved in the cooperative learning process so that it has a positive impact on the quality of interaction and communication, which can motivate learners to improve their learning achievement.

The effect of jigsaw cooperative learning model on students' cognitive learning outcomes

Students' cognitive learning outcomes can be seen from the difference between the test results before being treated (Pretest) and the test results after being treated (post-test), then analyzed using N-gain. The average N-gain data on students' cognitive learning outcomes can be seen in Table 4.

Table 4. Average scores of pretest, posttest, and n-gain of learners' cognitive learning outcomes

N	$X \pm Sd$			Category
	Pretest	Posttest	N-gain	
32	65 \pm 10,58	90 \pm 8,64	0,73 \pm 0,23	High

In Table 4, it shows that the average pretest value of students' cognitive learning outcomes before being given learning using the Jigsaw Type cooperative learning model is only 65 but after applying learning using the Jigsaw type cooperative learning model, the average post-test value of students' cognitive learning outcomes becomes 90, so there is an increase in the average value of students' cognitive learning outcomes by 25. When viewed from the value of the effectiveness indicator of learning outcomes, namely 60, then as many as 94% of students have a post-test value above 60, with an average of 90.

The lowest average score of students is because students have not been taught in depth about ecosystem material, so students have difficulty working on Pretest questions given by the teacher even though previously at Junior High School (SMP) they had discussed a little overview of ecosystem material. Then, the average posttest score is quite high compared to the average Pretest score, this is because students have been taught the material about ecosystems.

The increase in students' cognitive learning outcomes can also be seen by looking at the distribution of significant N-gain scores. Based on table 3, it can be seen that the average N-gain value of students' learning outcomes is 0.73 with a high category with details of the frequency of N-gain high criteria as much as 69%, medium 25% and a low 6%. For more details, see Figure 3 below

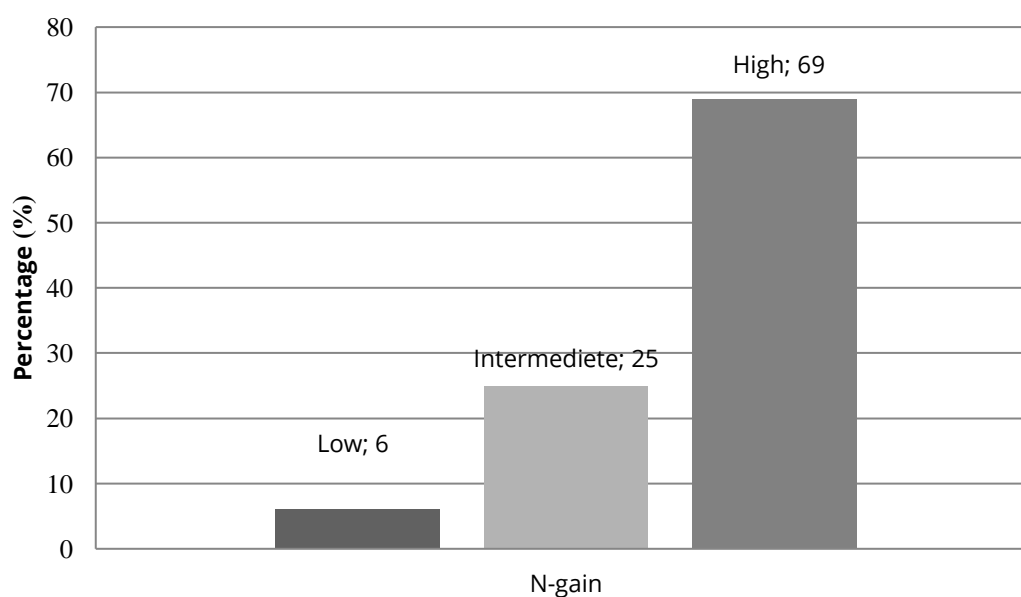


Figure 3. Frequency spread of N-gain

The increase in students' cognitive learning outcomes in this study was due to the learning process of the Jigsaw type cooperative model applied by educators providing opportunities for students to actively participate in seeking, finding, understanding and transferring information or concepts obtained. In addition, the Jigsaw type cooperative learning model can foster the responsibility of students so that students are actively involved in understanding a problem and solving it in groups. This has a positive impact on students' mastery of the material, so that students can have better learning outcomes. In addition, the improvement in students' learning outcomes is also due to an increase in communication skills of students. Because if students have good communication skills, it will foster positive interdependence. That is, students are ready to provide and teach the material learned to other members of their group, so that it can provide a learning experience that is not forgotten by students, namely by learning through direct experience (learning by doing). Because, learners can gain more experience by actively and proportionally engaging rather than just seeing material or concepts, so that it will have an impact on improving learning outcomes (William, 2019)

This is in accordance with research conducted by Aulia (2022) which states that the application of Jigsaw type cooperative learning in science learning is able to improve students' science learning outcomes which are characterized by increased interest in learning and complete learning outcomes in students. Similarly, research conducted by Kahar (2020)

CONCLUSION

Based on the results of the study, several conclusions can be drawn, namely, the average of each aspect of oral communication skills of students after learning by applying the jigsaw type cooperative learning model is included in the high category. The highest average aspect of oral communication skills is in the indicator of conveying understanding orally. In addition, the jigsaw type cooperative learning model is also effective in improving students' cognitive learning outcomes as indicated by the significant difference between initial understanding and understanding after learning with high gain value criteria. This is likely due to the implementation of the syntax of the jigsaw type cooperative learning model, almost all activities are carried out, the students' response to learning which shows that most students in the experimental class responded positively to the jigsaw type cooperative learning model in this study can train students' oral communication skills and learning outcomes.

REFERENCES

- Aulia, M., Suwatno, S., & Santoso, B. (2018). Meningkatkan keterampilan komunikasi lisan melalui metode storytelling. *Manajerial: Jurnal manajemen dan Sistem Informasi*, 17(1), 110-123.
- Aulia, T. (2022). Penerapan model pembelajaran kooperatif tipe Jigsaw untuk meningkatkan hasil belajar siswa pada mata pelajaran IPA di SMP Brawijaya. *e-Jurnal Mitra Pendidikan*, 6(6), 376-387.
- Cahyarini, E. (2022). Efektifitas model pembelajaran Jigsaw berbantuan video terhadap kemampuan komunikasi lisan dan hasil belajar kognitif siswa SMK. *UPEJ Unnes Physics Education Journal*, 11(3), 81-94.
- Fatkhurahman, H. (2018). Implementasi model pembelajaran kooperatif Jigsaw untuk meningkatkan keterampilan komunikasi peserta didik pada materi pesawat sederhana. *Pensa E-Jurnal: Pendidikan Sains*, 6(2), 229-236.
- Grainger, P. R., Christie, M., & Carey, M. (2019). Assessing written communication skills using a continua model of a guide to making judgments (GTMJ). *Journal of University Teaching & Learning Practice*, 16(2), 10.

- Gray, F. E., Emerson, L., & MacKay, B. (2005). Meeting the demands of the workplace: Science students and written skills. *Journal of science education and technology*, 14(4), 425-435.
- Hindrasti, N. E. K., Amelia, T., & Nofiana, M. (2020). Analisis kebutuhan dalam pengembangan asesmen autentik keterampilan Abad ke-21 untuk mahasiswa pendidikan biologi. *Pedagogi Hayati*, 4(2), 79-86.
- Kahar, M. S., Anwar, Z., & Murpri, D. K. (2020). Pengaruh model pembelajaran kooperatif tipe Jigsaw terhadap peningkatan hasil belajar. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 9(2), 279-295.
- Kurniawan, M. R., Arif, E., & Asmawi, A. (2021). Hubungan antara konsep diri, kepercayaan diri dengan kemampuan komunikasi interpersonal dalam proses pembelajaran pada mahasiswa. *Journal of Education, Humaniora and Social Sciences (JEHSS)*, 4(1), 485-493.
- Marfuah, M. (2017). Meningkatkan keterampilan komunikasi peserta didik melalui model pembelajaran kooperatif tipe Jigsaw. *Jurnal Pendidikan Ilmu Sosial (JPIS)*, 26(2), 148-160.
- Mercer-Mapstone, L. D., & Kuchel, L. J. (2016). Integrating communication skills into undergraduate science degrees: A practical and evidence-based approach. *Teaching & Learning Inquiry*, 4(2), 122-149.
- Mu'minati, I. S., Jalmo, T., & Marpaung, R. R. T. (2020). Pembelajaran tipe Jigsaw menumbuhkan keterampilan komunikasi lisan dan hasil belajar kognitif peserta didik kelas X SMA Negeri 14 Bandar Lampung. *BIOEDUKASI (Jurnal Pendidikan Biologi)*, 11(1), 59-68.
- Ningrum, A. R., & Putri, N. K. (2020). Hubungan antara keterampilan berkomunikasi dengan hasil belajar IPS pada peserta didik kelas V SD. *Terampil: Jurnal Pendidikan Dan Pembelajaran Dasar*, 7(2), 177-186.
- Putra, T. K., & Abdullah, D. F. (2019). Higher-order thinking skill (HOTS) questions in english national examination in Indonesia. *The Journal of Educational Development*, 7(3), 178-185.
- Rahmah, M. A., & Rohaendi, S. (2021). Meningkatkan kemampuan komunikasi siswa SMP dengan pendekatan open ended secara online. *Biomatika: Jurnal ilmiah fakultas keguruan dan ilmu pendidikan*, 7(1), 86-91.
- Rizki, S., Mawardi, M., & Permata, H. K. I. (2019). Peningkatan keterampilan berkomunikasi melalui model pembelajaran kooperatif Jigsaw. *Jurnal Bidang Pendidikan Dasar*, 3(2), 1-8.
- Sriyati, S., Amelia, D. N., & Soniyana, G. T. (2018). Application of expert-notice dialogue (END) method to assess students' science communication ability on biology. *Journal of Physics: Conference Series*, 1013(1), 012005.
- Sukyadi, D., & Prastowo, N. S. (2018). Learning speaking skills in elementary school. *Journal of Basic Education*, 9(1), 51-60.
- Tsay, M., & Brady, M. (2010). A case study of cooperative learning and communication pedagogy: Does working in teams make a difference?. *Journal of the Scholarship of Teaching and Learning*, 10(2), 78-89.
- Ula, S., Afifa, A. N., & Azizah, S. A. (2021). Pengaruh penggunaan teknologi di masa pandemi COVID-19 terhadap hasil belajar pada mata pelajaran biologi di MAN 2 Jember. *ALVEOLI: Jurnal Pendidikan Biologi*, 2(1), 54-66.
- Waniroh, W., Dewi, R. A. K., & Rozak, D. L. (2022). Pengaruh model pembelajaran kooperatif tipe Jigsaw terhadap hasil belajar siswa materi organ pencernaan manusia pada siswa. *Caruban: Jurnal Ilmiah Ilmu Pendidikan Dasar*, 5(1), 71-81.
- William, W., & Hita, H. (2019). Mengukur tingkat pemahaman pelatihan powerpoint menggunakan quasi-experiment one-group pretest-posttest. *Jurnal SIFO Mikroskil*, 20(1), 71-80.

Acknowledgment

Researcher would like to thank the university which funded this research and the participants who were involved in this research.

Authors' Note

The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

How to Cite this Article

Priadi, M. A., Jalmo, T., Sikumbang, D., & Meilinda, K. (2022). The effectiveness of Jigsaw learning model in developing students' oral communication skills and cognitive learning outcomes. *Assimilation: Indonesian Journal of Biology Education*, 5(1), 29-38.