Implementation of Jigsaw Coopertaive Learning and Gallery Walk Based on Practices to Develop Science Process Skills and Sscientific Attitude of Students

Fitri Laila*, Prasetyorini[1], S. Kurniasih[2]

[1] Senior High School of Kemang 1 Bogor
[2,3] Study Program of Science Education, Graduate School of Pakuan University

*E-mail: Fitrilaila1179@gmail.com

Abstract: This study aims to obtain information on improving students ' science process skills and scientific attitudes through practical - based Jigsaw and Gallery Walk learning on the material organization of life. This research method uses a quasi-experimental design with a two-experimental pre-posttest group design, where no one acts as a control group, both groups act as an experimental group that is given different treatment and both are given pretest and posttest. The object of this research is the students of class VII.1 and VII.2 with 41 students each. The instruments used are in the form of multiple choice test questions, KPS observation sheets or performance assessments and questionnaires for scientific attitudes before and after learning which are equipped with learning implementation observation sheets and student and teacher questionnaires. The results of this study indicate that: (1) there are differences in the KPS of students who carry out practicum-based Jigsaw and Gallery Walk learning. (2) there are differences in the scientific attitude of students who carry out practical-based Jigsaw and Gallery Walk learning. (3) practicum-based Jigsaw and Gallery Walk learning can develop students' KPS and Scientific Attitudes. Based on the normalized gain scores, these two learnings have moderate values, both on the KPS and students' scientific attitudes. Thus, it can be concluded that Jigsaw and Gallery Walk learning can improve students' KPS and Scientific Attitudes.

Keywords: *science process skills, scientific attitude, jigsaw, gallery walk.*

INTRODUCTION

In order to improve science learning outcomes, the government has taken various ways, particularly the Ministry of National Education, among others, by improving the quality of science subject teachers, namely through coaching and training teachers through education and training institutions and/or other relevant agencies. In addition, the government also procures complete learning facilities

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih

through the provision of science course textbooks as well as practical tools and materials for laboratory equipment so that there is an improvement in the teaching and learning process which results in reciprocal interactions between teachers and students.

One of the student centered learning is Cooperative Learning. Cooperative Learning is a learning model where the teacher only acts as a facilitator.

There are many types of cooperative learning, one of which is Jigsaw and Gallery Walk (walking exhibition). Kurniasih and Sani (2015: p.24) state that Jigsaw Cooperative Learning is "cooperative learning designed to increase students' sense of responsibility for their own learning and the learning of others. "In this Jigsaw learning model, student activity is needed, with the formation of small groups consisting of 3-5 people consisting of the home group and the expert group. Besides Jigsaw, there is also a Gallery Walk Cooperative learning (walking exhibition), this cooperative learning is used to activate each individual and group (cooperative learning) in learning. The purpose of this Gallery Walk learning is to build group cooperation and give mutual appreciation and correction in learning (Ismail, 2008).

The process of searching for scientific concepts can be through learning that applies direct experience to learning objects, such as learning by practicum or experimental methods.

Through practical activities, students will gain hands-on experience. According to Suyono and Hariyanto (2015: p. 127), in practicum students can do it themselves, design themselves, prepare various materials and tools, observe themselves, analyze, evaluate and then make their own conclusions as direct experience (hands-on experience, firsthand experience) in order to satisfy their curiosity and the need for their own perceived problem (the felt need) to be solved. Hands-on experience will be able to develop skills. The skills that are trained are known as Science Process Skills (KPS). Science Process Skills (KPS) itself is a skill that is needed by students, not only in learning science but in everyday life" (Sukarno, 2014)

Jigsaw cooperative learning and practicum-based gallery Walk is a form of modification and innovation in learning. The use of these two lessons is expected to be able to develop science process skills and students' scientific attitudes which are still low. There is a need to develop science process skills and scientific attitudes in science learning as an inseparable part.

SMP Negeri 1 Kemang is one of the public schools in Bogor Regency. Based on general observations of class VII science learning at the school, the situation that can be stated is that teachers sometimes deliver material still using lecture and discussion methods and rarely carry out learning with practicum. For the completeness of laboratory equipment in this school, it can be categorized as

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

sufficient, the only problem is that they do not have a laboratory assistant to help carry out the practicum, this is the reason why teachers rarely carry out practicum. The learning used also has not led to the development of students' scientific process skills and scientific attitudes. Therefore, more active and effective learning is needed. Previously, classroom action research has been conducted at this school using the same learning method, namely Jigsaw, and from the results of this research, the Jigsaw cooperative model is very effective in improving student activities and learning outcomes. Therefore, this research wants to be further developed by combining Jigsaw with practicum. In addition, this Jigsaw will be compared with the practicum-based Gallery Walk learning.

METHOD

The method used is a quasi-experimental design with a two-experimental pre-posttest group design, where no one acts as the control group, both groups act as the experimental group and are given different treatments and both are given pretest and posttest. The first experimental group used Jigsaw learning and the second experimental group used Gallery Walk learning, both of which were based on practicum

RESULTS AND DISCUSSION

1. Science Process Skills

a. Practice-based N-gain Jigsaw

The results of the N-Gain calculation in the practical-based Jigsaw experimental class can be presented in table 1 of the frequency distribution and histogram graph in Figure 1

Table 1. Jigsaw KPS Frequency Distribution

Interval Class	F	Relative Frequency (%)
9-22	1	2,44
22-36	4	9,76
37-50	13	31,71
51-64	12	29,27
65-78	8	19,51
79-92	2	4,88
93-106	1	2,44
Total	**41**	**100**

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

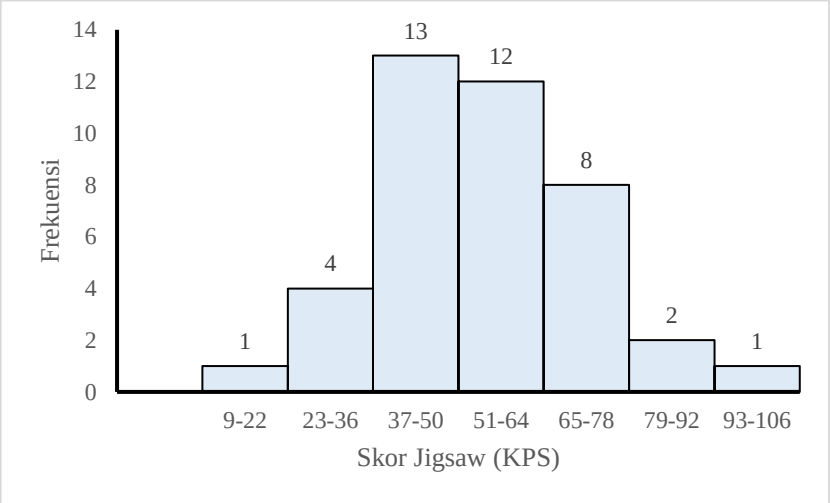

Figure 1 Jigsaw KPS Frequency Distribution

b. N-Gain Gallery Walk based on Practicum

The results of the N-Gain calculation in the experimental class II, namely practicum-based Gallery Walk learning can also be presented in the gallery walk frequency distribution table and the histogram graph in Figure 2.

Table 2. Frequency Distribution of Gallery Walk

Interval Class	F	Relative Frequency (%)
20-29	1	2,44
30-39	1	2,44
40-49	1	2,44
50-59	9	21,95
60-69	7	17,07
70-79	17	41,46
80-89	5	12,20
QUANTITY	**41**	**100**

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

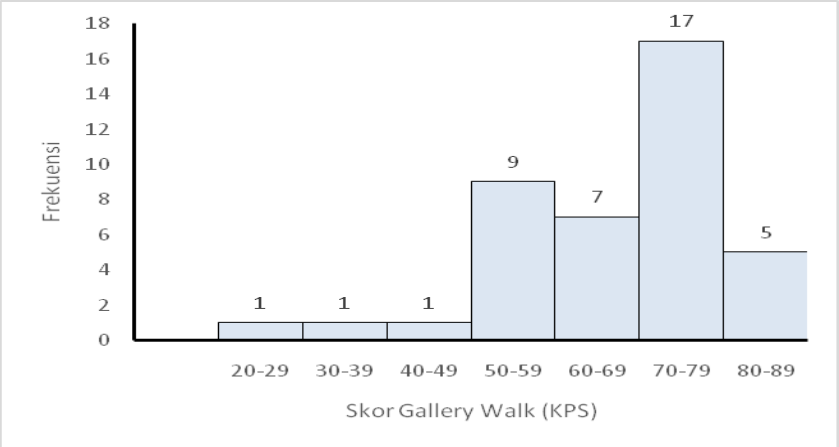

Figure 2. Frequency Distribution of KPS Gallery Walk

c. Results N- Gain Science Process Skills Per Aspect

Table 3. N-Gain of Science Process Skills Per Aspect

KPS Aspect	N – Gain			
	Experiment I	Category	Experiment II	Category
Observation	56	Medium	66	Medium
Classification	59	Medium	70	Medium
Planning Research	53	Medium	70	Medium
Apply	54	Medium	76	Medium
Interpret	47	Medium	65	Medium
Communicate	57	Medium	65	Medium
Mean	54	Medium	69	Medium

For more details, the distribution of data in table 3 can be seen in Figure 3.

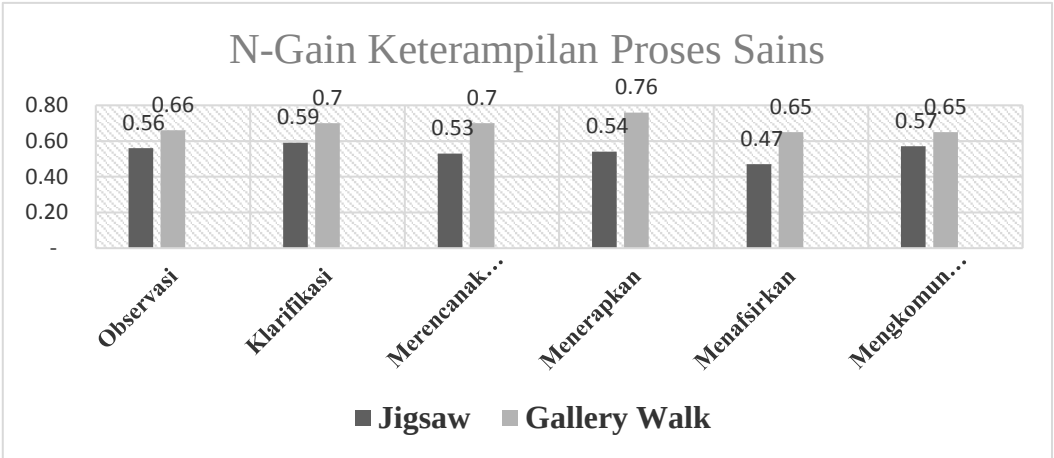

Figure 3. KPS N-Gain Per Aspect

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

From the data above, it can be concluded that practical-based Jigsaw and Gallery Walk learning can improve Science Process Skills in all aspects observed.

Based on the results of the N-gain hypothesis test for Science Process Skills, it was concluded that there were significant differences between students who carried out practicum-based Jigsaw learning and students who carried out practicum-based Gallery Walk learning. The significant difference based on the researcher's observations was caused by several factors. First, from the N-gain results, it can be seen that there is a significant difference in scores, where practicum-based Gallery Walk learning has a higher average score of 67.0 while practicum-based Jigsaw learning is only 53.3.

In the results of the N-gain of students' Science Process Skills per aspect, gallery walk learning places a higher value position on all observed aspects. In the observation aspect of learning, the gallery walk is able to find new knowledge and can facilitate students' memory because something that is found is seen directly. In the aspect of interpreting the process of learning, Gallery Walk can also motivate student activity in the learning process because if something new is found to be different from one another they can correct each other between fellow students, both groups and between students themselves.

Gallery Walk in the aspect of implementing and planning research can streamline lesson time and students can more easily understand lessons because Gallery Walk learning provides an opportunity for students to create a work and see firsthand their lack of understanding of the material being studied by looking at the work of other friends and can interact with each other to fill that gap. For the classification aspect of learning, Gallery Walk allows students to do and find the observed facts for themselves, collect data and then look for similarities and differences in the material being studied, so students are active while the teacher only motivates and observes the work of students. Gallery Walk learning also accustoms students to being able to give and receive criticism from others in this case being able to develop aspects of communicating in Science Process Skills.

The practice-based learning with Jigsaw has a smaller N-gain value than Gallery Walk, both overall and per aspect. This is caused by several factors. In the observation aspect, observation activities are carried out when students are in the expert group, the assignment of group members to become an expert team often does not match the abilities and competencies that must be learned. Before the first material expert team returned to their original group to serve as peer tutors, it was necessary to do a mastery test of the material that was their task, so that the learning objectives could be achieved.

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

Aspects of Science Process Skills communicating in practicum-based Jigsaw learning students who do not have confidence in discussing will find it difficult to convey material to their friends. In the aspect of planning research and implementing students who are not used to competing, it will be difficult to follow the learning process coupled with practical activities. The stages of Jigsaw learning require quite a lot of time so that the observation aspect in practicum activities is not optimal so that the time used is not in accordance with the curriculum load. A common factor that occurs is the condition of a crowded class, which makes students less able to concentrate in receiving and delivering learning.

The results of research that support the fact that the use of the model greatly influences students' Science Process Skills are the results of research by Pratiwi, pramudiyanti, Bintoro (2014), showing that students' science process skills have increased with an average N-Gain of 63.05. Student learning activities also increased with an average of 88.02. Thus, the use of the practical method with the Jigsaw learning model has a significant effect on improving science process skills and student learning activities on the subject matter of the characteristics of living things.

2. Scientific Attitude

a. N-Gain Scientific Attitude in Practical-Based Jigsaw Learning The results of the calculation of the N-Gain scientific attitude in the experimental class I with practical-based Jigsaw learning can also be presented in the gallery walk frequency distribution table and the histogram graph in Figure 4.

Table 4. Jigsaw Frequency Distribution on Scientific Attitude

Interval Class	F	Relative Frequency (%)
22-32	2	4,88
33-43	4	9,76
44-54	5	12,20
55-65	13	31,71
66-76	12	29,27
77-87	4	9,76
88-98	1	2,44
Total	**41**	**100**

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

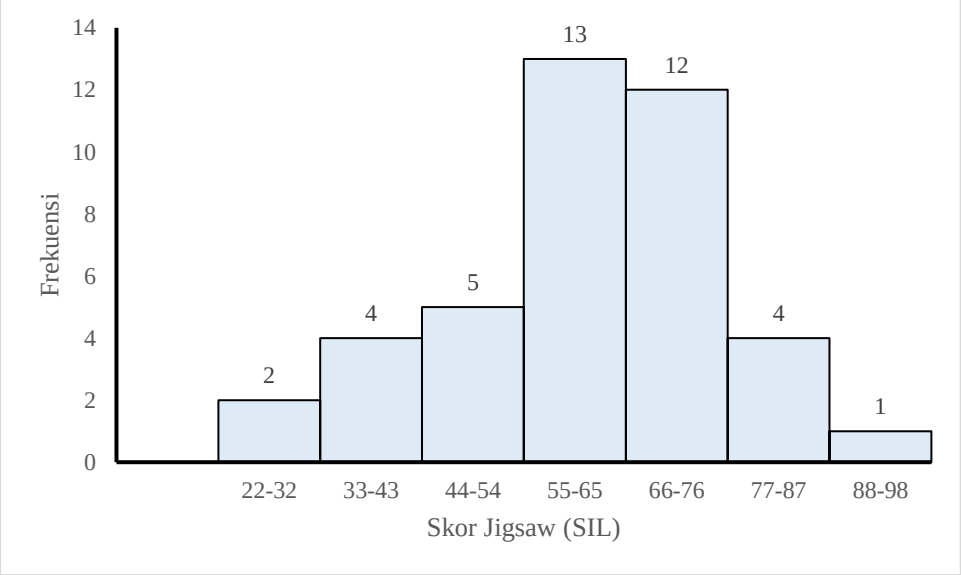

Figure 4. Jigsaw Frequency Distribution on Scientific Attitude

b. N- Gain Scientific Attitude In practicum-based Gallery Walk learning The results of the N-Gain calculation in the experimental class II, namely Gallery Walk learning based on practicum on students' scientific attitudes can also be displayed in the frequency distribution table in table 5 and Figure 5

Table 5. Gallery Walk Frequency Distribution on Scientific Attitude

Interval Class	F	Relative Frequency (%)
8-19	3	7,32
20-31	3	7,32
32-43	7	17,07
44-55	10	24,39
56-67	13	31,71
68-79	4	9,76
80-91	1	2,44
Total	**41**	**100**

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

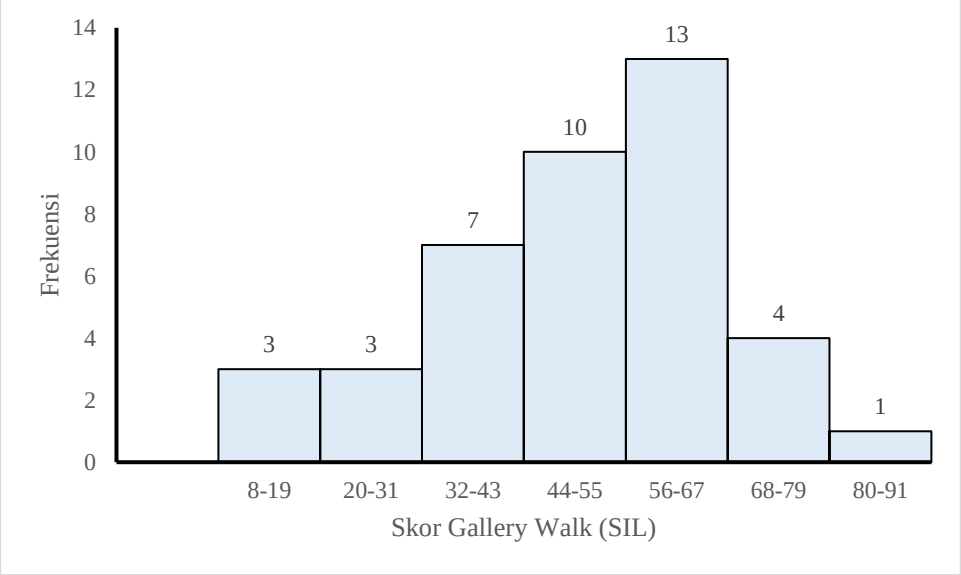

Figure 5. Gallery Walk Frequency Distribution on Scientific Attitude

c. Results N- Gain Scientific Attitude Per Aspect

The calculation of N-gain is carried out to determine the increase in the ability of scientific attitudes. The results of the calculation of N-gain scientific attitude per aspect in the experimental class I and experimental class II can be seen in the following tables and graphs:

Table 6. N-Gain of Scientific Attitudes Per Aspect

Aspects of Scientific Attitude	**N – Gain**			
	Experiment I	**Category**	**Experiment II**	**Category**
Curiosity	64	Medium	47	Medium
Critical thinking	42	Medium	30	Medium
Diligent and thorough	68	Medium	51	Medium
Not easy to believe	62	Medium	55	Medium
Honest and responsible	61	Medium	53	Medium
Open	60	Medium	54	Medium
Mean	**57**	**Medium**	**54**	**Medium**

For more details, the distribution of data in Table 6 can be seen in Figure 6

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

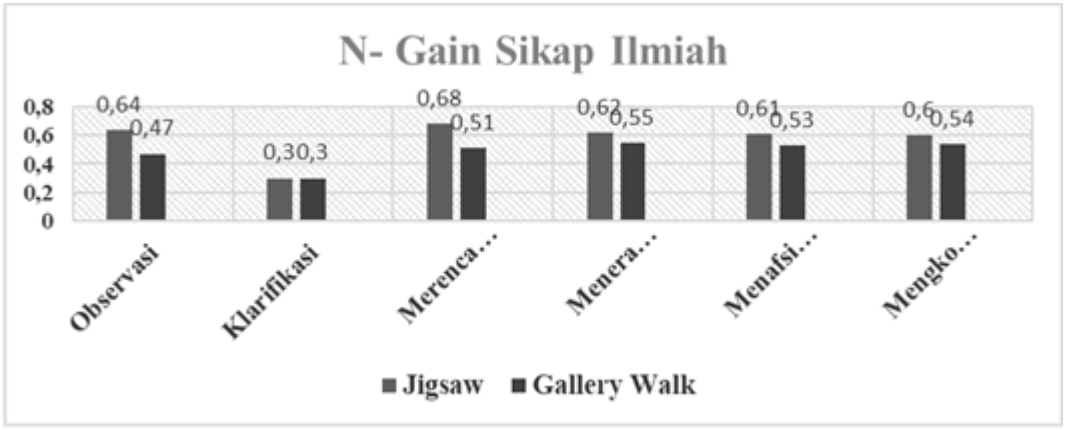

Figure 6. Scientific Attitude N-Gain Per Aspect

Based on the results of the N-gain hypothesis test of students' scientific attitudes, it was concluded that there were significant differences between students who carried out practicum-based Jigsaw learning and students who carried out practicum-based Gallery Walk learning. The significant difference based on the researcher's observations was caused by several factors. First, from the N-gain results, it can be seen that there is a significant difference in scores, where practicum-based Jigsaw learning has a higher average score of 60.6 while practicum-based gallery Walk learning is only 49.9.

In the results of N-gain students' scientific attitude per aspect, Jigsaw learning places a higher value position on all aspects observed. In the aspect of curiosity, the selection of challenging problems encourages students to have curiosity. Jigsaw learning can help students in critical thinking aspects in solving problems faced together in groups. Practical activities in Jigsaw learning make students more diligent and careful in observing because they carry out their respective tasks that must be submitted to their groups. The division of tasks to each individual in addition to making students diligent and thorough also makes students not easily believe in their findings. Students will review their findings because students have concerns that their findings are not in accordance with the theory being studied so that it will have an impact on their group scores.

Practical-based jigsaw learning can increase students' sense of responsibility towards their own learning and the learning of others. Students not only learn the material provided, but they must also be ready to provide and teach the material to other group members. For the open aspect of Jigsaw learning, it is effective to train students to speak to convey their own ideas/ideas/opinions so that each student complements each other.

The practicum-based learning with Gallery Walk has a smaller N-gain value than Jigsaw both overall and per aspect. This is caused by several factors. The large number of students in one class makes the members in one group more numerous,

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

so that some students depend on their friends' work. In general, the cause of the low N-Gain of gallery walk learning compared to Jigsaw learning on students' scientific attitudes is that there is no division of individual tasks and there is no individual obligation to convey it to others so that students lack curiosity, think critically, so they are less diligent and thorough. Students are also less curious so it is easy to believe in their findings without further investigation. It is very clear that the responsibility of students in learning Gallery Walk is lower, especially for students with low learning motivation, they will rely on students who are diligent. For conveying ideas or ideas, only group representatives serve as presenters, students who are shy or tend to be quiet cannot open up to one another.

Research results that support the fact that the use of the model is very influential on scientific attitudes are research results. The results of this observation are in accordance with the research conducted by Una Lailis Tsani, et al (2016) which concluded that Gallery Walk can train public speaking and increase collaboration and creativity and student cohesiveness during the learning process. This is also supported by the results of I Pande's research (2014) which states that jigsaw learning can improve students' scientific attitude.

3. Implementation of practice-based Jigsaw and Gallery Walk learning

a. By teacher

Table 7. Recapitulation of the Percentage of Observation Results of Teacher Activities in Jigsaw and Gallery Walk learning

Meeting	% Implementation of Jigsaw	% Implementaion of Gallery Walk	Criteria
1	**94 %**	**83%**	**Almost all activities carried out**
2	**94%**	**94%**	**Almost all activities carried out**
3	**100%**	**100%**	**All activities carried out**
4	**100%**	**100%**	**All activities carried out**

Based on table 7 at meetings one and two, learning activities have not been fully implemented either on the jigsaw or gallery walk this is due to time constraints so that the teacher cannot carry out closing activities in the form of responding to the results of the discussion and informing the material for the next meeting. the two learning activities have not been fully implemented either on the jigsaw or

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

gallery walk this is due to time constraints so that the teacher cannot carry out closing activities in the form of responding to the results of the discussion and informing the material for the next meeting.

b. By Student

Table 8. Recapitulation of the Percentage of Observation Results of Student Activities in Jigsaw and Gallery Walk learning

Meeting	% Implementation of Jigsaw	% Implementation of Gallery Walk	Criteria
1	**71,4 % (most activities carried out)**	**83%**	**Almost all activities carried out**
2	**85,7%**	**94%**	**Almost all activities carried out**
3	**92,8% (Almost all activities carried out)**	**100%**	**All activities carried out**
4	**100%**	**100%**	**All activities carried out**

Based on table 8 learning activities at the first meeting, especially in Jigsaw learning, most of the activities carried out were due to the first new students carrying out the learning carried out so that they needed adjustments. In addition, there were quite a lot of experiments conducted at the first meeting and students were still not used to using various types of laboratory equipment. so that it is quite time-consuming. For Gallery Walk learning, the implementation of learning is easier so that in each meeting there are no significant obstacles.

CONCLUSION

1. There are differences in the Science Process Skills of students who carry out practicum-based Jigsaw learning with students who carry out practicum-based gallery walk learning based on differences in N-gain values in practicum-based Jigsaw and Gallery Walk learning.
2. There are differences in the scientific attitude of students who carry out practicum-based Jigsaw learning with students who carry out practicum-based gallery Walk learning.
3. Practical-based Jigsaw and gallery walk learning can develop students' science process skills and scientific attitudes

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

REFERENCES

Agasta Ika Wulansari.2012. *Pengaruh pembelajaran Kooperatif Tipe Jigsaw di Padu Dengan Eksperimen Terhadap Keterampilan Proses Sains Siswa Kelas X SMA Negeri 1 Kartasura. Tahun pelajaran 2011/2012*. (Skripsi) Surakarta : Fakultas Keguruan dan Ilmu Pendidikan Universitas Sebelas Maret.

Akhyar, M.Saiman. 2004. *Biologi untuk SMA kelas 1 Semester 1*. Bandung: Grafindo Media Pratama.

Ali Muhammad, Muhammad Ansori. 2011. *Psikologi Remaja, Perkembangan Peserta Didik.* Jakarta: Bumi Aksara.

Ali Nugraha. 2008. *Pengembangan pembelajaran Sains Pada Anak Usia Dini*. Bandung: Jilsi Foundation.

Athur A.Carin and Robert B. Sund. 1989. *Teaching Science Through Discovery*. Ohio: Carol Driver

Budiharto, Arif. 2010. *Problematika Implementasi Metode Gallery Walk Dalam Pembelajran Biologi Materi Pokok Virus Kelas X di MA Islamiyah AT-Tanwir Talun Sumberrejo Bojonegoro tahun 2010 /2011 (Skripsi)*. Semarang IAIN Walisongo

Dahar, Ratna Wilis. 2011. *Teori – Teori Belajar dan Pembelajaran.* Jakarta: Erlangga.

Darmodjo, Hendro, Yeni kaligis. 2004. *Ilmu Alamiah Dasar*. Jakarta: Pusat Penerbitan Universitas Terbuka.

Dimyati, Mudjiono. 2013. *Belajar dan pembelajaran.* Jakarta: Rineka Cipta

Djamarah, Syaiful Bahri. 2006. *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta

Ependi, 2013. *Pengaruh Metode Praktikum terhadap Keterampilan Proses Sains Siswa Pada Materi Keragaman Sistem Organisasi Kehidupan.. (Skripsi).* Bandar Lampung : Universitas Lampung

Eny Suryaningsih. 2014. *Pengaruh Media Pembelajaran dan kemandirian Belajar Terhadap Kemampuan Keterampilan Proses Sains*. Tesis PPs Universitas Negeri Jakarta

Heni Nuryanti. 2011. *100 % suka Biologi*. Jakarta: Trans Media

Imas Kurniasih.2015. *Ragam Pengembangan Model Pembelajaran Untuk Peningkatan Profesionalitas Guru*. Jakarta: Kata Pena

I Pande Putu Alit Antara. 2014. *Pengaruh Pembbelajaran Kooperatif Jigsaw Terhadap Penguasaan Konsep Kimia Dan Sikap Ilmiah Siswa.* Jurnal pendidikan dan Pengajaran. Jilid 47, No.1:76-84

Ismail SM. 2008. *Strategi Pembelajaran Agama Islam Berbasis Paikem.* Semarang: Rasail Media Group.

L. Silberman, Melvin. 2006. *101 Active Learning.* Bandung: Nusa Media dan nuansa. Edisi Revisi

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

Lie. 2002. *Cooperative Learning.* Jakarta: GramediaWidiasarana Indonesia.intoro. 2013.

Karina pratiwi, Pramudiyanti, Arif Bintoro, 2013. *Pengaruh Penggunaan Metode Praktikum Dengan Model Jigsaw Terhadap Keterampilan Proses Sains Siswa.* Jurnal Pengajaran MIPA.1-11.

Kanedi.2015. Inilah Arti Fakta dan Teori dalam Sains. m.kompasiana.com.diakses tanggal 7 maret 2015

Kurniati, Tuti. 2004. *Pembelajaran Pendekatan Keterampilan Proses Untuk meningkatkan Keterampilan Berfikir Kritis Siswa*. Tesis PPs Universitas Pendidikan Indonesia

M.Subana dan Sunarti. 2011. *Strategi Belajar mengajar Bahasa Indonesia*. Bandung.: CV Pustaka Setia

Muh.Tawil, Liliasari. 2014. *Keterampilan – keterampilan Sains dan Implementasinya Dalam Pembelajaran IPA.* Makasar: Badan Penerbit Univrsitas Negeri Makasar.

Nur Azizah. 2014. *Pengaruh Metode Pembelajaran Jigsaw terhadap Hasil BelajarMata pelajaran Dasar Kompetensi Kejuruan Di SMK Wongsorejo Gombong.* Jurnal Penelitian 1-14

Rakhmat, Cece, Nandang Budiman, & Nenden I. Herawati. 2006. *Psikologi Pendidikan.* Bandung: UPI Press

Sari, Prima Mutia. 2013. *Pengaruh Model pembelajaran Berbasis praktikum terhadap Keterampilan proses Sains, Sikap Ilmiah Dan penguasaan Konsep Sistem Regulasi.* (Thesis). Bandung : Universitas Pendidikan Indonesia.

Slameto. 2010. *Belajar & Faktor – faktor yang mempengaruhinya.* Jakarta: Rineka Cipta.

Sora.N. 2015. Pengertian Sains secara singkat dan jelas-pengertian apapun. www.pengertianku.net. diakses tanggal 6 maret 2016

Suhara, Basor Suhada. 2004. *Sains Biologi SMP Kelas VII.* Bogor: CV. Regina

Sukarno. 2014. *Profil pembelajaran Sains Berbasis kelas Sebagai Upaya Mengembangkan KPS Dan Meningkatkan PKS Siswa.* *Jurnal Pengajaran MIPA.*Volume 19. No.2 : 214-223

Suyono, Hariyanto.2015.*Implementasi Belajar dan Pembelajaran.* Bandung: Remaja Rosdakarya

Syamsul hadi. 2016. *Jaringan Otot Polos, Otot Lurik, Otot jantung*. http://www.cafependidikan.com. Diakses tanggal 15 mei.

Una Lailis Tsani,dkk. 2016. *Efektivitas Model pembelajaran Berbasis proyek Dengan Metode Gallery Walk Pada Pembelajaran materi Sel Di SMA.*Unnes Journal Of Biology Education. Volume 5 No.1:31-37

Wahyuni, Sri (2015). *Penggunaan Literasi IPA Dengan Metode gallery Walk Untuk meningkatkan Hasil Belajar Siswa Pada Materi Pokok Indera peraba*

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep

Manusia (Kulit) Kelas IV MI Miftahul Ulum Genuk Semarangtahun pelajaran 2013/2014.

Wartono, dkk. 2004. *Materi pelatihan Terintegrasi Sains.* Jakarta: Departemen Pendidikan Nasional.

Wijaya, Agung. 2008. *Biologi VII untuk Sekolah Menengah pertama dan MTs Kelas VII*. Jakarta: Grasindo.

Wina Sanjaya, 2008. *Strategi pembelajaran Berorientasi Standar Proses Pendidikan.* Jakarta: Kencana

Yeti Sulastri, Diana Rochintaniawati. 2009. *Pengaruh penggunaan Pembelajaran Kooperatif Jigsaw dalam Pembelajaran Biologi Di SMPN 2 Cimalaka.* Jurnal pengajaran MIPA. Volume 13.No.1: 15-21

Copyright © 2021 Fitri Laila, Prasetyorini, S. Kurniasih
https://journal.unpak.ac.id/index.php/jsep