Jurnal Akademika Kimia, 10(2): 72-77, May 2021
ISSN (online) 2477-5185 | ISSN (print) 2302-6030
http://jurnal.fkip.untad.ac.id/index.php/jak/

OPEN ACCESS

Application of Inquiry Learning Model with Lesson Study (LS) Pattern on Student Learning Outcomes in Colloid System Material

***Nur H. Wahyuni, Suherman & Tahril**
Program Studi Pendidikan Kimia/FKIP – Universitas Tadulako, Palu – Indonesia 94119

Received 05 March 2021, Revised 08 April 2021, Accepted 07 May 2021
doi: 10.22487/j24775185.2021.v10.i2.pp72-77

Abstract

This study aimed to know the effect of applying the inquiry learning model with lesson study (LS) pattern on student learning outcomes in colloid system material in class XI SMA Negeri 1 Sigi. This type of research was a quasi-experiment with an equivalent post-test design. Samples were determined by the purposive sampling method. The sample used in this study was students of class XI MIA 3 as an experimental class with 24 students and XI MIA 4 students as a control class with 20 students. The processing of student learning outcomes data used a non-parametric analysis of the Mann-Whitney U-Test test. The results showed that the mean value of the experimental class was higher than the control class, which was 23.98>15.82. Results of statistical analysis sig. 2-tailed was (0.019) <0.05 and $Z_{calculation}$ (-2.336) < Z_{table} (-1.96), based on decision-making criteria, it stated if the value of -$Z_{calculation}$<Z_{table} then H_0 is rejected. Therefore, it can be concluded that there is the effect of applying the inquiry learning model with lesson study (LS) pattern on student learning outcomes in colloid system material in class XI SMA Negeri 1 Sigi.

Keywords: Lesson study (LS), inquiry, colloid system, learning outcomes

Introduction

Education is the most important component in efforts to educate the nation's children and advance this nation towards a better direction. The most important thing that cannot be ignored in education is the figure of a teacher. Teachers have a significant role in formatting their students in school. Supini & Manurung (2010) state that teachers are highly expected in an effort to improve the quality of learning by trying various innovative learning strategies and will later be able to create a conducive learning atmosphere to improve learning outcomes.

In line with the implementation of the 2013 curriculum aims to produce productive, creative, innovative, and effective Indonesians through strengthening attitudes, knowledge, and skills. Therefore, the learning design in the 2013 curriculum must create a more interactive learning pattern and transform an isolated learning system into networked learning. The learning approach that is suggested and becomes the character of the 2013 curriculum is the scientific approach, whose application procedure has stages, namely asking, trying to associate, then communicating what is expected to produce students who are good at attitudes, knowledge, and skills (Putri et al., 2014)

Based on an interview with a teacher at SMA Negeri 1 Sigi, information was obtained; if you look at the learning outcomes of class XI students, there are still many who experience difficulties in chemistry lessons. The indicators are (1) there is a lack of student interest in learning chemistry; because of that, every implementation of student learning lacks concentration. (2) Student learning outcomes are still low; it is known that the average score of semester mid results in chemistry class XI students at SMA Negeri 1 Sigi is only 54.78, while the minimum completeness criteria set by the school is 65. According to Meilani (2016), the affective, cognitive and psychomotor domains are three domains covered in student learning achievement. These three domains are generally integrated with the final score of students juxtaposed with the score from the completeness criteria to see the relative achievement of students where there is a specified minimum score.

Concepts in chemistry are interrelated, including the material in the colloid system. Colloid system material is suitable if it is taught to students with a learning model that involves students directly in understanding this material; learning in schools still tends to be teacher-centered (teacher-centered learning), it can be seen from student learning activities that are still lacking so that students become passive (Istiana et al., 2015).

*Correspondence:
Nur H. Wahyuni
e-mail: Nurhijrahwahyuni96@gmail.com

Chemistry is essentially a way of finding out and understanding about nature systematically so that chemistry is not taught just by providing an understanding of meanings, facts, concepts, principles, but also a discovery through a process of searching with real action (inquiry) (Maliha, 2011). The inquiry model is defined by Piaget (Sund & Trowbridge, 1973) as earning that prepares situations for children to carry out their own experiments, in a broad sense wanting to see what is happening, wanting to do something, wanting to use symbols, and looking for answers to their own questions, linking findings from one discovery to another, comparing what has been found and what others have found.

Meanwhile, Trowbridge et al. (1981) described the inquiry model as a process of defining and investigating problems, formulating hypotheses, designing experiments, finding data, and drawing conclusions on these problems. Furthermore, Trowbridge said that the essence of inquiry teaching is to organize a student-focused learning environment/atmosphere by providing sufficient guidance in discovering scientific concepts and principles.

A model for teacher development to achieve the quality of learning in schools is lesson study. Lesson study is a model of professional education development through collaborative and sustainable learning based on the principles of collaboration and mutual learning to build a learning community. Lesson studies are carried out in 3 stages, namely planning (plan), implementing (do), and reflecting (see) in the form of sustainable activities (Rustono, 2008).

Lesson study is the enhancement of learning and the process of building knowledge that begins in Japanese basic education. Lesson study teachers in Japan work in small teams to plan, teach, observe, analyze, and improve individual class lessons, called lesson research. Almost all Japanese teachers participate in lesson study teams during the school year. In addition, they regularly observe instructional research in their school, which has lessons for the general public. Basically, Japanese lesson study is a broad-based, teacher-led system for teaching and learning improvement (Cerbin & Kopp, 2006).

Lesson study positions students as the center of learning. Teachers do not only transfer teaching materials but provide motivation and inspiration for students to be creative and independent. Through lesson study, students can dialogue and interact with fellow students openly and interactively under the guidance of the teacher so that they are motivated to master the teaching materials that are presented. Students are encouraged to be actively involved in understanding the material being taught, not only to be loyal viewers and listeners (Undang, 2009).

Learning outcomes are changes in student behavior due to learning. This change is pursued in the teaching and learning process to achieve educational goals. Behavior change is caused by students achieving mastery of a number of materials provided in the teaching and learning process (Purwanto, 2013). Learning outcomes are abilities possessed both in the form of knowledge (cognitive), attitudes (affective), and skills (psychomotor), all of which are obtained through the teaching and learning process (Romadhoni et al., 2019). The factors that influence student learning outcomes from within are student interest and motivation (Rajab et al., 2018).

Methods

The type used in this research is quasi-experimental or quasi-experimental with the equivalent post-tests group design. The complete research design can be seen in **Table 1**.

Table 1. Research design

Class	Treatment	Posttest
KE	X_1	O_2
KK	X_2	O_2

where
EC: experiment class, CC: control class, O_2: post-test colloid system material, X_1: inquiry learning model lesson study (LS) pattern, and X_2: Inquiry learning model

The population in this study were students of class XI at SMAN 1 Sigi, who was registered in the 2017/2018 school year. Two classes were selected using a purposive sampling method, namely a sampling technique based on certain considerations, namely classes that have relatively the same student learning outcomes, the same facilities and facilities, and classes are taught by the same teacher in the chemistry learning process so that it can be considered that these two classes have the ability the same beginning. Purposive sampling is part of a type of nonprobability sampling, where this type does not provide equal opportunities for every element or member of the population with the Inquiry learning model with lesson study (LS) pattern and other classes are given inquiry learning.

The principles that must be adhered to in lesson study learning are: (a) the principle of

openness, namely the willingness of teachers to be observed during learning. (b) the principle of togetherness, namely providing input, notes about facts in the implementation of learning in the classroom. (c) the principle of self-understanding, which is to provide opportunities for students to carry out the process of understanding learning. (d) the principle of self-introduction, which is to provide opportunities for students to try out new learning tools. (e) the principle of self-adjustment is to create a learning atmosphere in accordance with class levels and levels so that students become more active. (f) collaborative principle, namely the application of the learning process together or collaboration (Chairunnisa et al., 2017).

Results and Discussion

The learning outcome test is arranged in the form of a six numbers essay. This test is done to determine learning outcomes during the learning process. The list of comparison scores for the chemistry learning outcomes tests about Colloids in the experimental class and control class students can be seen in **Table 2**.

Table 2. Student learning outcomes about colloids

Description	Post-test	
	Experiment Class	Control Class
Sample	24	20
Lowest score	53	53
Highest score	90	90
Average	70.68	69.05
Deviation standard	3.50	3.30

Based on the hypothesis in this study, Inquiry learning patterned Lesson Study is used to help students with learning difficulties. Resulting in that there is effect of student learning outcomes on the forward learning model of inquiry patterned Lesson study in class XI students of SMAN 1 Sigi. Mathematically it can be stated as follows:

Ho: There is no difference in student learning outcomes in using the inquiry study model with the lesson study pattern and the inquiry learning model.

Ha: There are differences in student learning outcomes in using the lesson study model of inquiry and the inquiry learning model.

They were testing the research hypothesis using the nonparametric test Mann-Whitney U-Test analysis. This test was carried out because the data in this study were not normally distributed. The calculation of data analysis uses the calculation assistance of the statistics software. The results of the Mann-Whitney U-test analysis will meet the criteria for testing the hypothesis Ha is accepted and H_0 is rejected if U_{count} is less than U_{table}, for a sample of ≤ 20. The sample in this study amounted to 24 people in the experimental class and 20 people in the control class, then testing the hypothesis using the Z_{table} approach. The hypothesis proposed in this is that there is an effect of the application of the Inquiry learning model with the Lesson Study pattern on student learning outcomes on Colloid material in class XI SMAN 1 Sigi.

The test analysis results for the variable student learning outcomes obtained the output "Rank" for the mean value of the experimental class is more excellent than the control class, namely 23.98 > 15.82. The results of statistical analysis obtained are P.Sig (0.019) < alpha (0.05) and Z_{hitung} (-2.336) < Z_{table} (-1.96), based on the decision-making criteria which states if the value - Z_{hitung} < Z_{tabel} then H_0 is rejected so that it can be concluded that there is an effect of the application of the inquiry learning model with the lesson study (LS) pattern on student learning outcomes on colloid material in class XI SMA Negeri 1 Sigi. The results of these tests were analyzed using the Mann-Whitney U-test.

Based on the data from the observation of the implementation of learning, the two classes used as the research sample both used the Inquiry learning model, only in the experimental class the inquiry learning model was combined with LS so that there was a difference with learning in the control class where LS had three main stages, namely the plan, do, and see. (Dirjen PMPTK, 2008).

The planning stage aims to design learning that can teach students how to actively participate in learning activities. The implementation stage is the stage of implementing the learning design that has been prepared previously. During the learning process, the observer focuses attention on student activities, namely the interaction of fellow students (students), students and teachers (students and lecturers), students (students) with teaching materials, and student interactions with the environment. After completing the learning process, a discussion was held between the model teacher and the observer. At first, the model teacher (lecturer) conveyed impressions during the learning process, then continued by observers. Observers must convey the facts of their findings in class honestly and wisely in order to improve the learning process. The teacher (lecturer) model must be able to receive input from observers to improve learning at a later stage. In principle, everyone who is involved in the lesson study activities must get the

lessons learned. Thus lesson study activities can be used to build a learning community (Elvinawati et al., 2012).

The first stage is designing learning that can teach students how to actively participate in learning activities. The planning stage was carried out to discuss the lesson plan, worksheets, and the observer rules. The teacher who served as the model teacher presented the learning tools that would be implemented in the implementation of the do; the observers provided input or suggestions in order to improve the tools that would be implemented in the classroom. LS is not a strategy or learning model, but LS activities can apply various strategies and learning models that can be adapted to the situations and conditions, and problems faced by the teacher in each learning process (Khaeriyah et al., 2011).

The involvement of all students to be active in the learning process is very necessary. In cooperative groups, learning becomes an activity that can make students excel among their peers. Several studies conducted by Deutsch and Thomas have shown that when students work together to achieve a group goal, it makes them express good norms in doing whatever is necessary for group success (Melati, 2011).

The second stage is the implementation stage (do); the stage is carried out by a model teacher and five observers. The model teacher and the observers entered the class together. Observers should take a position behind or on the side as long as it does not interfere with learning activities. Observer observes all activities of students during the learning observation process. He can also record all learning activities with the tools that have been prepared (camera, camcorders, or CCTV) (Akhmad et al., 2014).

Table 3. Results of observation of student activities

Meeting	Observer	Total of Value	Percentage (%)
I	Observer I	104	52.00
	Observer II	121	50.41
	Observer III	115	57.50
	Observer IV	128	53.33
II	Observer I	111	55.5
	Observer II	130	54.17
	Observer III	123	61.50
	Observer IV	144	60.00
III	Observer I	131	65.50
	Observer II	140	61.66
	Observer III	144	72.00
	Observer IV	154	64.17
Average		129.41	58.82

The results of the observation of the first meeting activity data of students who got a score of 53.18 were included in the reasonably active category, and the learning result test or assessment was given to students gave an overview of the learning outcomes of the LS class where 24 students obtained 17 students who completed 70.83 % and incomplete amounted to 7 people 29.16 %.

Observation of second meeting activity data, namely the readiness of students in participating in learning activities is good, students' attention and understanding of the material presented by the model teacher is good enough, it's just that there are some students who do not follow the learning process well, this was due to students who were not paying attention to the teacher explaining only telling stories and playing on the cellphone. The results of observations of student activity data who get a score of 57.73 and a test of learning outcomes or assessments given to students provide an overview of the learning outcomes of LS class where the completeness score is 83.33 % which indicates an increase in activity and learning outcomes.

Observation of the third meeting activity data, namely the readiness of students in participating in learning activities, is very good, students' attention and understanding of the material presented by the model teacher is good, as shown by the exercise of students asking questions about the material being taught. This third meeting is very different from the previous meeting. Students become interested in participating in the learning process, students' attention increases, and they become active after being given practice on the questions they do well. Observation results of student activity data who get a score of 65.56 are included in the active category, and the learning result test or assessment is given to students provides an overview of the learning outcomes of the LS class (experiment), where the completeness value is 100 % which shows an increase, this happens that the more both student activities in the teaching and learning process, the student learning outcomes will also increase.

Table 4. Student outcomes

Completeness	Meetings		
	I	II	III
Complete	70.83%	83.33%	100%
Not Complete	29.16%	16.66%	0.00%

The data in **Table 4** can be seen that lesson study learning is very good and suitable to be applied to curriculum development in improving the process standards and passing standards of each subject competency, especially chemistry subjects. Lesson study is the most suitable approach to give current teachers the opportunity to deepen their knowledge of the subject matter as well as psychologic knowledge, that is, how to lead the minds of learners with special needs in this regard, in collaboration with other colleagues. Therefore, collaboration is the foundation of LS and a place for teachers to share their teaching experiences and knowledge with others (Chia, 2013).

The data above provides a temporary conclusion that with the increasing student activity in learning, the learning outcomes also increase. If student learning activities increase and student learning outcomes increase, it means that the quality of learning increases. Increased learning outcomes, an active classroom atmosphere where information sharing occurs with collaboration between teachers and observers so that lesson study can be implemented or applied in all subjects (Wahyuni, 2013).

The third stage is the reflection stage of the learning process carried out immediately after the implementation of the learning. This is intended so that all important events that have occurred are not forgotten in doing reflection. This activity is a very important stage because it is an effort to improve the learning process based on observations of the implementation of learning that has been implemented. From the results of the action (do) and observer observations, it is obtained a general description that the model teacher has tried to carry out learning well, which can increase student activity and interest in the learning process. Overall, lesson study learning is clear that students respond positively to group work. It is important to adhere to the view that lesson study is not about criticizing instructors; no, it should focus on observing student learning. However, there is an opportunity to provide feedback (Groningen & Bennett, 2012).

Based on the data obtained in the inferential statistical test, the lesson study patterned inquiry learning model has an influence with higher results on student learning outcomes. This is presumably because the experimental class was given treatment by applying the lesson study patterned inquiry learning model while the control class was given treatment with the inquiry learning model only. So it can be stated that learning by applying the lesson study-patterned inquiry learning model has a greater effect in improving student learning outcomes compared to the inquiry learning model alone because, in classes that use the lesson study pattern, reflection is held to increase student activity where maximum learning activity will show that learning going well and optimally so that learning is of higher quality. According to Hamalik (2011), the use of the activity principle provides great value for learning.

Conclusions

Based on the results of data analysis on student learning outcomes, it can be concluded that there is an effect of the application of the lesson study (LS) patterned inquiry learning model on student learning outcomes on colloid material in class XI SMA Negeri 1 Sigi. The post-test average learning outcomes of the experimental class and control class respectively 70.68 and 69.05, based on the average activity of the experimental class and control class students respectively 58.82% and 55% are included in the fairly active category, which describes that the increase in student learning outcomes from the results of the pretest and post-test in the experimental class and control class is quite high.

Acknowledgment

The author would like to thank the Headmaster and the chemistry teacher of Senior High School 1 Sigi, who has helped and supported the author so that data collection can be done well.

References

Akhmad, S., Haryono., & Fakhruddin. (2014). Pengembangan model supervisi klinis dengan pendekatan lesson study untuk meningkatkan kompetensi profesional guru bahasa inggris SMA Negeri di kabupaten Cilacap. *Journal of Educational Research and Evaluation, 3*(1), 7-17.

Cerbin, W., & Kopp, B. (2006). Lesson study as a model for building pedagogical knowledge and improving teaching. *International Journal of Teaching and Learning in Higher Education, 18*(3), 250-257.

Chairunnisa, Supriadi, & Rahman, N. (2017). Meningkatkan aktivitas dan hasil belajar siswa pada pembelajaran kimia penyetaraan reaksi redoks melalui lesson study di kelas XII IPA SMA Negeri 2 Palu. *Jurnal Akademika Kimia, 6*(1), 65-71.

Chia, N. K. H. (2013). A psychologic perspective of lesson study for special education teachers. *Academic Research International, 4*(4), 334-346.

Dirjen PMPTK, (2008). *Pedoman pelaksanaan mgmp berpola lesson study*. Jakarta: JICA

Elvinawati, Sumpono, & Amir, H. (2012). Lesson study pada mata kuliah kimia sekolah sebagai upaya peningkatan kualitas pembelajaran dan

pembangunan karakter (character building). *Jurnal Exacta*, *X*(2), 156-159.

Groningen, A. P. V., & Bennett, S. (2012). Lesson study: Collaboration, improvement, and reflection. *International Journal of Applied Science and Technology, 2*(8), 20-25.

Hamalik, O. (2011). *Kurikulum dan pembelajaran*. Jakarta: Bumi Aksara.

Istiana, G. A., Agung, N. C. S., & Soekardjo. J. S. (2015). Penerapan model pembelajaran *discovery learning* untuk meningkatkan aktivitas dan prestasi belajar pokok bahasan larutan penyangga pada siswa kelas XI ipa semester II SMA Negeri 1 Ngemplak tahun pelajaran 2013/2014. *Jurnal Pendidikan Kimia (JPK)*, *4*(2), 65-73.

Khaeriyah, S., Shofiyanti, Maliku, A., & Yetty, D. (2011). Implementasi lesson study menerapkan model STAD untuk meningkatkan interaksi, eksplorasi, dan motivasi siswa pada bahasa dispersi di kelas XII IPA SMA Negeri 1 Pontianak. *Jurnal Pendidikan Matematika dan IPA*, *2*(2), 28-38.

Maliha, M. (2011). *Pengaruh model guided inquiry (inquiry termbimbing) terhadap hasil belajar kimia siswa pada konsep laju reaksi (quasi eksperiment di kelas XI IPA SMAN 1 Leuwiliang*). Unpublished Thesis (S1). Jakarta: UIN Syarif Hidayatullah.

Melati, H. A. (2011). Meningkatkan aktivitas dan hasil belajar siswa SMAN I Sungai Ambawang melalui pembelajaran model advance organizer berlatar numbered heads together (NHT) pada materi kelarutan dan hasil kali kelarutan. *Jurnal Visi Ilmu Pendidikan, 6*(3), 619-630.

Purwanto. (2013). *Evaluasi hasil belajar.* Yogyakarta: Pustaka Pelajar.

Putri, C. A. I., Putra, K. N. D., & Dwi, R. (2014). Pengaruh metode pembelajaran SQ3R terhadap hasil belajar bahasa indonesia kelas V. *Jurnal Mimbar PGSD Universitas Pendidikan Ganesha Jurusan PGSD, 2*(1), 1-11.

Rajab, A., Masruhim, M. A., & Widiyowati, I. I. (2018). Hubungan antara minat belajar dengan hasil belajar siswa SMA menggunakan model pembelajaran numbered head together dengan bantuan media papan tempel pada pokok bahasan tata nama senyawa. *Bivalen: Chemical Studies Journal*, *1*(1), 39-44.

Romadhoni, E., Wiharna, O., & Mubarok, I. (2019). Pengaruh motivasi belajar terhadap hasil belajar peserta didik pada mata pelajaran gambar teknik. *Journal of Mechanical Engineering Education*, *6*(2), 228-234.

Rustono, W. S. (2008). Meningkatkan kemampuan mahasiswa menerapkan strategi pembelajaran melalui lesson study di Sekolah Dasar. *Jurnal Pendidikan Dasar, 10*(Oktober), 1-7.

Suminar, S. O., & Meilani, R. I. (2016). Pengaruh model pembelajaran discovery learning dan problem-based learning terhadap prestasi belajar peserta didik. *Jurnal Pendidikan Manejemen Perkantoran, 1*(1), 80-89.

Supini, & Manurung, B. (2010). Pengaruh pembelajaran kooperatif tipe jigsaw dan teknik pada pikiran terhadap hasil belajar sistem regulasi di SMAN 1 Lubuk Pakam. *Jurnal Pendidikan Biologi, 1*(2), 69-145.

Sund, R. B & Trowbridge, L. W. (1973). *Science; study and teaching (Secondary)*. Columbus, Ohio: Merrill.

Trowbridge, L. W., & Bybee, R. W., & Sund, R. B. (1981). *Becoming a secondary school science teacher*. Melbourne: Merill Publishing Company

Undang, G. (2009). *Lesson study model pengkajian pembelajaran kolaboratif.* Bandung: Sayagatama Press.

Wahyuni, S. (2013). Optimalisasi pembelajaran melalui pelaksanaan lesson study. *Jurnal Pendidikan Almuslim, 1*(1), 1-5.