

Utilization of Lesson Analysis as Teacher Self Reflection to Improve the Lesson Design on Chemical Equation Topic

E. A. Edyani^{1, a)}, A. Supriatna², Kurnia², L. Komalasari³

¹Sekolah PascaSarjana, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung 40154, Indonesia.

²Departemen Pendidikan Kimia, Universitas Pendidikan Indonesia.

³SMA Laboratorium Percontohan, Universitas Pendidikan Indonesia.

^{a)}icha.edyani@gmail.com

Abstract. The research is aimed to investigate how lesson analysis as teacher's self-reflection changes the teacher's lesson design on chemical equation topic. Lesson Analysis has been used as part of teacher training programs to improve teacher's ability in analyzing their own lesson. The method used in this research is a qualitative method. The research starts from build lesson design, implementation lesson design to senior high school student, utilize lesson analysis to get information about the lesson, and revise lesson design. The revised lesson design from the first implementation applied to the second implementation, resulting in better design. This research use lesson analysis Hendayana&Hidayat framework. Video tapped and transcript are employed on each lesson. After first implementation, lesson analysis result shows that teacher-centered still dominating the learning because students are less active in discussion, so the part of lesson design must be revised. After second implementation, lesson analysis result shows that the learning already student-centered. Students are very active in discussion. But some part of learning design still must be revised. In general, lesson analysis was effective for teacher to reflect the lessons. Teacher can utilize lesson analysis any time to improve the next lesson design.

1. Intorduction

Teachers as an important pillar in the world of education should have four competencies: pedagogic competency, personal competency, social competency, and professional competency. (Permendiknas, 2007). These competencies are crucial for the success of an education. Although wearing a good curriculum, but without balanced with the ability of the teacher then all in vain. Therefore, the Government demanded that all teachers to increase the competency of their self. One way teachers can do in enhancing the roles and responsibilities of the profession is to always do a self-reflection (Rahman, 2014). Self-reflection is a process of thinking back to interpret the experience for better planning in the future (Alwasilah, 2011). Through self-reflection teachers review the learning process that has been done, see advantages and disadvantages, evaluate, then apply it in further learning. This is expected to increase the teacher's self-competence. Especially in the designing process of learning (lesson design).

Lesson analysis is a way to see, hear, describe, discuss, and understand the interactions among teacher and students that comprise a lesson (Romagnano, Evans, & Gilmore, 2008). Many expert develop lesson analysis framework i.e. Fernandez, Kuno, Matsubara, and Hidayat&Hendayana. Hidayat&Hendayana framework already adapted to the process of education and learners in Indonesia. In this framework, teachers can see whether the learning process already student center or still teacher center, teachers can also view the interactions that occur between teachers with students and students



with students. Previous research that has been done by S (2015) shows that the teacher can generate a lesson of good design through self-reflection process with the help of lesson analysis on simple organic and inorganic compounds nomenclature topics. The next question is, how utilizing a lesson analysis as teacher self-reflection can improve the lesson design on chemical equation topic? In this study, main focus is the analysis of the effects of self-reflection process with the help of lesson analysis towards the lesson design designed by teachers.

2. Method

Qualitative method was used in this research. All data shown as descriptive form. The data collected is in the form of words of picture rather than number (Sugiyono, 2013). The research starts from build a chemical equation lesson design, implementation lesson design to senior high school student, utilize lesson analysis to get information about the lesson, and revise lesson design. The revised lesson design from the first implementation applied to the second implementation, resulting in better design for second implementation. The lesson process in the second implementation also analyzed by using lesson analysis. Then the findings from the analysis will be used to revise the last lesson design.

This research use lesson analysis Hendayana&Hidayat framework (2013) that have been adapted with student characteristic and learning condition in Indonesia. During the lesson process, all students and teachers activity are recorded using voice recorder and video recorder. Those records then transcribed, and applied to Hendayana&Hidayat lesson analysis framework. This lesson analysis format consist of conversation codes that occurs during lesson process. Each student-student and student-teacher conversation will be coded. The pattern that formed from the coding result will shows whether the lesson is teacher-centered or student-centered. Teacher then may use that pattern to reflect the lesson and improve the next lesson process. Flow of the research can be seen on Figure 1.

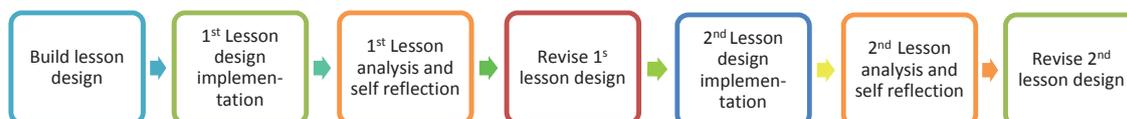


Figure 1. Research cycle

3. Results And Discussion

3.1. Build a Chemical Equation Lesson Design

Lesson Design that made in this research is different from Lesson design in general. The design consist of lesson activity or deductive situation created by the teacher, prediction of student's response, and teacher's anticipation. Objective of the lesson is to make the student be able to writes and equalizes chemical equation. So that the learning objectives achieved, the student's response prediction and teacher's anticipation should also be included into lesson design.

Lesson design that has been designed consists of two events, classical discussions and group. Both of these activities are designed to be student-centered learning through teacher's directives. The learning process of chemical equation starts from classical session. At classical session, teacher demonstrate reaction of nail with hydrochloric acid. This demonstration was observed by the students. Students and teachers then jointly determine the changes and write the equation. Then the students assisted by the teacher determine how to equalize the coefficients of equation.

Once the students gain a way to write and equalizes the equation, the learning process switched to a group. Students were divided into 8 groups, each consisting of four. Students work on five questions given by the teachers through discussion with a friend in the group. Each question will be reconfirmed in the classical style with the help of teachers.

3.2. First Lesson Analysis and Teacher Self Reflection

Following data obtained after transcribing and applying the recorded sound and video into lesson analysis format:

3.2.1. Classical Session. At this session, there are 184 classical dialogue/step which consists of 170 steps monologue of teacher's question-student's responses, and 10 steps student's initiative-teacher's response. Table 1 shows the categories of monologue teacher's question-student responses appear on a classical session in the first implementation. Based on existing data, it can be concluded that the learning process of a classical session in the first meeting is almost student-centered. This is because many students respond or argue when the teacher asked. Students do not just answer the close-question or resume fragments, but students often provide longer answers. As at the time of observing the demonstration, students observe and propose changes. There is also a dialogue initiative of the student-teacher response in the form of questions. This dialogue is there, although only slightly.

Table 1. Step number appears during classical discussions in the first implementation

No.	Category		Step Number Appears
	Teacher's Question	Student's Response	
1	Ask Yes/No	Yes/No	7
2	Ask resuming fragments	Resuming fragments	11
3	Ask definition	Answer by remembering notes	5
4	Ask with limited answer	Choose answer with no reason	12
5	Ask reason (contend)	Answer by reading text-book	39
		Answer by remembering notes	41
		Answer using own words	50
6	Paraphrase question	Answer using own words	6

3.2.2. Group Discussion Session. In the group sessions there are 1093 steps student's dialog. Number of dialogue with the involvement of teachers are 438 steps, while the dialog without the involvement of teachers are 655 steps. Based on these data it can be seen that the student-student dialog more dominant than the dialog between teacher-student. This indicates that students are active in group discussions. But in the group discussion of this first meeting there still some interruptions or teacher's involvement during the discussion process. Data of student's dialog with teacher's involvement is shown in Figure 2, and without teacher's involvement is shown in figure 3.

Based on figure 2, dialogs that occur the most are TTS-RIP and TPS-RPI. TPS-RPI dialog is a dialog in which student asks for teacher's approval regarding their assignment, and teacher lead them to find correct answer through question. TTS-RPI is a dialog in which student asks a solution of unresolved assignment, and teacher answers by giving question so the student can find their own answer. Based on this data, it can be concluded that there still many teacher's involvements in group discussion session. Teachers should let students discuss more with friends in the group. But teachers can anticipate questions from students well. Teachers did not directly answer student's questions, but first lead students by asking questions. Through these questions students are encouraged to think and obtain their own answers.

Figure 3 shows the kind of student's dialogue that appears during the student group discussion. The dialog that appears most in every group is EKB and EKM. These data indicate that students in each group do a question and answer to complete the tasks assigned by the teacher. Besides question and answer dialog, the students also argue about a problem. It can be seen from the number of agree-expressions (EKS) and disagree-expressions (EKT) showed by the students. In addition there is also the expression of "AHA" indicating that students achieve or obtain something. This further confirms that the students work together in solving the problem given by the teacher in the group.

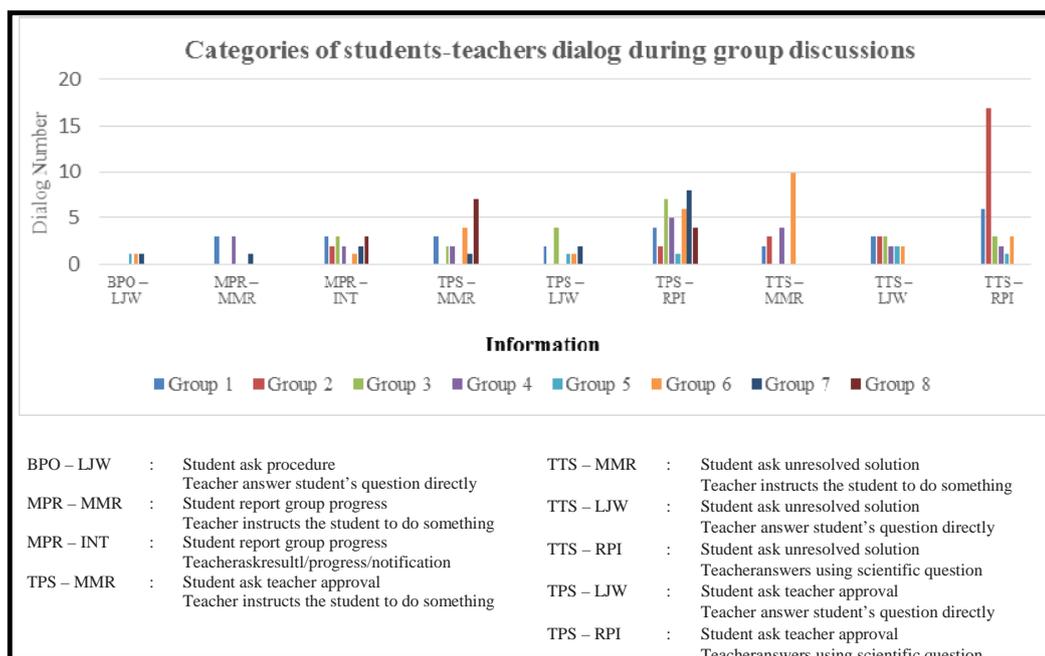


Figure 2. Categories of students-teachers dialog during group discussions in the first implementation

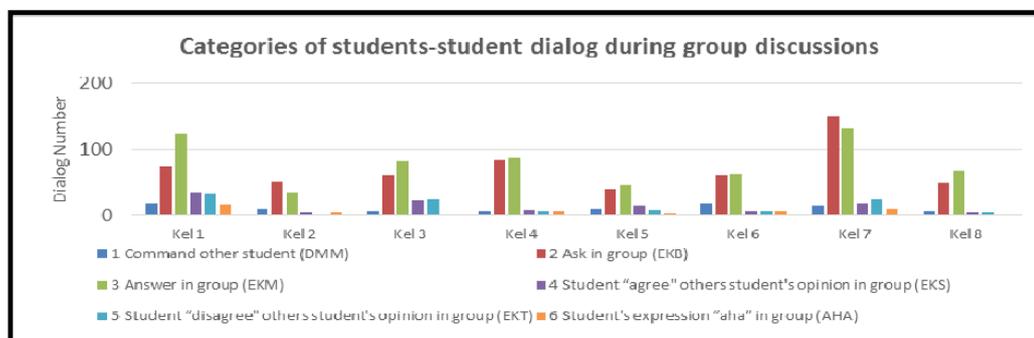


Figure 3. Categories of students-student dialog during group discussions in the first implementation

Based on the data that has been described above, it can be concluded that in the implementation of first chemical equation lesson design, the learning process has been student center, although there are still many interruptions from the teacher. Besides the data described above, it can be seen how the teacher guides the learning process, whether the learning process goes according to lesson design or not. Based on the results of the lesson analysis, teacher self-reflection results obtained through interviews as follows:

- G : In classical session, students have a great curiosity. Can be seen from the number of students coming to see the changes that occur from the reaction between nail and HCl. Students actively answer teacher's question about writing and equalizing chemical equation. Even in classical session students rarely ask, but all of the students involved in these activities.
- G : Sharing that occurred in the group has been very good. Students are divided into groups in which there are students with high cognitive ability, medium and low. Then one group consisted of two men and two women. Therefore, the discussion in the group will be effective. Although there is still many question to teacher.
- G : Almost all the group can solve the jumping problem. This happens because of the assistance given by the teacher that rice contains

carbohydrates. In this session, the students are very enthusiastic to search for information, from open books and search the internet. Students discover the formula of carbohydrates but are still confused by the combustion reaction and write energy is formed. Overall, students actively discuss, to find out, keen to communicate its findings, as well as appreciate the friend who gives some opinions.

- G : In terms of attitude, there are many students who changes at the time of learning, some students who had just silence before is being active and even willing to move forward, like Rafli and Harpa. Students who previously lacking focus and work on other things while learning, on learning yesterday they were focus and discuss in the group. In terms of cognitive, students who previously could only write chemical equation of a simple matter, be able to write and equalizes chemical equation of a problem or application.
- G : Most students already know how to equalize the equation. Students are less able to write down chemical equation caused by lack of knowing about nomenclature compound.
- G : There are many groups, the total are 8 groups. Very tired when describing or response student's question in each group. In addition there no enough time for confirming at the end, so the confirmation wasn't effective.
- G : In general what is planned has been implemented. But it takes so much time in first classical session, so the confirmation about the activities and the final confirmation becomes not effective.
- G : In terms of lesson design, the first classical activities should not be too long to allow more time to confirm all the questions well. Then a final confirmation really has to be effective so that the students fully understand. Change the demonstration to a more observable, such as the burning of Mg. Besides the nomenclature of the compounds will be emphasized so that they can write the equation. In terms of technical implementation, at the time of the classical all students have to actually rotate the seat facing forward so that everyone is in focus. During the discussion the teachers reduce interruptions and answer student questions. Teachers should direct them to discuss.

3.3. Revise First Lesson Design

Based on the results of teacher self-reflection, it can be concluded that the interruption of teachers in the next learning should be reduced in order to maximize the student's ability to complete the task by discussing in groups. Demonstration of nails and hydrochloric acid is less attracted to the students and students hard to write the reaction, therefore, the demonstration should be replaced with a more interesting reaction, burning Mg. In addition, teachers must review the rules of nomenclature of compounds to make students more easily write down the equation. Then, answer's confirmation is also less effective so that many students hesitate and many students ask answers and confirmation to teachers.

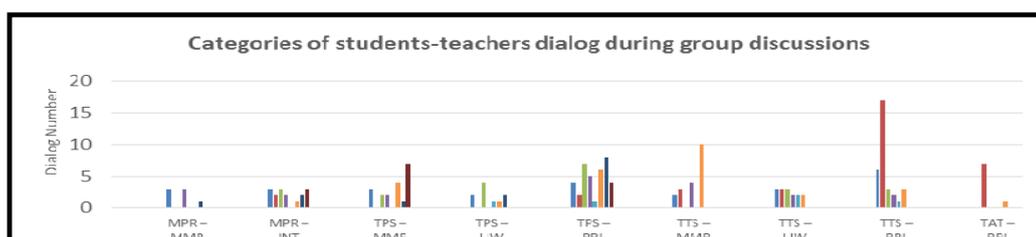
3.4. Second Lesson Analysis and Teacher Self Reflection

After the lesson design was revised and implemented in a different class, the teacher re-analyze and do self-reflection. At classical session, there are 320 steps that consist of 253 steps monolog of teacher's question-student's response and 13 steps monolog of student's initiative-teacher's response. Table 2 shows the categories monologue of teacher's question-student's response that appear in classical session at the second meeting. Based on these data it can be seen that the teacher has been directing the learning process in becoming a classical session centered on students. It can be seen from the reduced number of questions with short answers and the growing number of questions with open answers. Student's response was also nice, shown in table 2 many students answered teacher's questions using their own sentences.

Table 2. Step number appears during classical discussions in the second implementation

No.	Category	Step Number Appears
	Teacher's Question	Student's Response
1	Ask Yes/No	Yes/No
2	Ask resuming fragments	Resuming fragments
3	Ask definition	Answer by remembering notes
4	Ask with limited answer	Choose answer with no reason
5	Ask reason (contend)	Answer by reading text-book
		Answer with student's own argument
6	Paraphrase question	Answer by remembering notes
		Answer using own words

Based on table 2 can be seen that in the second implementation, the student-teacher dialogs were much reduced. This means that teacher already reduces interruptions during the group discussions. Data of student's conversation during group discussions with teacher's involvement is shown in figure 4, and without the teacher's involvement is shown in figure 5.



BPO – LJW	:	Student ask procedure Teacher answer student's question directly	TTS –	:	Student ask unresolved solution Teacher instructs the student to do something
MPR – MMR	:	Student report group progress Teacher instructs the student to do something	TTS –	:	Student ask unresolved solution Teacher answer student's question directly
MPR – INT	:	Student report group progress Teacher ask result/progress/notification	TTS – RPI	:	Student ask unresolved solution Teacher answers using scientific question
TPS – MMR	:	Student ask teacher approval Teacher instructs the student to do something	TPS –	:	Student ask teacher approval Teacher answer student's question directly
			LJW	:	Student ask teacher approval Teacher answers using scientific question
			TPS – RPI	:	Student ask teacher approval Teacher answers using scientific question

Figure 4. Categories of students-teachers dialog during group discussions in the second implementation

Based on the figure 4, a category of dialog that appears the most TTS-RPI, RPI-TPS, and TTS-MMR. TTS-RPI is a category of dialog in which students asking the solution of the problems they face, and the teacher directs them find the solution by giving questions. This category appears because most students confused when writing the chemical formula in the equation, other than that the students are also confused in equalizing the coefficients of the equation. TPS-RPI is a category in which students requesting approval of teachers and the teacher did not directly answer, but to give students directive question and gain confidence in their answers. Students often still have a doubt about the chemical formula which he wrote, in addition students are also often hesitant when equalize the equation. TTS-MMR is a category of dialog in which students ask about the solution of an unresolved problem. Teachers answered these questions by giving steps so that the students can obtain the solution of the problem. It happen while there some confusion occurs when students equalizes equation.

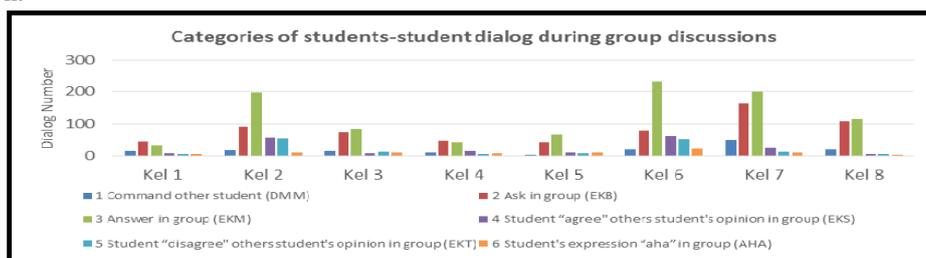


Figure 5. Categories of students-student dialog during group discussions in the second implementation

In group discussions, category of dialog most commonly found are answering (EKM) and asking (EKB) in the group, as well as affirmative and negative expressions (figure 5). This shows that students discuss well in the group. Group 6 and group 7 has the most amount of asking and answering dialog, this group also had the most AHA expression. These groups discussed so well that they found many new facts and find solutions to their problems (expression AHA).

Based on the above data, it can be concluded the learning process has been student-center, the interruption of the teachers have been greatly reduced. Based on the results of the lesson analysis, teacher self-reflection results obtained through interviews as follows:

- G : *The learning process at this second meeting is already much better than in the first meeting. Last week's demonstrations about HCl and nails reaction are not too observed. This week has been replaced with Mg combustion demonstration. The changes in the reaction is very clear. Students are very interested on the flame and can observe the process when the ash was being formed. My interruption on classical sessions and group sessions has been significantly reduced, so that students can be more dominant in the learning process. Students seemed to focus and enthusiastic in discussions to solve problems. They want to find out the answers by opening the book and discuss, and are willing to come forward to communicate the results of their discussion. Teacher is not too significant in answering student's questions directly, but students are guided to find the answers themselves.*
- G : *In classical session students are required to rotate the chair, so that students concentrate fully forward and pay attention to the demonstration. Demonstrations in the classical session encourages students to know more. It can be seen from the number of students that asked to see Mg ribbon, and see the changes that occur from the combustion reaction Mg. Students are also active when asked by the teacher to explain what happened before and after the reaction. In addition, students are also actively answered teacher's questions on how to write and equalize the equations.*
- G : *During the group discussion, some students was silent and did not contribute at first. As the conversation progresses the students become interested and actively involved. Even these students came forward to present the answers of their group. Students who changes the most during the lesson process are David and Anhal.*
- G : *Because some things are already pointed out such as confirmation of coefficients and indexes, how to write chemical formulas, and how to equalize the reaction coefficient, the student becomes better understood. By the time working on the problems the students do not really need help from the teacher.*
- G : *There are 5 problems given to the student. It turns out they need more time to discuss these problems.*
- G : *In terms of lesson design, exercises should be reduced, due to lack of time to discuss the problems. Classical activities mainly concentrated more to students. Students are more directed to be more active. In terms of technical implementation, teachers are significantly reduced interruptions than the first meeting, but it would be better if it reduces again. Teachers should lead students to discuss.*

3.5. Revise Second Lesson Design

Based on the results of teacher self-reflection, lesson design had to be revised again. Exercises should be reduced because of the lack of time available. Confirmation about the activities also require additional time for more effectiveness. In addition, teachers should be working to make learning more student-centered. Teacher's effort can be further reduced interruptions when students discuss and provide students the opportunity to be asked for more.

4. Conclusion

Lesson analysis can be used as a tool to reflect on the learning process by the teacher. Lesson analysis gives teachers a variety of views to observation, reflection, and the study of learning in the classroom. Through self-reflection activities that assisted with lesson analysis, the teacher can be aware of how the learning process has been done, how the teacher interaction with students or students with the students during the learning process. In addition, teachers can also find out the problems that occur during the learning process, either in terms of material or on how to guide the class. After realizing the problems, teacher can correct or seek solutions to these problems so that the learning process is getting better in the future.

References

- [1] Alwasilah, A. C. 2011 *Pokoknya Action Research*. (Bandung: Kiblat Buku Utama)
- [2] Hendayana S., & Hidayat A. 2013 *Developing tools for analyzing of classroom interaction: Does it student-centered or teacher-centered lesson* (Bandung: PPT Seminar international MSCEIS. UPI)
- [3] Kemendikbud 2007 *Peraturan Menteri Pendidikan Nasional Republik Indonesia nomor 41 tahun 2007*
- [4] Rahman, B. 2014 *Paedagogia. Universitas Lampung*. Retrieved July 11, 2016, from dosen.fkip.unila.ac.id/data/index.php?prodi=P19&id=1960031502
- [5] Romagnano L., Evans, B., Gilmore, D 2008 *AMTE Monograph* (4), pp. 103-15
- [6] Saputra, B 2015 *Desain didaktis pada pembelajaran tatanama senyawa anorganik dan organik sederhana berbantuan lesson analysis sebagai self-reflection guru di sekolah menengah atas*. (Thesis, Universitas Pendidikan Indonesia, 2015, Unpublished).
- [7] Sugiyono 2013 *Metode Penelitian Kuantitatif, Kualitatif dan Kombinasi (Mixed Methods)* (Bandung : ALFABETA)

