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Reflective Pedagogy: Case Study of Organic Chemistry at the University of Muhammadiyah Semarang

Eko Yuliyanto^{1*}, Fitria Fatichatul Hidayah², Enade Perdana Istyastono³, Yosef Wijoyo⁴, and Titien Siwi Hartayu⁵

^{1,2} Muhammadiyah Semarang University, Semarang, Indonesia

^{3,4,5} Sanata Dharma University, Yogyakarta, Indonesia

*Corresponding author email: ekovulivanto@unimus.ac.id

Abstract

The development of the modern age is a lot of changes in education is the paradigm of teacher-centered learning into student-centered learning which has a very important role in maximizing its competence in classroom management. One of the lessons in chemistry education that has problems is organic chemistry courses. Based on the reflections applied to teachers and students "What has been gained from the learning process?", "What is the value obtained while the process is underway?" And "What will be done next (implementation)?" The results are still very unsatisfactory, this is due to the limited ability of lecturers in the learning process.

Associated with these conditions, then of course required intensive changes and planned for comprehensive improvement associated with the input to be generated. Efforts to be made is to improve the paradigm of learning. The selected learning paradigm is Reflective Pedagogy Paradigm (PPR). Reflective Pedagogy Paradigm was chosen because based on the results of research can improve the performance of lecturers in teaching, improve the readiness of lecturers in teaching, and make students able to reflect the learning process, and students become more active. The research was conducted following a workshop with lecturers who have implemented Reflective Pedagogy at Sanata Dharma University Yogyakarta. Stages in Reflective Pedagogy are context, experience, reflection, action and evaluation. It is expected by the end of two meetings. To be able to apply PPR, a lecturer needs to be equipped with special training on PPR-based teaching strategies as well as reflection skills (ICAJE, 1993, Gwaza et al., 2010; Schaub-de Jong dkk.2011; Wijoyo et al., 2016).

Based on the results of the teacher reflection, it is increasingly realized that the preparation of learning is very important, and it is realized. While based on the results of reflection students stated that the purpose of learning is clear, the material relevant to the profession of students, and understanding of the material becomes easier, and the moral values for students. This case study is also in line with previous research that John Dewey (1933), He argued that learning from experience is enriched by reflecting on experience and Donald A. Schön (1987) theorized that reflective practice represents an important factor to improve professional activity. Jack Mezirow, (1991, 2000) gives reflection a central role in learning because through it we become aware of the ways in which we interpret reality and give meaning to actions and behavior. Writing-to-learn tasks should encourage students to conceptualize writing in a way that emphasizes exploration, expressive inquiry, discovery, problem-solving, decision making and knowledge construction.

Key Word: Reflective Pedagogy Paradigm, case study, Organic Subject



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1. Introduction

The development of the age and technology of today is much to give a change in education is the paradigm of teacher-centered learning to become student-centered learning where the lecturer has a very important role in maximizing his competence in classroom management. One of the lessons in Unimus chemistry education that has problems is organic chemistry course. Organic chemistry is indeed a very large range of material and raises the question "what kind of material will be used by high school teachers?". Application of organic chemistry in Semarang chemical education is still minimal. This of course needs to be held a joint improvement where in order to improve the quality of learning in general, of course not only seen from the good test results but also need a comprehensive improvement of the learning process. So that organic chemicals can be adapted to the needs of graduates who will play a role as a chemistry teacher. The process of learning improvement is not only teacher-centered, but many things can be done. But there is something important that a teacher has to do in-class learning, this is in accordance with the following statement.

"the most powerful, durable and effective agents of educational change are not the policy makers, the curriculum developers or even the education authorities themselves; they are the teachers"
(Sellars, 2012)

Some basic questions that lecturers present include "What has been gained from the learning process?", "What is the value obtained while the process is in progress?" And "What will be done next (implementation)?" The result of the study of organic chemistry is still very unsatisfactory, this is due to the limited ability of lecturers in the learning process and the ability of supporting facilities of organic chemistry learning. Associated with the condition, then of course required an intensive and planned coaching for comprehensive improvement associated with the input to be generated. Efforts to be made is to improve the paradigm or support in learning. The selected learning paradigm is Reflective Pedagogy Paradigm (RPP).

The workings of the PPR are to form a personal student with experience of a humanitarian value, then the student is facilitated with questions to reflect on the experience, then facilitated by action questions, so that the students make their intentions and act accordingly (ICAJE, 1993; Metts, 1995). In order to apply PPR lecturers need to be equipped with special training on PPR-based teaching strategies and reflection skills (ICAJE, 1993, Gwaza et al., 2010; Schaub-de Jong dkk.2011; Wijoyo et al., 2016).

Reflective Pedagogy Paradigm was chosen because the result of the research was able to improve the lecturer's performance in teaching, improve the readiness of the lecturer in teaching, and make the students able to reflect the learning process, and the students become more active (Yosef Wijoyo, et al, 2016). This is similar to:

John Dewey (1933) argued that learning from experience is enriched by reflecting on experience and Donald A. Schön (1987) theorized that reflective practice represents an important factor to improve professional activity. Jack Mezirow, (1991, 2000) gives reflection a central role in learning because through it we become aware of the ways in which we interpret reality and give meaning to actions and behavior"

The existence of several advantages RPP hence the need for the implementation of RPP in the process of organic chemistry learning collaboratively among lecturers to improve the professionalism of lecturers in



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the classroom. The hope of this research will be obtained various inputs used in improving the quality of teaching. In addition to developing learning, RPP can improve the quality of student learning outcomes. Ideally, if the learning process in the classroom is good and professional, then the impact on student learning outcomes.

2. Methods

2.1 Research Design

This study is a case study based on the facts of the problems that exist in unimus chemical education. The problems faced by the organic chemistry lecturer in the classroom are the teaching ability of the lecturer and the scope of the taught material. The course of organic chemistry is a compulsory subject with the weight of 3 credits. This course consists of 2 parts namely Organic Chemistry I and Organic Chemistry II

2.2 Research Instruments

This research is a case study conducted on lecturers of organic chemistry in chemical education, University of Muhammadiyah Semarang. The instruments used are lecturer and student reflection sheet and video recording of learning process. Students who follow II organic chemistry lectures as many as 15 students

2.3 Research Procedur

The study was conducted as follows:

- a. Lecturers conduct an evaluation of learning process on semester Even 2015/2016. The components of reflection include: materials, methods, teaching skills, student acceptance of materials, evaluation of student learning outcomes, and student satisfaction in the learning process, conformity with the profession of graduates using the reflection of teachers (lecturers)
- b. Workshop Implementation of Reflective Pedagogy Paradigm (RPP) at Sanata Dharma University (USD) in Yogyakarta.
- c. Plan and develop the learning tool based on Reflective Pedagogy Paradigm (RPP) in the course of Organic Chemistry with expert guidance from USD
- d. Applying the learning process of Organic Chemistry based on Reflective Pedagogy Paradigm (RPP)
- e. Evaluate results and learning process

3. Results

The research was conducted since March 2017. This research is a collaboration between chemical education of Muhammadiyah University of Semarang and Pharmacy University of Sanata Dharma Yogyakarta.

First, to reflect the learning of organic chemistry in 2015/2016, the results obtained reflection data that: a. Organic chemistry learning is boring and students are not active, b. Material on RPP is still too much, c. Learning sometimes mentions clear goals, d. Matter tends to be a lot rote, e. The suitability of the material



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with career graduates is less appropriate, because graduates only teach high school, where the organic material in SMA is still limited.

Second, following workshop reflective implementation: This activity was conducted on January 18, 2017, 5-8 februari 2017: At this stage we learn about Reflective Pedagogy Paradigm (RPP). The results include:

- Lesson plan (RPP) is 4 times the encounter with the carboxylic acid material and its derivatives
- Organic Chemistry Learning Module: Carboxylic Acid and its derivatives
- Student Reflection Sheet
- Teacher Reflection Sheet
- Reflection Assessment Instrument
- Multiple choice questions Evaluation

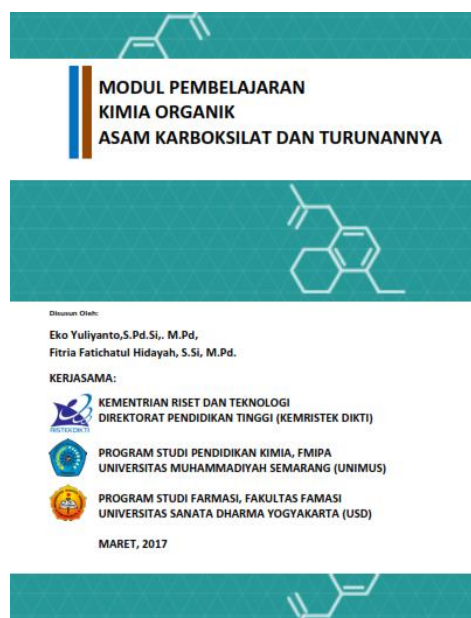


Figure 1. Orgaik Chemical Learning Module

Third, the application of Pedagogy Paradigm (RPP) learning process: The learning activity is done on 4 May 2017 and 18 May 2017. The learning process begins by giving pre-test questions and at the end of the meeting, students are given learning reflection sheet. Learning activities are recorded for observation by a team of RPP experts.

Fourth, Evaluate results and learning process:

Evaluation of the learning process is done by triangulation of data: student reflection, teacher reflection and video observation of learning process.

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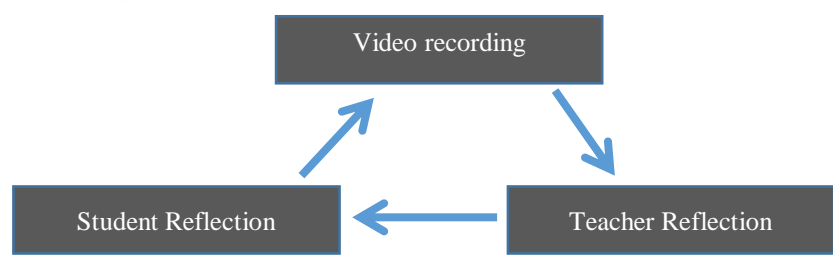


Figure 2. Learning evaluation mechanism

Lacturer Reflection

Context Phase: This stage of the lecturer explores the *prior knowledge* of the students and links relevance Course materials to their needs after graduation. At the beginning of the learning has been explained to the student the benefits of carboxylic acid and its derivatives in life. Methyl salicylate, vinegar, apple vinegar, apple scent, pineapple and headache medicine are some of the ingredients used in our lives. In addition, students are also interested in the use of formiat acid used in natural rubber latex. Teachers already explore knowledge they have. Having the same understanding then we continue the next step of knowing carboxylic acid and nomenclature and its properties.

Experience Stage: At this stage the lecturer presents the material to the students; What activities are done by the students so that they are actively involved in the search and construction of knowledge. Activities undertaken by students are listening to explanations of the carboxylic acid nomenclature, its properties and its acidity. At this stage students are actively involved in discussions when asked questions. In the next stage students are given a case (*problem based learning*) about anhydrous acetic acids that evaporate in the laboratory and cause eye irritation. In addition, lecturers also guide groups who find it difficult at the time of discussion.

Reflection Phase: This stage of the lecturer guides students to reflect. The forms of guidance at this stage include, helping to recall the purpose of learning, the usefulness of knowledge in everyday life, in addition to asking students to fill out the reflection sheet carefully and carefully so that students can do in totality and obtained the expected information.

Stage of Action: This stage of the lecturer emphasizes that: the student as an educated person has a lot of knowledge, therefore his students hope to educate others or the community where they live. Certainly a good science is a science that brings benefits to society. Public education can not be done at all locations, but students must have special moments to apply knowledge in the community environment such as: the danger of excessive use of vinegar on the teeth, the use of salicylic acid in infants or the education of the way of making vinegar.

Evaluation Phase: Based on the module that has been made already formulated some items that become the charge during the learning process karboksilta and derivatives as follows:



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Competence: Students are systematically and logically able to explain the structure, properties and benefits of carboxylic acids (along with their derivatives), have the skills and creativity in drawing compound structures using computational software (marvin) and able to synthesize carboxylic acids and derivations.

Conscience: Students are honest and meticulous in informing the use and the care of carboxylic acid and its derivation in society.

Compassion: Students have a concern and are involved in educating on the use of carboxylic acids and the dangers in the community.

The is the final stage in the learning process, based on the results of the lecturer's observation, that honest attitude can not be seen that indicators, so the students also care about the community on the use of carboxylic acid and the danger in the community. This process is just the beginning, and students are not used to doing this. The process of "conscious" habituation will certainly make the students fully aware to educate the public.

Student Reflections

- a. Learning objectives
Students based on the reflection sheet, can not write down the learning objectives in detail. Students only write down goals achieved or not achieved, but not explained what has been achieved during the learning process.
- b. Relevance to the profession
At this stage the students only write relevant or irrelevant to their profession in the future; But not accompanied by a detailed explanation of the relevance in terms of what for their future activities.



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c. Learning process

This stage students are asked to explain the flow of learning process that has been followed in detail, but students have not written down the learning process that has been experienced and there are students who do not understand how to answer this point.

d. What knowledge you have learned after studying this material, which is useful to support your profession in the future. The results of student reflection is good in writing the knowledge that has been obtained both in terms of science and practical benefits. However, some students still do not answer this question or misinterpret the question.

e. What values of life have you gained after following the learning process

The values of life they get include: Willing to listen to others, Have courage in expressing opinions, Respect opinion of others, Willing to cooperate in group, Be honest, Responsible, Thorough, time-management, have polite attitude, Help fellow. Values of life in the learning process by students have been quite often delivered during the learning process. This means that in the learning process is also taught the good attitudes prevailing in the community

f. Plan your action as a follow-up to the knowledge and values of life, which you have gained after the learning process. Students have formulated their action plans quite well, although some of them are still normative. There are also students who do not write answers on these reflection points

4. Discussion

The slogan of reflection and reflective practice has been embraced by many teachers, teacher educators and educational researchers all over the world within the last two decades (Schön, 1983, 1987; Elbaz, 1988; Day, 1993; 1999b; Eraut, 1994; Hatton and Smith, 1995; Zeichner and Liston, 1996; Newman, 1999; Freese, 2006). Reflection is defined and interpreted by different academics and researchers differently, they all accept that it is a desirable attitude and practice to improve one's practice and learning (Cole, 1997; Freese, 1999). Without reflection, length of experience does not automatically give insight and wisdom and thus, one can run the risk of relying on routinised teaching and not developing (Reiman, 1999; Hopkins, 1999). In the other hand learning process, offense is not a disgrace. Osterman (1990) indicates that 'Problems become, not dirty linen to be kept from the public's view, but opportunities for dialogue, learning and change' (p. 140).

Improvement of various mistakes made during the learning process can be used as a discussion material and found the solution. Of course with the various problems can be used discussion materials to improve the learning process. Dewey (1933) states that growth comes from a 'reconstruction of experience' (p. 87). Therefore, experiential learning theory holds the idea that learning is dependent on the integration of experience with reflection. It puts reflection at the centre of learning process. Based on this theory, it can be argued that by reflecting on their own experience, teachers as learners can construct their own educational perspectives and gain new insights from that experience and develop new strategies to use in subsequent teaching (Kolb, 1984; Boud et al, 1985; Osterman, 1990; Reiman, 1999).

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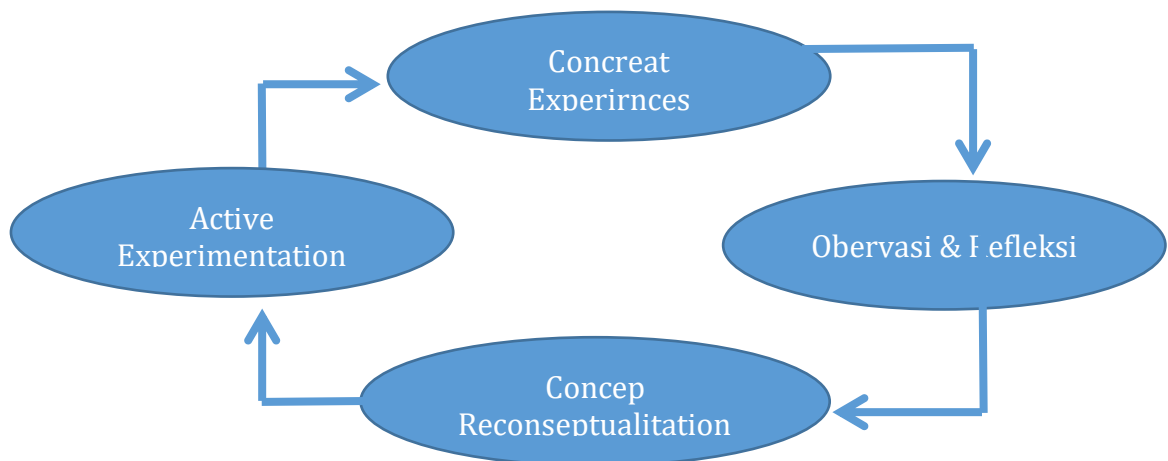


Figure 3. Reflection Cycle

This is in line with some other studies that reflection is a good method for improving the learning process “*Reflection is a powerful procedure that teachers can utilize to investigate, and make their teaching practices better*”(Fatemipour, 2013). Its also makes “Individuals can show readiness for learning throughout their career”(Rădulescu, 2013).

Because in the process of reflection teachers are required to conduct a review to find the shortcomings that are done during the learning process (finding problems) and then do the problem solving learning process, as said by Williams (1998) sees reflection as 'a theory of metacognition which directs skilled behaviour during professional activity or assists in the deliberative processes which occur during problem solving' (p. 31).

Not all teachers are able to reflect, this is because the reflection process involves intellectual ability and affective ability, but also an interest in the world of education. Seeing reflection as an activity for exploring experience and learning from it, Boud et al (1985) define reflection as ‘a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciation' (p. 19).

In the process of reflection teachers should involve the ability to think critically in pouring reflection in the journal. Many researchers emphasise the importance of being critical in the reflective process (Dinkelman, 2000). It allows teachers to stand outside their practice and see what they do from a wider perspective and consider alternative ideas and practices which take into account of the dynamics of power embedded within schools and classrooms (Nicholas, Tippins, and Wiesemen, 1997). If teachers reflect upon their experience without being critical, their experience might become an unreliable and sometimes dangerous guide for giving advice.

Teachers are people who have an interest in the learning process, but he will always try to improve the teaching and learning process. Evidence of his love of the learning world of a teacher will continue to reflect to become a professional teacher. During reflection, teachers engage in a problem-solving activity, which increases their effectiveness (Day, 1999b; Jay, 1999).

But, there are some factors affecting teachers’ reflection such as teachers’ emotions and working conditions. Hargreaves (1998) considers teaching as an emotional practice. Therefore, it can be argued that emotions have significance for reflection as well because they can colour our learning, understanding and



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as expressed “*Reflective writings as an effective form of assessment that would provide a more insightful assessment of students' learning and thoughts*”(YuekMing & Manaf, 2014). Writes a process of learning, not merely rewriting a process, but a cognitive process that requires profound knowledge.

For students to make reflections sometimes like an activity that boring even based on the results of learning at first meeting, there are some students can not reflect on the learning process that has been experienced. This means that students still can not explore and express what they have learned well, but by doing it over and over will certainly train their skills in processing experience and make them more aware of what has been received or that is not, this is like the following statement.

Writing is not just a way to express or display our knowledge. Writing in itself is a fundamental mode of learning, allowing students to reflect on what they have learned, clarify their thoughts, stimulate and foster the ability to organize knowledge and reflect upon beliefs (YuekMing & Manaf, 2014).

J Wagner (2005) maintains that writing-to-learn tasks should encourage students to conceptualize writing in a way that emphasizes exploration, expressive inquiry, discovery, problem-solving, decision making and knowledge construction. Inquiry is the science, art and spirit of imagination. It can be defined as the scientific process of active exploration by which we use critical, logical and creative-thinking skills to raise and engage in questions of personal interests. Driven by our curiosity and wonder of observed phenomena, inquiry investigations usually involve: Generating a question or problem to be solved, Choosing a course of action and carrying out the procedures of the investigation, Gathering and recording the data through observation and instrumentation to draw appropriate conclusions

Dewey (1993) assessed reflective thinking as “active and continuous thinking of any subject”. Atay(2003: 54) described reflective thinking as a process and he characterized this process as “remembering, thinking over and assessing with a particular purpose of any experience”. Loughran (1996: 13), on the other hand, described reflective thinking with phases such as claim, problem, hypothesis, reasoning and testing. The existence of the reflection process certainly makes us as teachers become more aware there are still many shortcomings in the learning process, therefore requires methods, strategies or learning resources alain so that the process of learning process effectively.

5. Conclusions

Reflective Pedagogy: Cased Study Organic is a case study in the form of a refinement learning improvement process. Improvements to be improved include: context, reflection, reflection, action and evaluation. In addition, reflective learning is highly recommended in every teacher, because with reflection teachers are also trained to think critically, inquiry skills, and of course in the learning process more careful.

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