

Teaching Learning Chemistry Education: A Reflective Thinking for in Service Teacher

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ABSTRACT

Reflective practice in higher education has recently become a concern in distance learning. Through reflection activities in service, teachers are expected to make a respond to the matters, activities, or knowledge they have just learned. The purposes of this study were to 1) develop a learning prototype that can build reflective thinking, and 2) gain students' perceptions of the learning prototype that have been developed. The research is research and development which adopts the Four-D model's development model by S.Thiagarajan, et al. (1974), which consists of 4 stages, namely: the definition stage (define), the design stage (design), the development stage (develop) and the deployment stage (dissemination). The study was conducted on a chemistry education course (TAP), The data was obtained through 27 students. The indicators were the students' competencies to formulate learning problems, to analyze problems that occurred, and to provide an alternative learning improvement. The results were: all learners (100%) were able to formulate the learning problems: 87.5 % of students were able to analyze the problems; 65% of students were able to make alternative learning improvements. The students' perception expressed their satisfaction having served online tutorial activities through a reflective thinking approach. The impact of this research is students can analyze and solve the learning problems in their classes.

Keywords: *learning improvement, learning prototype, online tutorial, reflective thinking, students' perceptions*

1.INTRODUCTION

Reflective practice can be a valuable process in teacher professional development for both pre-service and in-service teachers. A teacher who wants to improve their competencies through formal education is known as a service teacher. According to Billing (1976), in-service education is staff development which is a considered and continuous process for furthering their job satisfaction and career prospects and of the institution for supporting its academic work and plans.[1] Teacher educators can most effectively train student teachers in reflective practice by using students' personal histories, dialogue journals, and small and large-group discussions about their experiences to help students reflect upon and improve their practices.[2] Kolb (1984:4), defined reflective thinking as a learning style providing a significant re-arrangement as reflective observation by teachers reviewing the status of many individuals and making objective judgments.[3] Reflection is a model of learning from authentic experiences that one uses to

accomplish professional learning, expertise, and performance skills development (Wongwanich et al., 2014). Learning which serves reflective thinking approach drives students to make an analysis and decide based on their analysis. Reflective competence can be obtained through various ways such as reviewing literature that has been studied or analyzing events/problems based on his experience. Through reflection activity in services, teachers can make a response to the events, activities, or knowledge they had just learned. Learning through thinking reflective had done such as Uzun et al., (2013)[4], Ming & Manaf (2014)[5], Yadigroğlu, et al., (2014), Demirela et al., (2015)[6] and Smith & Joyce (2016). The Study discusses learn to frame and reframe complex, the process of analyzing, reconsidering, and questioning experiences within a broad context of issues.

In service, teachers will easily get information based on their teaching experience. This paper discussed how to prepare a learning prototype for an in-service

teacher in developing reflective thinking. It was also meant to get in-service teachers' perceptions on learning prototype that had been developed.

2.METHOD

The research is research and development which adopts the Four-D model's development model by S.Thiagarajan, et al. (1974)[7], which consists of 4 stages, namely: the definition stage (define), the design stage (design), the development stage (develop) and the deployment stage (dissemination).

The subject used is the program final project (TAP) course, which is a course that is given at the end of the program after taking several supporting courses. With this, this course is a comprehensive knowledge of chemistry instruction. The steps in this research include the following

1), the definition stage (define),

This study is to determine and define needs in the learning process and collect various information related to the product to be developed. The steps include analyzing student needs and learning objectives.

All learning approach developed should relate to the program or discipline and the students' needs. Before going develop the instructional, need analysis is needed. Needs analysis can be referred to as a method to find and evaluate what students want to learn (Nirmasari, 2018). In this study, reflective thinking began when students are less able to answer questions given in the course as supporting subject course TAP. When the teacher asks the students (in-service training teacher) to make a reflection based on the results of the student's teaching experience, for example, a student responded as follow:

"In teaching the Concept of Material and its amendment, I found that my students were excited to follow the lesson since the concept of matter and the changes explained about life environment, the difficulty was some of them were still groping to familiarize chemistry and since our school does not have laboratories, we used the classroom to do practicum."

Based on the expression of teaching experience it appears that not all students can make a reflection of learning, most of them make an expression of constraint teaching.

After obtaining student needs, learning objectives are prepared. The design of learning begins with the development of a Competency Map, the competencies are.

1. Identify weaknesses and strengths of the chemistry learning process and their reasons if related to:
 - a. Basic teaching skills, or
 - b. Learning approaches/methods/techniques, or
 - c. Media/learning resources, or
 - d. Study material, or
 - e. Assessment of the learning process and outcomes, or
 - f. The teacher's attitude in teaching
2. Determine alternative remedial solutions to the weaknesses encountered and their reasons using relevant learning and learning theories
3. Designing learning improvements based on solutions that have been determined
4. Analyzing learning cases that indicate teacher mastery of school chemistry-related curricular materials determines the resolution of material problems with essential concepts that are often difficult for students
5. Determine the solution/solution based on the results of the analysis of learning cases that indicate the mastery of the teacher of school chemistry curricular material with the stages of completion understood by students related to:
 - a. Student misconceptions or
 - b. Daily life, or
 - c. Other disciplines, or
 - d. Essential concepts that are often difficult for students.

2) The design stage (*design*)

The design of learning begins with the development of the Competency Map, further develop the draft Events Tutorial (RAT) and Unit Activity Tutorial (SAT). Map competency is intended to demonstrate the competencies to be achieved through learning activities online tutorial. The design shows unity tutorial lessons given during the tutorial period, which contains the discussion on the topics that will be presented, reference can be traced by the students, as well as learning strategies will be given. While SAT derived from the RAT and represents the learning activities online tutorial that contains descriptions of the topics covered as well as learning activities undertaken by students

The first step was to conduct an analysis based on the learners' teaching experiences. The second step was to develop a reflective learning prototype that began with

the development of a Competency Map, Design Tutorial (RAT), and Unit Activity Tutorial (SAT).

Then proceed with the implementation of the on-line tutorial activity for in-service teachers.

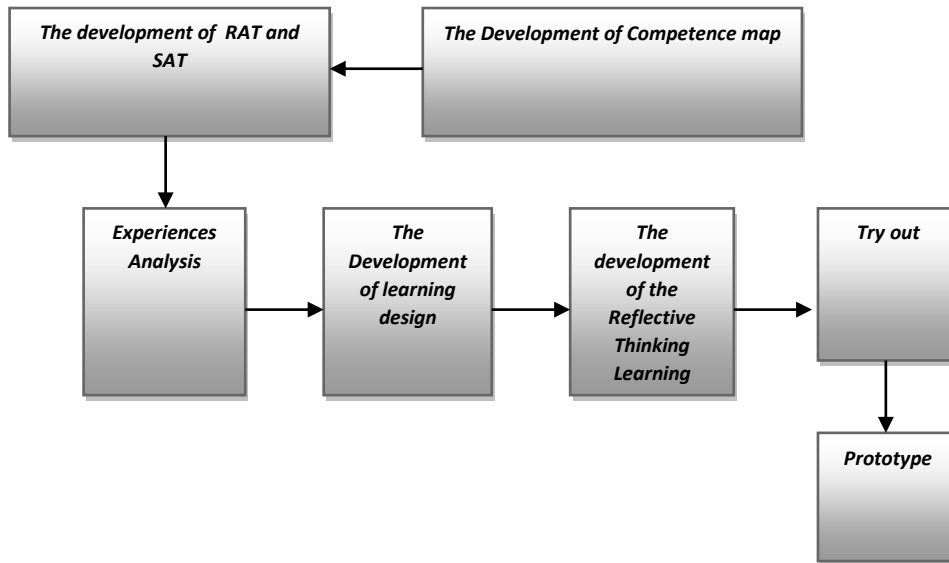


Figure 1. Research Design

3). The Development Stage (*develop*)

The development of tutorial online chemistry TAP had shown the availability of focusing attention, information about learning objectives, the stages of learning, the initiation material that invited students to be able to recall previous knowledge and understanding, the direction of a tutor who asked students to have a discussion, as well as the students to develop reflective thinking.

Learning activities undertaken include the provision of material carried by the tutor's initiation, provides a forum for discussion, and provision of a task. Providing material initiation begins by giving an example of the "case" chemistry learning. Giving an example of cases in an essay or article, intended as a "trigger" to train students to analyze the learning that happens in the classroom, and showed the students how to analyze and reveal the events. The initiation material, containing about how to identify the strengths and weaknesses that occur in the learning process, reviewing some theories related to teaching and learning as well as guidance to the students to find the right answer to a given question. The guidance is shown among others by invitation to students to pay attention to the keywords of reading or learning a given case as well as the study of learning theories associated with the material provided. The tutor invites the student to train their understanding to bring out the formulation of other issues such as the link between learning outcomes such as the selection of

media/media utilization, student involvement, the use of assessment tools, and learning strategies.

In addition to giving the material through initiation, in the form of a case study, the students were also invited to a discussion about the teaching experience with a friend of the tutorial classes in the discussion forum. In the discussion, the tutor invites students to analyze teaching experience, including asking students to perform self-reflective based learning that takes place in its class. Items requested to do self-reflective to students is: "How can student learning outcomes at the end of the lesson have I done?". Here in after: "Why does my student learning outcomes have not been satisfactory?". Furthermore, the tutor invites students to make notes based on the analysis of the activities of teaching and relate it to the theory of teaching and learning. The initiation is expected to occur on teaching and learning interactions between tutor and students and students with student.

In addition to the material and the initiation of discussions, on-line tutorial tutor activity also invites students to perform tasks about their teaching experience. Through these stages can be explained that the prototype of a learning approach to self-evaluation and reflective thinking can be described as follows Fig.2.

Learning with a reflective thinking approach trained students to be able to do an analysis and make a decision based on the results of their analysis. The reflective practice consists of attentively considering

student's own experience in applying knowledge to practice while being trained by tutors in the discipline. This study in line with Kolb (1984) specifically: (1) gaining concrete experiences in a situation; (2)

observing and reflecting on experiences; (3) formulating abstract concepts through analysis and making generalizations; and (4) testing hypotheses in future scenarios, leading to new experiences. [3]

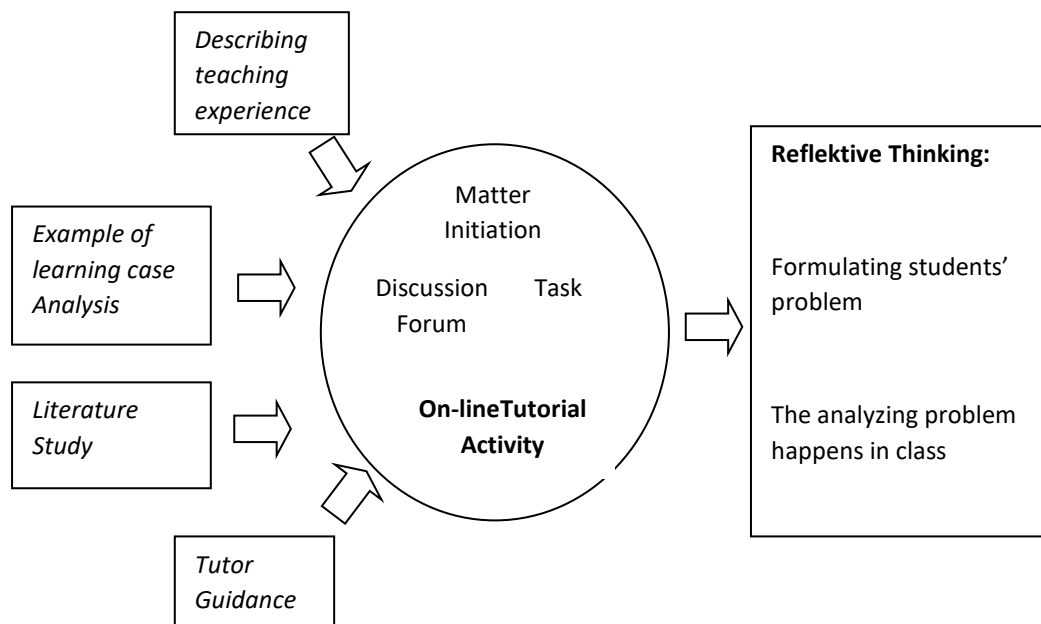


Figure 2. Development Prototype of Reflective Thinking on the Tutorial Activity Course On TAP

4). The Deployment Stage (dissemination)

The development of formative test was carried out based on the results of 27 students' learning and their opinion on the activities of the Chemistry TAP online tutorial given. In the course, there were six discussion forums also, learners actively bring up the topic of discussion under the reflective learning outcomes in its class. As examples of the topics of discussion raised by the students in a discussion such as a student's lack of motivation, less concentration in learning, lack of drive, the atmosphere is not conducive, and the learning outcomes less satisfactory. In the task, the tutor invites students to complete the task that contains exercises in the evaluation of learning in each class. The task was developed by considering capability: 1). Formulate learning problems, 2). Analyzing the issues involved, 3). Create an alternative to the improvement of learning.

Data were obtained based on 2 months of online tutorial activities. During the tutorial learning was applied using a reflective approach, starting from giving initiation to discussion material, discussion, trained, and completed the tasks. Data were obtained based on the results of student response to the tutorial activities with the reflective approach that has been

given. Data were analyzed based on the results of their reflective teaching experience by considering the ability to: 1) formulate learning problems, 2) analyze the issues involved, 3). create an alternative learning improvement. It also analyzed the responses/ answers towards learning presented in connection with a reflective approach.

3.FINDING AND DISCUSSION

Almost all the students are less likely to experience difficulties analyzing the learning outcomes of each class (shown in Figure 3). While many students are having difficulty creating learning improvement ideas laid out in the design of learning improvement. While the ability to think reflectively is needed to improve the learning program in its class. The pattern of the answers given students some of which are answered briefly and with a detailed description. The short answer is only a mention of the events in the classroom, while the full answer includes an explanation of the condition of the classroom environment, equipment, processes, and procedures of learning that occurs, the alleged weaknesses and strengths of learning provided as well as efforts to improve the lesson. Learning results obtained are.

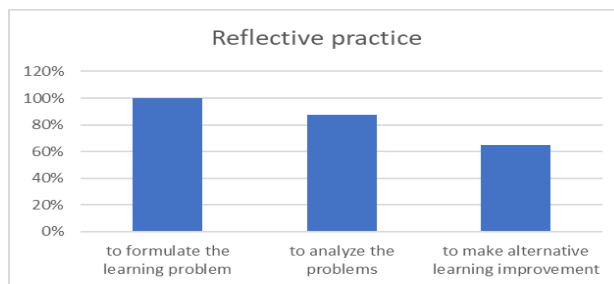


Figure 3. Student’s Learning Results

Below are the examples of the students’ answer: Learning problems that commonly occurred in the classroom.

- School students were less focused on early learning.
- Students did not pay attention to the task given for instance they were asked to bring refined turmeric from home, but they brought turmeric rhizome.
- Learning outcomes were unsatisfactory.
- Learning seems to burden school students and cannot make children fun

Learning issues that commonly occurred in the classroom:

- Students are less focused on the initial learning
- Students are lack attention and understanding of the given task
- Learning outcomes are not satisfactory
- Learning is not fun and a burden for the school students

Analyze why the above matters could happen.

They could happen since: “most of the students had not understood the calculations of van Hoff factor which is expressed by the symbol i therefore they did not understand the n value (number of ions produced) and α (degree of ionization). Students tended to the same calculation of non-electrolyte solution. By the time of working group discussion, some students were still more relied on their friend than themselves”.

The reasons why the issues could happen

It could be happened because of the following reason: Most of the students did not understand the Van'Hoff factor that is symbolized by " i ", therefore they did not understand the " n " value (number of ions produced) and " α "(degree of ionization). Students tend to use the same calculation by using the non-electrolyte solution. In the group discussion, the students also still relied on their friends to answer the questions.

The alternatives to solve the problem can be done by:

I applied the method of Think Pair and Share in classroom learning activities since it is simple and easy to do, furthermore, it does not take

too much time for a discussion activity. Having applied the method, I found the students' interest, motivation, and learning outcomes have optimal increased significantly in line with what I expected.

The solution for the problem

The researcher tried to implement the Think Pair and Share method in classroom learning activities. This method is simple, easy to execute, and it used a little time for the discussion. After applying the method, the researcher found that students' interest, motivation, and learning outcomes were increasing quite significantly in line with what I am expected.

Evaluation of Students’ Opinions of the reflective practice

Students believe that learning to approach reflective thinking was useful. Students commonly stated good responses about the presentation of TAP online tutorial activities which used a reflective thinking approach, even some suggested having broader activities such as adding presentations via video and PowerPoint. The students' opinions were stated as follows.

Evaluation of Students’ Opinions of the reflective practice

In students' opinion, learning by using the reflective thinking approach was useful. Commonly, they gave positive responses about the TAP online tutorial presentation that used that approach. Some students even suggested having more activities, like adding presentations through video and PowerPoint. The students’ opinion was stated as follows:

"The Implementation of the Chemistry TAP online tutorials which was related to the ways on conducting learning reflection in the classroom was very good as it could identify the strength and the weaknesses of the learning process that had been done. Besides, the friends' feedback could improve either the ongoing learning process and or in the

coming years. Unfortunately, several students did not attend and took part in the first initiation meeting. The Chemistry TAP online tutorial is very useful to broaden and increase our creativity in applying learning methods in the classroom".

"The implementation of the Chemistry TAP online tutorials that were related in conducting the learning reflection was very good. It could determine the weakness and strength of the learning process in the classroom. The feedback given by friends also can improve the on-going learning process and or in the coming years. Unfortunately, several students did not take part in the initiation meeting. The TAP online tutorial gave many advantages for the students. it can broaden and increase the creativity in applying learning methods in the classroom."

"The tutorial gives a good overview in knowing the strengths and weaknesses in learning activities we conduct, my advice related to the learning is that there must be more excited if it also uses video or PowerPoint explanation".

"The online tutorial was very useful in determining the strengths and weaknesses of the learning process. My suggestion in making the learning process more exciting is by explaining video or PowerPoint."

Although most students have well-informed about learning with a reflective approach, some students stated that they did not accustom to making learning analysis through reflective thinking. Most of the respondents stated that they had tried to search for a variety of literature resources about learning models and instructional improvement efforts, by studying the Essential Material Book related to the TAP Chemistry topic, as well as the use of literature that can be downloaded from the websites accessed through Internet, as the students expressed below.

Even though most students have already given information about the reflective approach, some students state that they did not use to make learning analysis by using reflective thinking. Most of the students said that they have tried to find literature about learning models and instructional improvement. They also already studied the Essential Material Book about Chemistry TAP and the sources that can be downloaded from the website, as the students stated below:

"I have searched for a variety of literature or studies related to learning experience through relevant literature and resources, through case study examples on the internet, as well as through the results of reflection and discussion with faculty lecturers in region office UPBJJ and peers help at school."

"I already found out many kinds of literature about the learning experience through the relevant resources, case study on the internet, and the result of reflection and discussion with lecturers in regional offices (UPBJJ) and peers at school."

"I typed keywords to search for the material to be learned and then looked up at the book. As I could not find it or it did not give much information, I browsed articles through the internet."

"I tried to search for the material by typing the keywords and then read the book, but I could not get the information I need. So, I browsed the article on the internet."

"Besides reading the module repeatedly, seek /read a variety of sources, especially from the internet which is relating to learning materials."

"I read the learning materials from a variety of sources, especially from the internet. I did it besides reading the module over and over again."

4.CONCLUSION

Online learning can be applied to the learning with a reflective approach. It aimed to encourage students to be able to perform high-level thinking, such as analyzing and taking a decision. The decision referred to in this study was the decision to design a learning improvement to the learning that had been conducted. By doing a reflection on teaching experience students were driven to the learning atmosphere that built their understanding of analysis and evaluation assessment. Based on the analysis and evaluation, the student was able to conclude the matters that occurred during the course learning such as analyzing the strengths and weaknesses of learning and designing a learning improvement. Through learning with the reflective approach, it is expected that students who are also teaching as chemistry teachers at school, can drive themselves to do learning improvement in the classes they conduct. Therefore, the online tutorials course activities on Chemistry TAP needs to be always improved and designed in well-managed preparation

as the arrangement of learning strategy including the formulation of Tutorials Events Unit (SAT). Thus, the activities of Chemistry TAP online tutorials need to be developed and was always considered to the students' ease in accessing the program and follow the tutorial as well as accessing literature sources to keep abreast with developments of science and learning models that can be transferred in the classes they conduct.

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