LEARNER AUTONOMY USING 5E LEARNING CYCLE

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ABSTRACT
This research aims to determine the effect of the 5E learning cycle on learner autonomy. Research with the type of quasi experiment using questionnaires as a measure of learner autonomy. The research subjects are 84 preservice teachers’ students. 5E Learning Cycle applicants with the syntax of Engagement, Exploration, Exploration, Elaboration, and Evaluation were carried out in advanced science courses in the second semester. The results showed that the mean pre-test score of the control group and the experimental group had increased. The Mann-Whitney U test obtained a significance of 0.039 and the effect of the 5E learning cycle showed a high category with score of N gain is 0.98. So that it can be concluded that the 5E learning cycle affects student learner autonomy.

Keywords: 5E learning cycle, learner autonomy, science.

INTRODUCTION

The educational phenomenon arise at this time is how a person can be said to be mature as long as study. One indicator of a person said to be an adult is that he is able to determine their direction in every situation that exists. That is the condition every person when he is studying. They are able to set himself to concentrate in learning, completing tasks in learning and able to be responsible for dealing with existing problems.

In their age maturity, college student must have a competency that support their learning. The average of each person not able to make best decision, they must be motivate by their parents or teachers [1]. The case based on the Misir & Koc research, every learner have not able learn on their own initiative, determining learning goals, and responsible yet [2]. They also stated just 30% of the learners used technology (computers and internet) for learning and they they need to go beyond their learning of prescribed materials [3]. So, learner autonomy must be have each student college.

Autonomy is one of the topics in the psychological discussion related to self. The terms of Autonomy used include learner autonomy and self regulation. Autonomy in autonomy terms as freedom or ability to decide [3-4]. So, learner autonomy as someone's dependence on others and as the ability to do something in making choices without the help of others. Learner autonomy can also be interpreted as the ability to resist temptations that come from within and outside a person. In addition, in the context of identity, learner autonomy shows an expression of attraction to something [5-6]. The research about learner autonomy by Sah (2015) showed autonomy can be develope by effective learning like Data-Driven Learning (DDL), an approach to enhancing learner autonomy exploring the language[7]. The other hand, to enhance learner autonomy Eneau and Develotte use working online together for adult learners working on an online learning platform as part of a professional master's degree programme[8].

The importance of learner autonomy is characterized by directing thoughts, feelings and actions to achieve learning goals. Autonomy of learning can develop because someone has a learning process. Autonomy of learning will be very important in learning, because the skills developed in students will influence the lives of students later. The characteristics of learning autonomy according to Williams [5] are: have the desire to progress (have self motivation, self-esteem, and self-confidence, not seeking attention, tend not to follow peers because independent students are able to decide themselves with little concern if they are wrong), respect for peers and the environment (able to be responsible in groups, constructive time management and disciplined, trustworthy and valued adults, active and energetic, not passive, satisfied when winning, both personal and collective, able to communicate and express feelings, be confident and dare to take risks and work together and when working independently, enjoy challenges), have a higher standard of work, are more socially skilled (more socially aware...
have more social awareness, able to offer assistance to friends. Independent students can organize and monitor the learning process. Ceylan revealed that students who have learner autonomy in learning are students, who can: 1) determine learning goals, 2) know what is learned and the development of their learning, 3) choose the learning methods and techniques to be used, 4) monitor anything which has been studied, and 5) evaluates what has been obtained[9].

Learning Cycle is a student centered learning model. Learning Cycle is a constructivism approach that has a series of stages of activity (phases) that are organized in such a way that students can master the competencies that must be achieved in learning by playing an active role [10]. Learning Cycle initially consists of exploration phases (exploration), introduction of concepts (concept introduction), and application of concepts (concept application) [11]. In the exploration phase, students are given the opportunity to utilize their five senses as much as possible in interacting with the environment through activities such as practicum, analyzing articles, discussing natural phenomena, observing natural phenomena or social behavior, and others.

The three-phase learning cycle has now been developed and refined into 5 and 6 phases. In the 5 phase Learning Cycle, the engagement stage before exploration was added and an evaluation stage was added at the end of the cycle. In this model, each stage of concept introduction and concept application is termed explanation and elaboration. Therefore the 5 phase Learning Cycle is often called the 5E Learning Cycle (Engagement, Exploration, Explanation, Elaboration, and Evaluation) [10][12-14].

The engagement stage aims to prepare students to be conditioned in taking the next phase by exploring their initial knowledge and ideas and to find out the possibility of misconceptions in previous learning. In this engagement phase students' interest and curiosity about the topic to be taught tries to be raised. In this phase students are also invited to make predictions about phenomena that will be studied and proven in the exploration phase. In the exploration phase, students are given the opportunity to work together in small groups without direct teaching from the teacher to test predictions, conduct and record observations and ideas through activities such as lab work and literature review.

In the explanation phase, the teacher must encourage students to explain the concepts with their own sentences, ask for evidence and clarification of their explanations, and direct the discussion activities. At this stage students find terms from the concepts learned. In the phase of elaboration (extension), students apply concepts and skills in new situations through activities such as advanced practicum, and problem solving. In the final stage, evaluation is evaluated on the effectiveness of previous phases as well as evaluation of knowledge, understanding concepts, or student competencies through problem solving in a new context which sometimes encourages students to conduct further investigations.

Based on the stages in the cyclical learning method as described above, it is expected that students not only hear the teacher’s information but can play an active role in exploring and enriching their understanding of the concepts learned. Based on the research by Sah and Eneau & Develotte, the phenomenon case about learner autonomy recently, this research will looking for the effect of the 5E learning cycle on learner autonomy of collage student in science learning[7-8].

MATERIAL AND METHODS

Methods

The design of this study use Pre-Test and Post-Test Control Group. The research was conducted in this research is preservice teachers study program.

Instrument

The conception test instrument that was developed to find out the conception of preservice elementary school teacher students was 7 items. Test items used the four-tier test format. The conception test validation was judged by two physics education experts and one theoretical physicist. The results of the validation of the conception test items indicated that the validator generally stated that the items to be used are valid both in content and construction. Validators provided some notes that are suggested to be revised, especially those that are considered inappropriate, that is, related to accepted scientific theory, image clarity, sentence editorial, and written order. The research instrument was in the form of several multiple-choice items on the concept of force and movement that require explanations about the selected answers. To find out the participants’ conceptual change, they wrote their responses towards several written statements (Yes/No/Not always) and with confidence levels (Sure/Not really sure/Not sure). The participants answered the questions individually and do not include their names to ensure their anonymity.

Procedures

The sample were taken randomly with 84 students divided into two classes. Class A as a control class with 43 students and Class B as an experimental class with 41 students. The research meeting took place in three weeks with three face-to-face use of the 5E learning cycle.
Group A is the control class with conventional learning treatment, while Group B is the experimental class with learning using the 5E learning cycle. Each group was given a Pre Test and continued with learning Advanced Science Courses with Reproductive System material and the Circulatory System. The design of this study is in the form of design and experimental analysis with experimental design accompanied by a discussion of statistical analysis used. Data were collected through a modified student learning autonomy questionnaire from Joshi's research (2011) with thirty items of statements [3]. Students choose by giving a checklist in the questionnaire column as scale 1 = S = Often, 2 = K = Sometimes, 3 = J = Rarely and 4 = T = Never. Each statement is a criterion or indicator of learning autonomy with each of the ten statement points, namely: 1) Having motivation to learn, 2) Being able to make decisions and initiatives to overcome the problems faced, and 3) Responsible for what he does. The data obtained were analyzed to see the effect of the application of the 5E learning cycle on the autonomy of learning science and then analyzed through the Mann-Whitney U test with a statement of results that if the value of p <0.05, the hypothesis is accepted and then to see an increase in independent learning, carried out by analyzing through the N-gain.

Data Analysis

The type of data is quantitative data obtained from the results of the pretest and posttest. The pretest and posttest data were analyzed to know increasing after using the STEM integrated handouts through 10 items. The amount of increase is calculated by the formula:

\[ N \text{ - gain} = \frac{\text{posttest - pretest}}{\text{score max - pretest}} \times 100 \]

The results of the N-gain calculation are interpreted using classification (Table 1).

| N-gain          | Classification |
|-----------------|----------------|
| N-gain > 0,7    | High           |
| 0,3 < N-gain ≤ 0,7 | Medium       |
| N-gain ≤ 0,3    | Low            |

The results of N-gain calculation of students creative thinking skills in experiment class and control class could be interpreted using classification (Table 2).

| Percentage (%) | Classification |
|----------------|----------------|
| 81 - 100       | Very High      |
| 61 - 80        | High           |
| 41 - 60        | Medium         |
| 21 - 40        | Low            |
| 0 - 20         | Very Low       |
RESULTS AND DISCUSSION

Based on the data collection technique in the form of a questionnaire about student learning autonomy. Questionnaires were filled by 84 students who were research samples so as to obtain the average as follows.

| Test Statistics | Learner Autonomy |
|-----------------|------------------|
| Mann-Whitney U   | 651.500          |
| Wilcoxon W       | 1597.500         |
| Z                | -2.063           |
| Asymp. Sig. (2-tailed) | .039          |

a. Grouping Variable: Class

The Mann-Whitney U test shows that Asymp. Sig. of means 0.039 < 0.05, so the hypothesis is accepted, there are difference between control class and experiment class. Thus, the 5E learning cycle has an influence on learner autonomy.

| Table 4 The Summary of N-Gain Score of Learner Autonomy |
|-------------|-----------------|-----------------|-----------------|
| Mean | Pre-Test | Post-Test | N Gain |
| Control | 45,488 | 48,233 | 0.76 |
| Experiment | 47,366 | 50,878 | 0.98 |

Table 4 have shown that the learner autonomy of the control class and the experimental class has increased. This increase can be seen from the score of pre-control class 45,488 increase to 48,233. The control class was not treated in the form of the 5E Learning Cycle model. The class is taught by the same lecturer as the conventional learning model.

On the other hand, the experimental class treated with the 5E Learning Cycle model during the three meetings experienced an increase in the average learner autonomy. The mean score of the pre-test of experimental group 47,366 increased to 50,878. The increase in the experimental class is higher than the control class. From these results it can also be seen that the N Gain Score of experimental class is higher than the control class N Gain Score. N Gain scores are included in the high category.

Figure 1 The Result of Control Class in Learner Autonomy Indicators

| Pre-Test and Post-Test Results |
|--------------------------------|
| Control Class                  |
|                                |
| Having learning motivation     | 1.649                          |
| Able to take decisions and initiatives to overcome the problems faced | 1.712 |
| Responsible for what he does   | 1.851                          |

\[\text{Prates} \quad \text{Pascates}\]
Figure 1 the mean of control class has increased for each criteria of learner autonomy. The learning process carried out by the lecturer is the same as applying conventional learning. Learning is done by observing the surrounding environment and question and answer, and giving one-way material (students with lecturers). The results of the questionnaire given to students in the experimental class showed that the average score of learning autonomy had increased in each of the criteria (Figure 2). The learning process carried out by lecturers in advanced science materials through the 5E Learning Cycle was carried out in a coherent manner. Students carry out the steps in the 5E Learning Cycle syntax. This shows that the learner autonomy of science can increase with the presence of learning variations, especially through the 5E Learning Cycle. The results of the autonomy of learning science can also be seen apart from the learning process can also be seen also through the upload on social media, especially about the tasks given to make a poster article.

![Figure 2](image)

**Figure 2. The Result of Experiment Class in Learner Autonomy Indicators**

Learning to use the 5E Learning Cycle (Engagement, Exploration, Explanation, Elaboration, and Evaluation) has effective steps to be implemented in science learning [13][15-16](Bybee et al, 2006; Madu & Amaechi, 2012; Ulina, 2017). The implementation of the 5E learning cycle is carried out coherently with prior engagement, which is by looking at the phenomenon of problems that occur in the surrounding environment, especially regarding the reproductive system and circulatory system, an example of the problem is imposing infectious disease images. This step aims to direct students to focus on the material. In addition, this is used as giving initial information and recalling the knowledge that has been possessed by students [13]. They individually conduct initial questions and answers to explore the problems presented, similar to what was done in Ulina [16].

Furthermore, during the exploration phase, students are grouped with a group of 4-5 people to solve problems about the topics presented (reproductive system and circulatory system). This action confirmed by research of Kurniawati & Wilujeng (2016) that by grouping in exploration phase, they are looking for various literature to solve the problems presented[17]. Next, they conduct discussions by discussing in groups according to the explanation stage. That stage, students are expected to understand and master of all the material.
In the elaboration stage, students choose one topic to be appointed in an individual article, they make a digital poster accompanied by a brief description and must be accompanied by the source of the quotation. Next, it will be uploaded through social media as the evaluation stage. From the whole process, they can be known about the mastery of the material and how to independently learn the stages well. This is similar to Qarareh research that in carrying out the 5E learning cycle is done by making concept maps in science learning[18]. Other that, learner autonomy can be do by action from each person of student[19]. This media as a portfolio task for every student to improve their autonomy. The other hand collage students are invited to use technology to improve their ability[20].

The other finding of using the 5E learning cycle has a positive impact on student learner autonomy. It was also found in Pitriani's research that the 5E learning cycle can increase learner autonomy[21]. Indicators of learning autonomy have increased, including: having learning motivation has increased, similar to the research of Yulistiana and Dewi, et al who investigated that the 5E learning cycle can increase motivation[22-23]; the indicators responsible for what they did have increased, similar to Lutviana which states that the 5E student cycle is able to improve character[24]; and an increase in indicators is able to overcome problems as well as in increasing mathematical problem solving skills in the research of Handayani, Sadra, & Ardana[25]. These things can be seen in student activities during learning which play an active role and participate in activities with enthusiasm, and the task is well done. The limitations of this study are, lecturers as directors, students as actors to do all types of learning and assignments, although it is hoped that students really have autonomy to learn. but as is the case with Ng, Confessore that in order to succeed the autonomous learner there is a need for coaching for students[26].

CONCLUSION

Based on the data from the analysis it can be concluded that the 5E learning cycle has an effect on the learner autonomy students with a significance of 0.039; the influence of the 5E learning cycle shows a high category with an N score gain of 0.98 so that the results can be stated that the 5E learning cycle has an influence on student learner autonomy science learning. Learning through this 5E learning cycle has a high advantage, but in carrying out further learning it is necessary to provide variation in implementation in each syntax.

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