The development of students creativity through the implementation of guided inquiry method on sciences

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Abstract. Creativity is an ability that is needed by students as prospective teachers, because students who have high creativity will be able to come up with ideas or concept, find and create something new, and be able to solve problems that arise quickly and accurately. The purpose of this study was to develop student creativity through the guided inquiry method in science. This research was an experimental study with one group post-test research design. The instrument used was the observation sheet and creativity questionnaire. Hypothesis testers use a statistical test (T-test) at a significant level of 5% with normality test prerequisites. The results obtained the T value of 1.747 with df 27. Sig (2-tailed) of 0.039 and T table of 1.703. Based on the calculation results, the calculated T value is greater T table (1.747 > 1.703) and sig value 0.039 <0.05, which means that the guided inquiry method can develop student creativity in science.

1. Introduction

Creativity is an ability that is needed by students as prospective teachers, because students who have high creativity will be able to come up with ideas or concepts, find and create something new, and be able to solve problems that arise quickly and appropriately. The creativity is still lacking in students. One of the results of the study states that student creativity in learning is still lacking so it needs to be developed [1]. Research results shows that: factually in the field there are still teachers who have lack of creativity [2]. Another problem is that the creativity of the teacher in opening and closing the lessons is still lacking and shows a monotonous routine [3]. Abu's research result show that the creativity of teachers in implementing the learning process is still low [4]. Another problem is also that the teacher an optimal in closing the lesson, due to the teacher less in creativ [5]. From this problem, it is necessary to equip prospective teacher students with a variety of high creativity so that when are graduate, they will be able to become creative teachers. According to Lehtone, Anna et al, creativity is an ability that must be developed in individuals [6].

In the Field Experience Practice course, students are equipped with eight basic teaching abilities. The students must be creative in order to be able to teach according to the eight skills so that the learning carried out becomes creative, innovative and enjoyable. However, the creativity of students is still not maximized. This can be seen from the teaching practice they show, such as rigid delivery of material, lack of creativity in presenting contextual material examples, method and media selection is not optimal and classroom management is still lacking. Creativity seen in this research is the creativity of students in carrying out teaching practices by delivering material related to science.
Creativity is the ability of individuals to give birth / produce something new in the form of ideas and real works that are relatively different from those that have been there before [7], another definition of creativity is all productive efforts that are different and unique from individuals. In the world of education, creativity is very important to understand a lesson and be able to interpret the overall activities to be carried out [8]. There are five main components in creativity that characterize the ability to think creatively, namely: ability to generate many ideas (fluency), flexibility / ability to solve problems in various ways (flexibility), authenticity (originality), decomposition (elaboration), and redefinition. As for the characteristics of creative students 1) sensitive to problems, 2) fluent in saying, and expressing, 3) flexible in thinking, 4) originality, and 5) have the ability to collaborate [9]. According to Mitchell, the development of student creativity can be done through various ways such as artwork, inquiry, giving assignments, problem solving, brainstorming, open ended and project work and others [10]. This study used the guided inquiry method to develop student creativity. Guided inquiry is a learning model that provides opportunities for students to be fully involved to find and investigate a problem in the learning process. This learning model also emphasizes the process of searching and finding [11]. According to Hong-Yi Le, if you want to develop individual abilities and creativity, you can use the method of inquiry [12]. Guided inquiry is one way to present analytical, critical and scientific research material by using certain methods to draw conclusions [13]. Inquiry learning is a part of contextual learning where the discovery process becomes the most important thing. Based on some of the theories above, the guided inquiry learning model is very well suited to be applied to the Field Experience Practice course on the grounds that students can find themselves the best techniques in applying eight teaching abilities by reading references, listening to learning videos and understanding the material presented, and discussing with group members. In this study, there is a syntax of the inquiry model that will be applied later, among others: oration, formulating problems, making guesses (hypothesis), collecting data, making conclusions and direct practice by applying eight teaching abilities.

2. Method
This research was an experimental research by applying the method of inquiry to develop the creativity of prospective teacher students. The study design used One Groups Posttest Design and the population was randomly selected. There are two instruments used, namely observation sheet and creativity questionnaire. Hypothesis testing using one sample T-test at a significant level of 5%.

3. Result
Research data can be described as follows:

| Table 1. Description of Creativity Data |
|----------------------------------------|
|             | N  | Range | Minimum | Maximum | Mean   | Std. Deviation | Variance  |
| Kreativitas | 28 | 25.00 | 61.00   | 86.00   | 71.6786 | 6.59435        | 43.485    |
| Valid N (listwise) | 28 |

The description of the data shows the average value of creativity is 71.7 with a high category. While the standard deviation is 6.6. The drinking value is 61 and the maximum value is 86. Before testing the hypothesis, the data normality test as the prerequisite test was done. The data normality test results are as follows:

| Table 2. Data Normality Test Results |
|--------------------------------------|
|             | Kolmogorov-Smirnov | Shapiro-Wilk |
| DataKreativitas | Statistic | df | Sig. | Statistic | df | Sig. |
|               | .113      | 28 | .200* | .959      | 28 | .327 |
| a. Lilliefors Significance Correction |
| * This is a lower bound of the true significance. |
Based on the results of testing using SPSS, the Shapiro-Wilk value was obtained with a significant value of 0.327, which means a sig value of 0.327 > 0.05. It can be concluded that student creativity data is normally distributed. The following will describe the results of hypothesis testing using one sample test.

| Creativity Data | t   | df  | Sig. (2-tailed) | Mean Difference | Lower     | Upper     |
|-----------------|-----|-----|-----------------|-----------------|-----------|-----------|
|                 | 1.747 | 27  | 0.039           | 1.67857         | -0.8785  | 4.2356    |

Based on the results of the one-sample test, the T value was 1.747 with df 27. Sig (2-tailed) was 0.039. For decision making on the one sample T test, if the T count is greater than the T table, the alternative hypothesis is accepted or the two-sided significant value is less than 0.05, the hypothesis is rejected (H₂ accepted). From the calculation above, the calculated T value is greater than T table (1.747 > 1.703) and sig .039 value <0.05.

### 4. Discussion

The results showed that the average value of creativity was 71.7 with a high category. While the Shapiro-Wilk test result with a significant value of 0.327 which means the data is normally distributed. Furthermore, the results of one-sample test, the calculated t value of 1.747 and t table value of 1.703.

After applying the guided inquiry method, the creativity of students become better, this is shown when students practice teaching. Students are able to apply eight basic teaching skills creatively. Observation results when students practice teaching, students are creative in opening lessons such as not rigid, the right voice, proper body movements, cheerful expression and use of standard language, able to greet children in a friendly manner, checking attendance and student readiness and students do not directly convey the material but do the apperception well. According to Lunenburg and Irby that apperception is very important, linking the knowledge that students have with the material to be studied can influence student learning outcomes [14]. The activity of opening a lesson is an important activity with the aim as a pleasant interaction will occur later. According to Sanjaya, the purpose of opening the lesson is to attract the attention of students [15]. According to Mansor, that opening learning activities can create effective learning [16]. According to Ojukwu that in activities opening lessons, students will be introduced to things that will be learned with the aim that students feel interested, feel curious, and there is a willingness to learn [17]. According to Awang that the activity of opening a lesson serves to get the attention of students and will make the teaching and learning process meaningful and interesting [18].

While the activity of closing the lesson, it looks like students are able to make conclusions, give assignments, and inform the material to be learn at the next meeting. According to Jalmo 2020, closing activities can provide information about the achievements of the learning objectives. The closing activity of learning can help students to know their achievements [5].

Student creativity is shown when managing classes such as being able to create and maintain an optimal learning atmosphere. Students in teaching look responsive, attention both to individuals and groups, able to give clear instructions and provide reinforcement. The results showed that good classroom management will make the learning process effectively and successfully [19]. Student creativity is also measured by media selection and the right method. Students are able to teach well, the media used in accordance with teaching materials, as well as the methods used in accordance with the characteristics of students. According to Esmaeili, et.al that creative teachers are teachers who are able to apply appropriate teaching methods with various characteristics of students [20].

Based on the results of hypothesis testing, it can be concluded that there is a significant influence of the application of the guided inquiry method to the development of student creativity in mastering basic teaching skills. Guided inquiry is indeed one of the most effective learning methods to be
applied in the learning process. Various stages contained in inquiry will be able to make students to develop their creativity. The processes contained in inquiry are 1) the planning process; 2) the process of finding information; 3) managing processes; 4) the process of creating; 5) sharing process; and 6) the evaluation process. It is supported by other research findings that inquiry is indeed able to develop creativity, such as the results of research that the inquiry model can enhance basic scientific creativity by looking at the increase in the average scores obtained by students [21]. The research conducted by Sari et al. prove that students' creativity as teacher candidates can be developed by applying inquiry [22], the results of previous studies states that learning by applying the guided inquiry model has a significant increase compared to the creativity of students taught through conventional / traditional learning [23]. Guided inquiry learning can also develop students' desire and learning motivation to master and learn the concepts of learning material [24]. Guided inquiry gives students space, opportunity, and experience, helps student to construct and practice eight basic teaching skills through the thought process [25]. By applying various stages of the inquiry method, such as the stage of finding information, then presented, then students will develop good communication skills. This is in line with the results of Susilo's research that applying the inquiry method can develop students' thinking abilities and be able to communicate their ideas [26]. Prospective teacher students can develop their scientific attitude through the inquiry learning [27]. According to Sari, Hayat Sholihin, Mulyati Arifin (2015), the inquiry method can certainly provide opportunities for students to develop their creativity through the opportunity to find themselves [28]. Wenning J.C 2007 states that the application of the inquiry method can create opportunities for students to create themselves so that high creativity can be formed within students [29]. Various other research results have proven that the inquiry method can improve children's creativity such as the results of Padila's research in 2018 [30] and alkaterini Michalopoulou in 2014 [31].

5. Conclusion
Based on the results of data analysis, it was concluded that the application of the guided inquiry method can develop student creativity with calculated value of 1.747 and T table of 1.703. From the calculation, the calculated T value is greater than T table (1.747> 1.703) and sig value 0.039 <0.05. The results of this study support previous studies that the application of the inquiry method can develop the creativity of prospective teacher students. The existence of various results of this study can be recommended for teachers and lecturers to apply the inquiry method in learning. The goal is students have competency in making as many questions as possible so that thinking will be smooth. This is an indicator of the smoothness of aspects of creativity. In addition, students have the ability to vary ideas, and are able to collaborate with other people's ideas.

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