# The Effect of Campus Teaching Programs on the Computational Thinking Ability of Prospective Elementary School Teachers

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**Abstract.** Computational Thinking is a Thinking Skill required by individuals to solve problems. The low ability of Computational Thinking will have a systemic impact on the individual in solving a problem. This study aimed to determine the effect of the campus teaching program on the Computational Thinking of Prospective Elementary School Teachers. The research approach used in this research is the Quantitative Quasi Experiment. The sample of this study was students of the PGSD UNS Study Program Semester VI. Students who take part in the Teaching Campus Program (KM) are the Experimental Group, and those who do not are the Control Group. Normality test using Kolmogorov-Smirnov, homogeneity test using Levene, and hypothesis testing using T-test. The results showed that the value of the T test results 0,00 < 0,05. Can be concluded that so there is a significant influence related to the Computational Thinking of students participating in the Teaching Campus program.

**Keywords:** Computational Thinking, Teaching Campus, Teacher Candidates

## 1 Introduction

21st Century Learning is Learning that is carried out by prioritizing the skills needed by each individual to face the future. The skills in question are Skills - Skills to solve problems. Such as Critical Thinking Skills, Creative Thinking Skills, Lateral Thinking Skills, Logical Thinking Skills and Computational Thinking Skills.

The era of disruption demands the integration of technology in every component of human life, including thinking skills. The real form of internalizing technology in thinking activities is Computational Thinking Skills. Computational thinking skills are thinking skills that apply computational science in solving problems. Computa-


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tional Thinking is a method of solving problems in everyday life with a computational basis and the application of informatics [1][2][3]. Another opinion states that there are two important steps in Computational Thinking Ability, namely the process of reasoning thinking followed by decision making and problem solving[4]. Based on the existing definitions and facts, Computational thinking skills are skills that are needed by each individual. Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child's analytical abilities[5]. Individuals intended are no exception for Elementary School Students or Prospective Teachers. This is in accordance with the opinion that students must have Computational Thinking to help construct solutions in solving complex problems[6][7][8].

Computational thinking skills have 4 main pillars, namely: problem decomposition, pattern recognition, pattern abstraction and generalization, and algorithmic thinking. (1) Decomposition: Ability to break data into smaller and manageable parts; (2) Pattern Recognition: Ability to see similarities or even differences in patterns that will be used in presenting data; (3) Abstraction: identify general principles that produce patterns; (4) Algorithm Design: Developing instructions for solving the same problem[9][10][11][12].These four pillars must be facilitated by educational institutions so that the graduates produced have the ability to think computationally so they can solve the problems they face.

Various kinds of efforts have been made by Higher Education institutions to equip students to solve problems in everyday life that may be encountered, such as implementing the Case Method and Team Based Project methods in teaching and learning activities in class, Using innovative Learning Media, Involving students in research and service activities, student participation in the Student Activity Unit (UKM) and others. However, in fact, data found that the level of students' computational thinking skills is still low. As happened in the PGSD FKIP UNS Study Program, based on data from the Computational Thinking Skills test, 74% of students still have low computational thinking skills, 23% of students have moderate computational thinking skills, and only 3% of students are in the high category. This data shows that the majority of students still do not have computational thinking skills.

Computational Thinking Skills can be improved by implementing the Independent Campus Learning Program (MBKM), which is compatible with the PGSD Study Program, namely the Teaching Assistance Scheme in the Education Unit with the Teaching Campus Program. Teaching Campus is a program where students and teachers collaborate in various components of the scope of Teaching and Learning Activities including administration and technology adaptation as well as placement close to domiciles which are included in the 3T areas (Forefront, Disadvantaged, and Outermost). Schools that are used as places for students to serve are schools with B or C accreditation[13]. The Teaching Campus can provide experience to hone leadership and self-development as well as improve competence outside the lecture class, as well as being a rare opportunity to be able to contribute and have a direct impact on Indonesian education[14]. This program is very suitable for efforts to improve computational thinking skills because in the Campus program teaching students are given space and opportunities to directly address real problems they face in the school envi-

ronment, so that it will train students in honing computational thinking skills in an effort to solve problems.

Some of the research on Computational Thinking that has been carried out in the world of education and learning is as has been done by Kadarwati (2020) who researched with the aim of knowing the effectiveness of computational thinking in increasing student creativity[15] and research that has been conducted by Cahdriyana & Richardo (2020) with the aim research to determine computational thinking skills in learning mathematics[3].Therefore, with the basic data available in this study, it will be carried out on a broader research object, namely at the student level so that they will know the computational thinking skills of Prospective Elementary School Teachers.

Based on the background that has been explained, the problem formulation of this study is Is there an influence of the Teaching Campus Program on the Computational Thinking Ability of Prospective Elementary School Teachers? and the purpose of this research is to determine the effect of the Teaching Campus Program on Computational Thinking Ability.

## 2 Method

This study uses a Quantitative approach with a quasi-experimental type. This type of quasi-experimental research involves placing the smallest experimental units into groups and controls which are not randomized[16]. The form of a quasi-experimental design in this study used a pretest-posttest control group design, by dividing the experimental group and the control group with the same proportion of the number of samples[17].

The population of this study were all students in semester VI of the Elementary School Teacher Education study program FKIP UNS, with a total sample of 25 students who took part in the Campus Teaching program as an Experimental Group and 25 students who did not take part in the Campus Teaching program as a Control Group. The location of the research was at Campus IV PGSD UNS Surakarta. The time for conducting research in June 2023.

The data collection technique used is the Computational Thinking Test. The Computational Thinking test was first validated by experts using the Aiken V Technique. Then the test was tried out once to students who were not included in the sample. After that it was tested for difficulty level (between 0.3-0.7), differential power (> 0.3), and estimated reliability (> 0.7 ), so that valid and reliable test results are obtained.

Data analysis was carried out by using the prerequisite test, namely the normality test using the Kolmogorov-Smirnov test, this test is used to see whether the data is normally distributed or not. The homogeneity test using Levene, this test aims to show that two or more sample data groups from the population have the same variance. Next, there is a hypothesis test with a T test to see whether there is an influence between the independent and dependent variables[18].

# 3 Results And Discussion

## 3.1 Result

Based on the results of the data analysis that has been carried out, it was found that the data taken from 25 students in the experimental group and 25 students in the control group were normally distributed as can be seen in the following graphs 1 and 2:

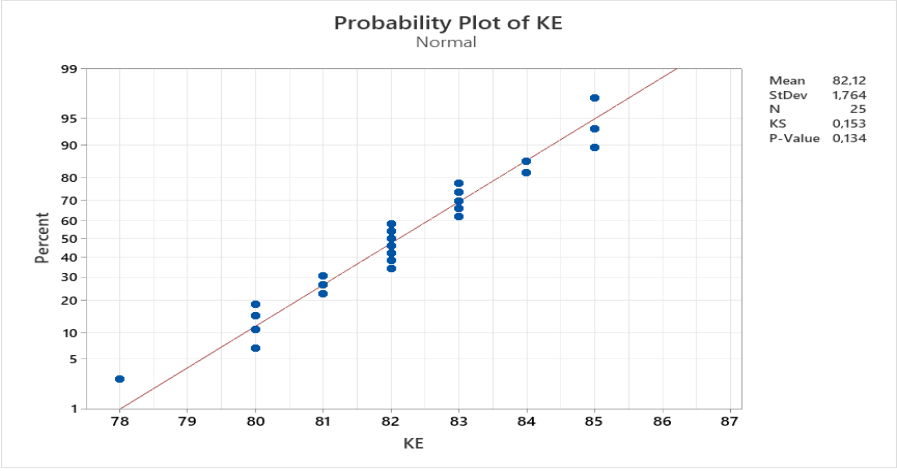


**Fig. 1.** Normality test in the experimental group

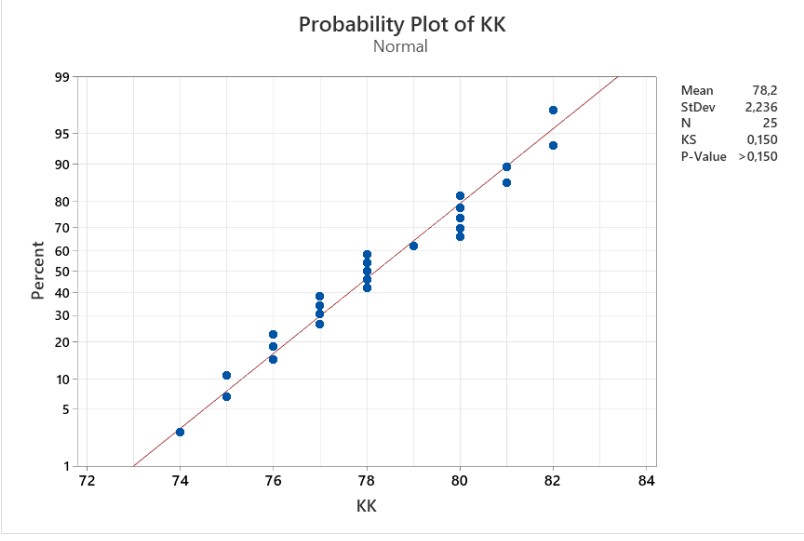


**Fig. 2.** Normality Test in the Control Group

Based on the images in graphs 1 and 2, it is found that the p value of each data is 0.134 and 0.15, which means above 0.05 or Ho is not rejected, so the two data are normally distributed.
In addition to the Normality Test, this study also carried out a homogeneity prerequisite test which can be seen in Figure 3 as follows:

**Test**

| | |
|---|---|
| Null hypothesis | $H_0: \sigma_1 / \sigma_2 = 1$ |
| Alternative hypothesis | $H_1: \sigma_1 / \sigma_2 \neq 1$ |
| Significance level | $\alpha = 0,05$ |

**Test**

| Method | Statistic | DF1 | DF2 | P-Value |
|---|---|---|---|---|
| Bonett | 1,81 | 1 | | 0,179 |
| Levene | 1,94 | 1 | 48 | 0,171 |

**Fig. 3.** Homogeneity Test results

Based on Figure 3, it is found that the p value of the Experimental and Control Group data is 0.171 based on the Levene's Test, which means above 0.05 or Ho is not rejected so that the data in the control and experimental groups are homogeneous data.

After getting the test results that the data is normally distributed and homogeneous, it fulfills the requirements to proceed to the Hypothesis Test using the T Test, the results are as shown in Figure 4.

**Test**

| | |
|---|---|
| Null hypothesis | $H_0: \mu_1 - \mu_2 = 0$ |
| Alternative hypothesis | $H_1: \mu_1 - \mu_2 > 0$ |

| T-Value | DF | P-Value |
|---|---|---|
| 6,88 | 48 | 0,000 |

**Fig. 4.** Hypothesis Test Results

Based on Figure 4, it is found that the p value is 0.000, which means it is below or <0.05 so it can be concluded that Ho is rejected. So the results show that there is an influence of the Teaching Campus program on the Computational Thinking of Prospective Elementary School Teachers or in another meaning, the Computational

Thinking of Prospective Elementary School Teacher Students who take part in the Teaching Campus program is better than Prospective Elementary School Teacher Students who do not take part in the Campus Teaching Program.

### 3.2 Discussion

The MBKM program is a program issued by the government, in this case the Ministry of Education and Culture with 8 schemes, one of which is the Teaching Assistance Scheme. One of the forms of programs with teaching assistance schemes in schools is the Teaching Campus program which started from the Pioneering Teaching Campus, Teaching Campus 1, Teaching Campus 2, Teaching Campus 3, Teaching Campus 4, and currently running Campus Teaching 5. Consistency of the Campus program Teaching which was held up to the fifth Series shows that this program has received a good response from the community or its users (in this case schools).

Universities or Colleges as providers of student delegations who are sent to take part in the Teaching Campus program will also be assisted and get extraordinary benefits because they are facilitated for their students to be able to take part in programs that are in direct contact with the school environment, especially the teaching department.

Based on the results of the research that has been done, it is found that students who take part in the Campus Teaching Program have better Computational Thinking abilities compared to students who do not take part in the program. This is because the Teaching Campus program has objectives, one of which is to provide opportunities for students to learn and develop themselves through activities outside the lecture class, including in this case Computational Thinking skills[13], besides that the campus teaching program also provides benefits that can help students improve their Computational Thinking abilities, namely Providing optimal learning opportunities in limited and critical conditions during a pandemic that can develop themselves, especially creativity, leadership and other interpersonal skills through this experience including Computational Thinking [13]. In addition, the benefits of the teaching campus program that students get are that this program is expected to be able to hone leadership, soft skills, and character as well as have teaching experience, collaborate with teachers in elementary schools and junior high schools in learning activities, besides that students also get credit recognition of the learning activities carried out amounting to 20 credits[13]. Based on the objectives, benefits, and advantages of the Teaching Campus program, it will have an impact on students when implementing the program. Students who take part in the program will be faced with real conditions regarding various kinds of problems that exist in the school environment, so that students will get used to solving problems well and wisely by using their thinking skills. This is in accordance with the opinion that students must have Computational Thinking to help construct solutions in solving complex problems [6][7][8].This ability can be possessed by students when students are accustomed and trained to solve problems. One of the right policies to make this happen is the campus teaching program. In this program students will be accustomed to solving problems using their thinking skills,

therefore students must have computational thinking skills. Students will have better thinking skills when students have computational thinking skills[19][20].

The Teaching Campus Program that students take part in will have a systemic impact on individual students who take part in this because many things are presented in real terms to program participants who are ultimately able to hone student abilities or skills, will be very different when compared to students who only attend lectures at classes that do not get direct experience in solving problems so that these differences in conditions cause differences in the results of computational thinking abilities, where students who take part in campus teaching programs have better computational thinking skills.

In addition, students who take part in the teaching campus program are students who have successfully passed the selection by the ministry team so that students who take part in the program are selected students as in the administrative requirements for registration there are 2 conditions indicating that students participating in the program are selected students, namely having a minimum GPA of 3 (from a scale of 4) and Preferably have teaching or organizational experience [13]. Based on the objectives, benefits, and advantages of the Teaching Campus program, it will have an impact on students).

## 4 Conclusion

Based on the results and discussion, a conclusion can be drawn in this study. Elementary school teacher candidates who take part in the Teaching Campus program have a better level of Computational Thinking Skills compared to Elementary Teacher Prospective Students who do not take part in the program, so that it can be interpreted that the MBKM program, especially the Teaching Campus, has one of which has a good impact on the abilities or skills of students who take part is Computational Thinking Skills.

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