# Education Reform Based on the Performance of the Teacher Training Institution in Building Competency

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***Abstract*— The education reforms in a country depend much on, among others, teacher quality. The institutions managing study programs that train the future teachers are expected to be able to prepare the teacher candidates that have the required competencies. There are four factors of the teacher competencies those are professional, pedagogy, social, and personality. This research aimed to study the teacher competencies of the physics teacher candidates at a Physics study program in Indonesia. The research method used ex-post facto with the number of participants of 50 students. The teacher competencies were tested by using a multiple-choice test with score 1 for a correct answer and 0 for an incorrect answer. The score total of each competency factor was analyzed by using MANOVA to find out the influence of gender and Semester. The result of this research shows that gender does not influence the competencies. At the same time, the Semester influences the competencies. Gender and Semester together influence the competencies. However, finding out the average score of the competencies that are still very low compared to the passing grade from MOEC means the learning process at the study program needs improvement. The implication from the result shows that the learning process at the Physics study program has not run effectively to build the competencies. As a study program that prepares the future teachers, the result becomes the basis for improving the curriculum and learning process that focus more on the competencies as the Physics teacher candidates**

***Keywords*—teacher training, teacher competency, education reforms, physics teacher, physics education, professional, pedagogy, social, personality**

## I. INTRODUCTION

The quality of education is one of the factors that determine the competitiveness of a country. Many countries initiate and implement the education reforms to build the quality of the national competitiveness sustainability quality through high-quality human resources [1], [2]. One of the efforts of the Indonesia government through the Ministry of Education and Culture (MOEC) is by improving teacher quality through various schemes. This policy is in line with the policies in various countries in the teacher reforms [3]. The government expects that standardization of quality through teacher certification will enable students to access equal education in various regions [4], [5]. Studies on preparing high-quality teachers, including those at the teacher training institutions, become critical [6]-[8].

There are several studies on the relationship between the access towards the quality teachers and students' achievement, including those on the teacher reforms in Indonesia [9]. Some studies show that the more significant gap in access to qualified teachers, the bigger gap in students' achievement [2], [10]. Other studies on the relationship between the teacher salary and national achievement show that countries with a higher salary of experienced teachers tend to have higher national education achievement. However, the national average salary of fresh graduate teachers has no relationship with the level of national achievement [11], [12]. Even though the salary is not the only one factor supporting the quality of the teachers, it needs to ensure the government funding is effective in building the teacher competencies [13], [14]. This performance will support the policies to improve teacher quality through the regulations [15], [16]. The availability of national policies on teacher quality tends to have a significant influence on national student achievement [17]-[19].

In Indonesia, the improvement of teacher quality cannot be separated from the new MOEC program called _Sekolah Merdeka' (Independent School). This program runs in 2018. With the number of teachers reaching 3.1 million (see http://statistik.data.kemdikbud.go.id/), it is not easy to run this program. One of the essential factors in improving teacher quality is the standardization of the teacher profession. Since

2017, the Indonesia government has released the policy of the certification. The government supports this program with incentive policy for the teachers that fulfill the professional qualifications. The success of this program is expected to be able to increase the availability of professional teachers that can improve student achievement [20]-[22].

Along with the development of teacher management in Indonesia, now non-teacher education program graduates can be teachers (based on the official letter released by Directorate of Learning and Student Affairs and Directorate of Primary Education Teacher Development). However, teacher education program graduates are still prominent resources for teacher candidates. Teacher education study programs are generally under the management of the faculty of teacher training and education at higher education institutions. The positions of Physics teachers at high schools will be, among others, from Physics teacher education program graduates. Preparing students at the Physics education study program as the Physics teacher candidates become critical to make the gap of the competencies smaller.

Based on Law Number 14, the year 2005 on Teachers and Lecturers, article 10 sentence (1) stating that the teacher competencies cover professional competency, pedagogy competency, social competency, and personality competency that are acquired through professional education. The professional competency is the ability of the teacher in the mastery of learning materials broadly and deeply, including the mastery of the curriculum contents at school, scientific substances, and scientific structures and methodology. The pedagogy competency is the ability to understand the learners, learning plans and implementation, evaluation of learning outcomes, the learner development to actualize their potentials. The social competency is the teacher‘s ability to communicate and interact effectively with learners, educational personnel, parents or guardians of the learners, and communities around. Personal competency is the personal ability reflecting the strong, stable, mature, wise, and charismatic personality, becoming a role model for learners, and having noble characters.

Based on this regulation, MOEC develops various instruments to measure the competencies. At the level of the study program, preparing the teacher candidates (including Physics teachers) is essential. This preparation includes the competency mapping and studies related to the readiness of the institutions to develop the competencies of the teacher candidates (students). It will be the basis for developing a curriculum and learning system. This research is taking apart to support MOEC policies. It aims to describe the influence of gender and Semester on the four teacher competencies. The result of this research will be the basis of policies for study program management. The policy is on the teacher candidates' training, especially on improving the curriculum and learning process that focuses on the competencies as the teacher candidates.

## II. METHODS

### *A. Research Context*

This research was conducted at a higher education institution managing the Physics teacher candidates through the study program in Yogyakarta, Indonesia. This study program prepares students to be teachers at junior high schools or senior/ vocational high schools. In Indonesia, there are two ways to be a certified teacher. First, MOEC gives opportunities to the teachers that have been working (on-job) to attend the certification program. This program covers knowledge mastering activities via online learning, workshop, peer teaching, and internship for three months. The second is for the teacher candidates (that has not taught). They have to attend PPG (Teacher Education Program) for one year. Thus, alumni of the Physics education study program do not automatically have the certification as Physics teachers. (based on official letter from Directorate of Primary Education Teacher Development No. 7713/B.3/GT/2018). Participants of this research were 50 students with Gender characteristics (Male 7 students; Female; 43 students) and on-going Semester (2nd Semester: 24 students; 6th Semester: 26 students).

*B. Instruments*

The instrument of competency measurement of the Physics teacher candidates covers four aspects those are professional (VAR1, 65 items), pedagogy (VAR2, 45 items), social (VAR3, 40 items), personality (VAR4, 40 items). The measurement of these aspects used a multiple-choice test with five choices, with only one correct answer. The score is 1 for each correct answer. The development of the instrument refers to the evaluation carried out by BSNP (Badan Standar Nasional Pendidikan or Board of National Education Standards). Table I shows the Core Competencies for each aspect.

TABLE I
LIST OF CORE COMPETENCIES

| No | Aspects | Core Competencies |
|---|---|---|
| 1 | Professional | 1. Mastering materials, structures, concepts, and scientific mindset that support the subject taught.<br>2. Developing learning materials taught creatively.<br>3. Utilizing the information and communication technology for self-development |
| 2 | Pedagogy | 1. Planning learning<br>2. Carrying out learning<br>3. Assessing and evaluating learning |
| 3 | Social | 1. Showing patriotism and nationalism by contributing towards communities and nation, obeying the law and being discipline<br>2. Behaving inclusively and respecting the diversity of religions, races, physical conditions, family backgrounds, socio-economic status, and considering gender difference<br>3. Communicating and interacting effectively, emphatically, and politely with students, fellow teachers, educational personnel, parents and communities based on social sensitivity and care<br>4. Cooperating and adapting with learners, fellow teachers, educational personnel, parents, within professional communities and other professions, and societies verbally or others that have socio-cultural diversity |
| 4 | Personality | 1. Being devout to the one and only God and showing religious characters<br>2. Upholding humanity values in carrying out the duties based on the religion, moral and ethics<br>3. Internalizing values, norms, and academic ethics<br>4. Showing responsibility for the expertise works independently.<br>5. Internalizing values of independency, struggling, and entrepreneurship<br>6. Showing characters that fit the teacher ethic code of Indonesia<br>7. Having sincerity, commitment, and truth to build characters, values, and skills of learners based on local wisdom values and noble characters |

*C. Analysis Technique*

This research used the ex-post facto research approach. The statistical analysis techniques used qualitative analysis based on test data for each VAR1, VAR2, VAR3, and VAR4. The next analysis was by using descriptive statistical analysis to find out the average and the standard deviation on each competency variable for each independent variable GENDER and SEMESTER. The average difference test (t-test) was done with MANOVA to find out the influence of GENDER and SEMESTER on the competencies (VAR). The result of descriptive data was also used to find out the interaction between GENDER and SEMESTER on VAR. The margin of error (p-value) used was 0.05.

## III. RESULTS

*A. General View*

This research used the ex-post facto research approach. The statistical analysis techniques used qualitative analysis based on test data for each VAR1, VAR2, VAR3, and VAR4. General View

From the measurement data of VAR1, VAR2, VAR3, and VAR4, the tabulation can be made by the totaling score of each item. Then obtain a total score for each variable per participant. Next, from the data, the graph was made to compare the difference in score achievement based on SEMESTER. Figure 1 shows the result of this process.

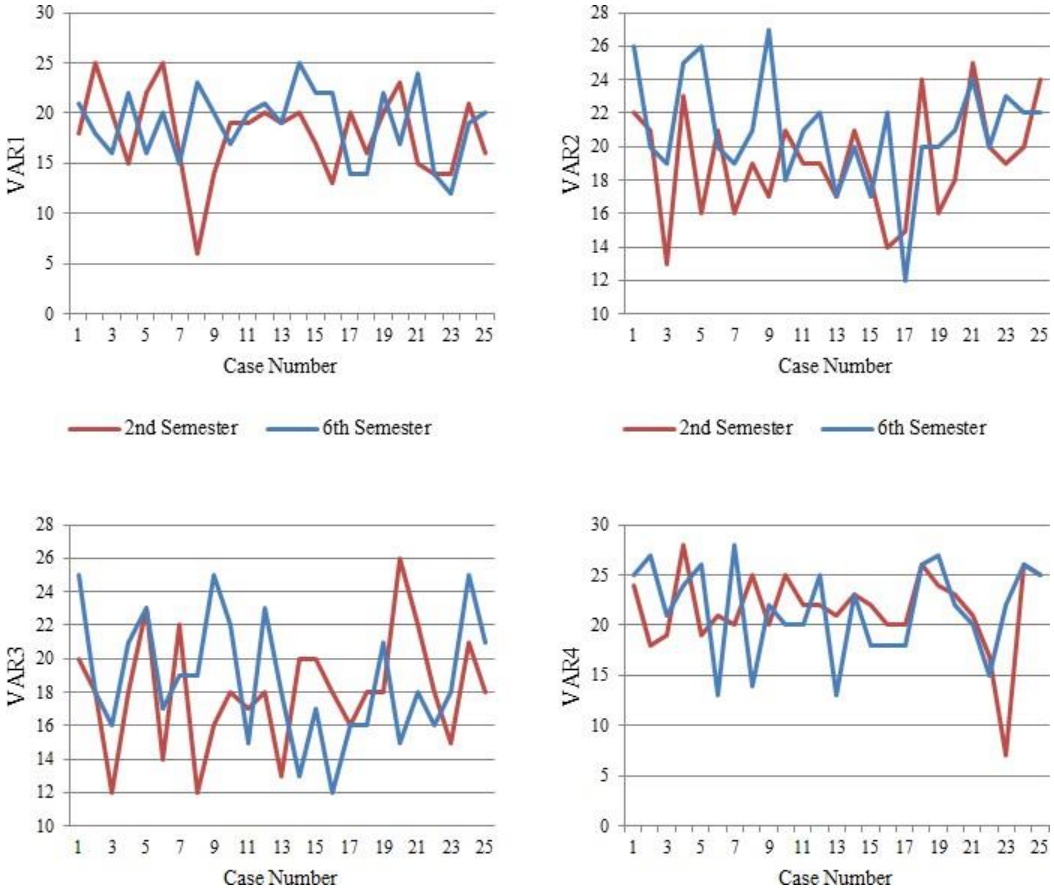


Fig. 1 Comparing competencies based on SEMESTER

Besides seeing the distribution of the competency achievement generally in Figure 1, general analysis is based on the average score and standard deviation of each variable (VAR1, VAR2, VAR3, and VAR 4), as shown in Table II.

TABLE II
CORRELATION BETWEEN VARIABLES

| Factors | Means | Standard Deviation | Correlations | | | |
|---|---|---|---|---|---|---|
| | | | VAR1 | VAR2 | VAR3 | VAR4 |
| VAR1 | 18.4000 | 3.84389 | 1 | | | |
| VAR2 | 20.0400 | 3.31945 | .122 | 1 | | |
| VAR3 | 18.4000 | 3.51092 | .181 | .366** | 1 | |
| VAR4 | 22.8571 | 3.71612 | -.039 | .337* | .310* | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

As stated in Methods, each variable has a maximum score (VAR1: 65 points; VAR2: 45 points; VAR3: 40 points; and VAR4: 40 points). Table 1 shows that each variable still reaches shallow scores (VAR1:

18.40 out of 65 or 28.31%; VAR2: 20.04 out of 45 or 44.53%; VAR3: 18.40 out of 40 or 46.00%; and VAR4: 22.86 out of 40 or 57.15%). The standard deviation tends towards this achievement meager compared to the passing grade of the competencies that is 76%. Table III shows detailed data related to participant descriptive based on GENDER and SEMESTER.

TABLE III
DESCRIPTIVE STATISTICS

| | GENDER | SEMESTER | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| VAR1 | Male | 2nd Semester | 13.0000 | 9.89949 | 2 |
| | | 6th Semester | 21.6000 | 1.81659 | 5 |
| | | Total | 19.1429 | 6.01189 | 7 |
| | Female | 2nd Semester | 18.5455 | 3.37677 | 22 |
| | | 6th Semester | 18.0000 | 3.60555 | 21 |
| | | Total | 18.2791 | 3.45946 | 43 |
| | Total | 2nd Semester | 18.0833 | 4.13802 | 24 |
| | | 6th Semester | 18.6923 | 3.60854 | 26 |
| | | Total | 18.4000 | 3.84389 | 50 |
| VAR2 | Male | 2nd Semester | 16.0000 | 4.24264 | 2 |
| | | 6th Semester | 22.8000 | 2.28035 | 5 |
| | | Total | 20.8571 | 4.18045 | 7 |
| | Female | 2nd Semester | 19.6364 | 2.87096 | 22 |
| | | 6th Semester | 20.1905 | 3.55836 | 21 |
| | | Total | 19.9070 | 3.19832 | 43 |
| | Total | 2nd Semester | 19.3333 | 3.05979 | 24 |
| | | 6th Semester | 20.6923 | 3.47297 | 26 |
| | | Total | 20.0400 | 3.31945 | 50 |
| VAR3 | Male | 2nd Semester | 12.0000 | .00000 | 2 |
| | | 6th Semester | 20.2000 | 5.44977 | 5 |
| | | Total | 17.8571 | 5.98411 | 7 |
| | Female | 2nd Semester | 18.5909 | 3.03408 | 22 |
| | | 6th Semester | 18.3810 | 3.10606 | 21 |
| | | Total | 18.4884 | 3.03450 | 43 |
| | Total | 2nd Semester | 18.0417 | 3.44496 | 24 |
| | | 6th Semester | 18.7308 | 3.60619 | 26 |
| | | Total | 18.4000 | 3.51092 | 50 |
| VAR4 | Male | 2nd Semester | 22.0000 | 4.24264 | 2 |
| | | 6th Semester | 23.2000 | 3.96232 | 5 |
| | | Total | 22.8571 | 3.71612 | 7 |
| | Female | 2nd Semester | 21.5455 | 4.26198 | 22 |
| | | 6th Semester | 21.0476 | 4.56592 | 21 |
| | | Total | 21.3023 | 4.36727 | 43 |
| | Total | 2nd Semester | 21.5833 | 4.16942 | 24 |
| | | 6th Semester | 21.4615 | 4.46525 | 26 |
| | | Total | 21.5200 | 4.28209 | 50 |

Table III shows an interesting phenomenon related to learning experiences from the 2nd Semester to the 6th Semester. This phenomenon can be found in the total score of each VAR. This way is by comparing scores on the 2nd Semester and the 6th Semester. For VAR1, it appears that the score of the 2nd Semester (18.08) is lower than the 6th Semester (18.69). For VAR2, it appears that the score of the 2nd Semester (19.33) is lower than the 6th Semester (20.69). For VAR3, it appears that the score of the 2nd Semester (18.04) is lower than the 6th Semester (18.73). For VAR4, it appears that the score of the 2nd Semester (21.58) is higher than the 6th Semester (21.46).

This data shows that learning experiences can improve competencies (except for personality competencies). Further analysis with multivariate analysis can be used to find out whether the difference of competency score between the 2nd Semester and 6th Semester is significant. This analysis is also to find out the influence of Gender or Semester on the competencies (VAR).

*B. Influence of GENDER and SEMESTER*

Multivariate analysis (MANOVA) was used with an alpha of 0.05 to find out the influence of GENDER and SEMESTER. Table 4 shows the analysis result. Table IV shows whether GENDER or SEMESTER influences the competencies of teachers on students.

TABLE IV
MULTIVARIATE TESTS

| Effect | | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[b] |
|---|---|---|---|---|---|---|---|---|---|
| Intercept | Pillai's Trace | .973 | 386.847[a] | 4.000 | 43.000 | .000 | .973 | 1547.388 | 1.000 |
| | Wilks' Lambda | .027 | 386.847[a] | 4.000 | 43.000 | .000 | .973 | 1547.388 | 1.000 |
| | Hotelling's Trace | 35.986 | 386.847[a] | 4.000 | 43.000 | .000 | .973 | 1547.388 | 1.000 |
| | Roy's Largest Root | 35.986 | 386.847[a] | 4.000 | 43.000 | .000 | .973 | 1547.388 | 1.000 |
| GENDER | Pillai's Trace | .089 | 1.048[a] | 4.000 | 43.000 | .394 | .089 | 4.190 | .302 |
| | Wilks' Lambda | .911 | 1.048[a] | 4.000 | 43.000 | .394 | .089 | 4.190 | .302 |
| | Hotelling's Trace | .097 | 1.048[a] | 4.000 | 43.000 | .394 | .089 | 4.190 | .302 |
| | Roy's Largest Root | .097 | 1.048[a] | 4.000 | 43.000 | .394 | .089 | 4.190 | .302 |
| SEMESTER | Pillai's Trace | .283 | 4.252[a] | 4.000 | 43.000 | .005 | .283 | 17.009 | .896 |
| | Wilks' Lambda | .717 | 4.252[a] | 4.000 | 43.000 | .005 | .283 | 17.009 | .896 |
| | Hotelling's Trace | .396 | 4.252[a] | 4.000 | 43.000 | .005 | .283 | 17.009 | .896 |
| | Roy's Largest Root | .396 | 4.252[a] | 4.000 | 43.000 | .005 | .283 | 17.009 | .896 |
| GENDER * SEMESTER | Pillai's Trace | .286 | 4.301[a] | 4.000 | 43.000 | .005 | .286 | 17.203 | .900 |
| | Wilks' Lambda | .714 | 4.301[a] | 4.000 | 43.000 | .005 | .286 | 17.203 | .900 |
| | Hotelling's Trace | .400 | 4.301[a] | 4.000 | 43.000 | .005 | .286 | 17.203 | .900 |
| | Roy's Largest Root | .400 | 4.301[a] | 4.000 | 43.000 | .005 | .286 | 17.203 | .900 |

a. Exact statistic

b. Computed using alpha = ,05

c. Design: Intercept + GENDER + SEMESTER + GENDER * SEMESTER

Table IV shows that with various methods, GENDER (blue box) does not influence the teacher competencies (p-value=0.05). On the contrary, SEMESTER influences the teacher competencies (p-value=0.05). However, GENDER and SEMESTER together influence the teacher competencies. This result is expressed on the significance column (last column; red box); where for GENDER is 0.302, SEMESTER is 0.896, and GENDER and SEMESTER together is 0.900.

This result shows an indication that the learning process has not effectively improved the competencies as the teacher candidates. The assumption is that the competencies in the 6th Semester are the accumulation of the competencies built since the first Semester. The other one is that participants of the 6th Semester have a similar basis when in the 2nd Semester if compared to participants of the 2nd Semester.

Further analysis to find out the influence of GENDER and SEMESTER on VAR1, VAR2, VAR3, and VAR4 was done with post-hoc analysis. Table V shows the analysis result.

TABLE V
TESTS OF BETWEEN-SUBJECTS EFFECTS

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[b] |
|---|---|---|---|---|---|---|---|---|---|
| Corrected Model | VAR1 | 113.345[a] | 3 | 37.782 | 2.846 | .048 | .157 | 8.538 | .645 |
| | VAR2 | 74.791[c] | 3 | 24.930 | 2.466 | .074 | .139 | 7.397 | .576 |
| | VAR3 | 98.929[d] | 3 | 32.976 | 3.003 | .040 | .164 | 9.010 | .671 |
| | VAR4 | 19.273[e] | 3 | 6.424 | .336 | .799 | .021 | 1.008 | .110 |
| Intercept | VAR1 | 6382.353 | 1 | 6382.353 | 480.776 | .000 | .913 | 480.776 | 1.000 |
| | VAR2 | 7795.216 | 1 | 7795.216 | 770.926 | .000 | .944 | 770.926 | 1.000 |
| | VAR3 | 6033.168 | 1 | 6033.168 | 549.479 | .000 | .923 | 549.479 | 1.000 |
| | VAR4 | 9718.674 | 1 | 9718.674 | 508.480 | .000 | .917 | 508.480 | 1.000 |
| GENDER | VAR1 | 4.772 | 1 | 4.772 | .359 | .552 | .008 | .359 | .090 |
| | VAR2 | 1.330 | 1 | 1.330 | .131 | .719 | .003 | .131 | .065 |
| | VAR3 | 28.712 | 1 | 28.712 | 2.615 | .113 | .054 | 2.615 | .353 |
| | VAR4 | 8.569 | 1 | 8.569 | .448 | .506 | .010 | .448 | .101 |
| SEMESTER | VAR1 | 81.803 | 1 | 81.803 | 6.162 | .017 | .118 | 6.162 | .681 |
| | VAR2 | 68.194 | 1 | 68.194 | 6.744 | .013 | .128 | 6.744 | .720 |
| | VAR3 | 80.498 | 1 | 80.498 | 7.331 | .009 | .137 | 7.331 | .755 |
| | VAR4 | .622 | 1 | .622 | .033 | .858 | .001 | .033 | .054 |
| GENDER * SEMESTER | VAR1 | 105.462 | 1 | 105.462 | 7.944 | .007 | .147 | 7.944 | .788 |
| | VAR2 | 49.190 | 1 | 49.190 | 4.865 | .032 | .096 | 4.865 | .579 |
| | VAR3 | 89.181 | 1 | 89.181 | 8.122 | .007 | .150 | 8.122 | .797 |
| | VAR4 | 3.635 | 1 | 3.635 | .190 | .665 | .004 | .190 | .071 |
| Error | VAR1 | 610.655 | 46 | 13.275 | | | | | |
| | VAR2 | 465.129 | 46 | 10.112 | | | | | |
| | VAR3 | 505.071 | 46 | 10.980 | | | | | |
| | VAR4 | 879.207 | 46 | 19.113 | | | | | |
| Total | VAR1 | 17652.000 | 50 | | | | | | |
| | VAR2 | 20620.000 | 50 | | | | | | |
| | VAR3 | 17532.000 | 50 | | | | | | |
| | VAR4 | 24054.000 | 50 | | | | | | |
| Corrected Total | VAR1 | 724.000 | 49 | | | | | | |
| | VAR2 | 539.920 | 49 | | | | | | |
| | VAR3 | 604.000 | 49 | | | | | | |
| | VAR4 | 898.480 | 49 | | | | | | |

a. R Squared = .157 (Adjusted R Squared = .102)

b. Computed using alpha = .05

c. R Squared = .139 (Adjusted R Squared = .082)

d. R Squared = .164 (Adjusted R Squared = .109)

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[b] |
|---|---|---|---|---|---|---|---|---|---|

e. R Squared = .021 (Adjusted R Squared = -.042)

Based on Table V, on GENDER row, this variable does not influence all competencies (VAR). This result can be seen from the significant value that is higher than the p-value (0.05). Meanwhile, on SEMESTER row, it appears that this variable has an influence on VAR1 (Sign.= .017), VAR2 (Sign.= .013), and VAR3 (Sign.= .009), but has no influence on VAR4 (Sign.= .858). Variable GENDER and SEMESTER together have influence on VAR1 (Sign.= .007), VAR2 (Sign.= .032), and VAR3 (Sign.= .007), but has no influence on VAR4 (Sign.= .665).

*C. Interaction between GENDER and SEMESTER*

From MANOVA and post-hoc analysis, the influences of GENDER and SEMESTER have been found. In this analysis, by using descriptive data in Table 2, it can be seen the interaction between GENDER and SEMESTER. Figure 2 shows the result of data processing.

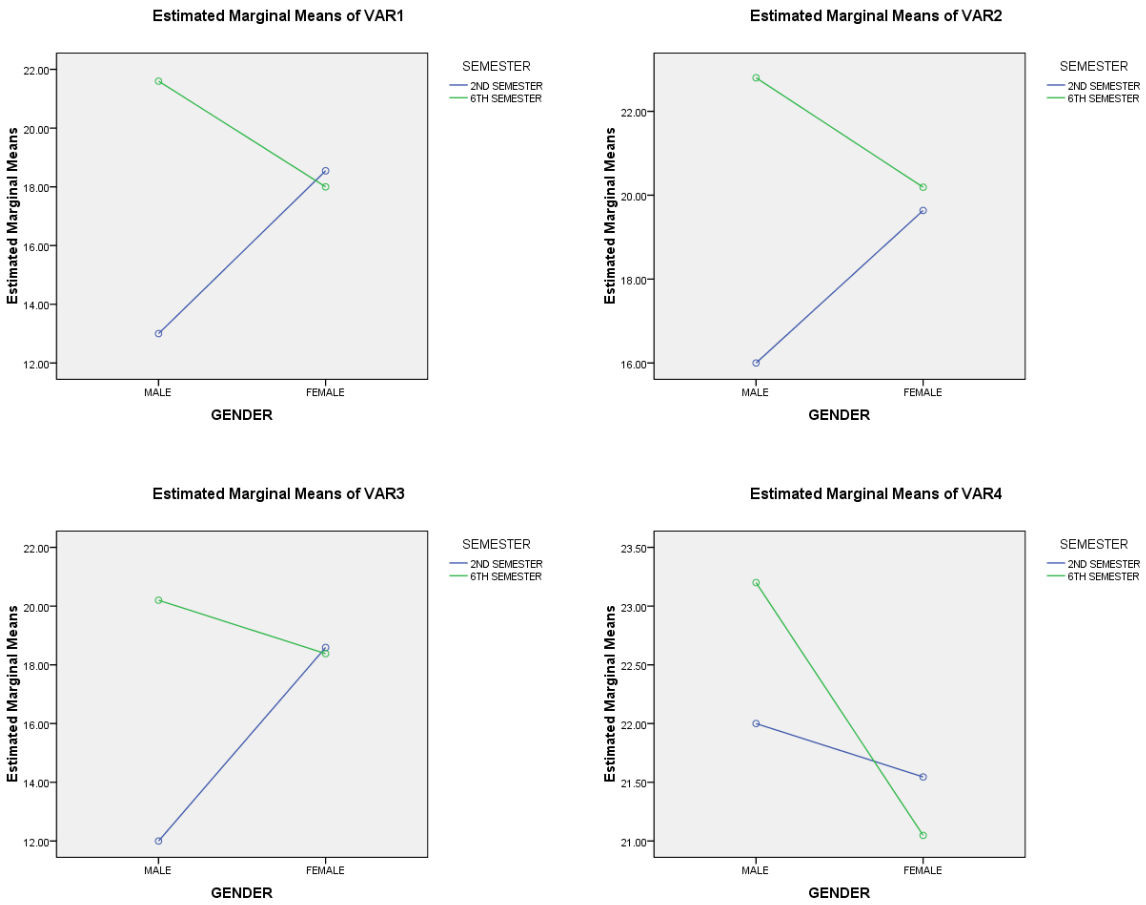


Fig. 2 Comparing competencies based on SEMESTER

From Figure 2, it can be analyzed that interaction between GENDER and SEMESTER occurs for VAR1, VAR3, and VAR4; and interaction does not occur for VAR2. This result shows that for VAR1, VAR3, and VAR4, the male teacher candidates (students) have higher scores in the 6th Semester compared to the 2nd Semester. On the contrary, the female teacher candidates (students) have higher scores in the 2nd Semester than the 6th Semester. This different achievement causes interaction between the two variables, GENDER and SEMESTER. This phenomenon does not occur on VAR2.

## IV. DISCUSSIONS

A teacher is a critical figure in the education system in Indonesia. Teacher's roles and potentials greatly influence both short-term and long-term education achievement of the nation. A teacher is an essential motivator of the student's success in the short term, such as academic success [23]. And also, in the future, such as their presence at higher education and job market, that becomes the motor of development [24]. Preparing the teacher candidates through the teacher training institutions becomes a critical part of the process of preparing the quality teachers. From data analysis in this research, the result of the difference test (t-test) of the average competencies between the 2nd Semester and the 6th Semester can be calculated. It appears that the learning process (SEMESTER) influences a significant increase on the competencies. However, this result is still not satisfying in terms of learning effectiveness. Because the average score of the competencies (VAR) is still lower than the minimum score requirement (a passing grade) of the teacher competencies determined by MOEC.

Another result related to GENDER shows that this variable does not influence the competencies (VAR). In other words, the learning process in the study program gives equal influence on gender. In developing the curriculum and learning process, the study program does not need to give different emphasis on the gender difference since the competency achievement tends to be similar. More detail analysis of each aspect based on the result of Post-hoc is as following:

### *A. Professional Competence*

The professional aspect (VAR1) can be used as a model explanatory of 15.7%. Similar to overall analysis, GENDER has no influence on the professional competencies (Sign= 0.552; p-value=0.05), while learning experiences (SEMESTER) have influence on the professional competencies (Sign= 0.017; p-value=0.05). The result of data processing shows that GENDER and SEMESTER together have an influence on the professional competencies (Sign= 0.007; p-value=0.05). This result meets the learning expectation. However, the average score of the professional competencies is lower than the standard determined by MOEC, so the study program needs to develop a better learning environment. This development is expected to increase the scores to surpass the minimum requirement. The study program should implement this development since the first Semester considering the score in the 2nd Semester is also low, so gain between semesters can be carried out gradually. The professional competencies are the mastery of learning materials, curriculum contents, and the mastery of scientific substances and methodology. With this definition, there is a specialization related to the professional aspect. This aspect emphasizes more on the mastery of scientific subjects. The mastery of scientific concepts become media for students to achieve many abilities. The abilities are to understand natural phenomena, finish ill-defined problems, think critically, and creatively in the process of discovering new things in students' life. In the process of learning Physics, students do not only acquire knowledge as instructional effects, but students also acquire an extra outcome. The student will form attitudes and behavior as nurturant effects [25], [26].

### *B. Pedagogy Competence*

The pedagogy aspect (VAR2) can be used as a model explanatory of 13.9%. Similar to the overall analysis, GENDER does not influence the pedagogy competencies (Sign= 0.719; p-value=0.05). Meanwhile learning experiences (SEMESTER) have influence on the pedagogy competencies (Sign= 0.013; p-value=0.05). Besides, GENDER and SEMESTER together have influence on the pedagogy competencies (Sign= 0.032; p-value=0.05). This result meets the learning expectation that learning can improve students' competencies. However, the study program still needs to find out more appropriate strategies in order that these competencies can reach the passing grade determined by MOEC. The pedagogy competencies are the ability to understand learners, planning and implementing learning, evaluating learning outcomes, and developing learners to actualize all potentials they have. With these pedagogy competencies, the teacher is expected to be able to balance knowledge achieved by students and skills acquired by students to survive in life. Curriculum developed by balancing the conceptual

knowledge and skill development is essential for a teacher [27]. A study conducted by [28], found out that even excellent students could not fully understand the concept taught. When presented with non-routine problems, students could not apply the knowledge they learn to solve problems.

The concept-based teaching has better effects on improving students' understanding without sacrificing procedural skills [29]. This finding shows the significance of using appropriate learning strategies for mastering particular concepts. Concept mastering activities by students need to be supported with the teacher's ability from planning to evaluation well. On nowadays learning, approaches that emphasize student-centered learning need to be adopted by the teachers in Physics learning those respect students. With these competencies, the teacher can give students opportunities to improve their abilities in finding new methods and strategies in solving Physics problems. One of the reasons causing the weakness of conceptual understanding of students is the tendency of science teachers that rely on ineffective teaching methods or strategies to improve scientific understanding [30].

*C. Social Competence*

The social aspect (VAR3) can be used as a model explanatory of 16.4%. Similar to the overall analysis, GENDER does not influence social competencies (Sign= 0.113; p-value=0.05). Meanwhile learning experiences (SEMESTER) have influence on the social competencies (Sign= 0.009; p-value=0.05). The result of data processing also shows that GENDER and SEMESTER together give influence towards the social competencies (Sign= 0.007; p-value=0.05). This result meets the learning expectation. However, the study program needs to review the curriculum and learning process implemented since the score of the social competencies is still very low. The social competencies are the teacher‘s ability to communicate and interact effectively with learners, educational personnel, parents or guardians of students, and communities around. These competencies position the teacher as a part of broader communities. A teacher is a member of communities that are expected to make a positive contribution to the environment, not only at school.

Teachers can help in developing societies and or communities by contributing their knowledge and expertise to societies. Teachers have significant roles in teaching new lessons in solving problems in societies [31]. Teachers can carry out these activities even outside the class. To develop these competencies, teachers need to have abilities in communication and interaction in societies.

*D. Personality Competence*

The personality aspect can be used as the smallest model explanatory compared to others, which is 2.1%. Similar to the overall analysis, GENDER does not influence the personality competencies (Sign= 0.506; p-value=0.05). Meanwhile, learning experiences also do not influence the personality competencies (Sign= 0.858; p-value=0.05). From the data analysis, GENDER, and SEMESTER together also do not give influence towards the personality competencies (Sign= 0.665; p-value=0.05). This result does not meet the learning expectation, particularly since learning experiences do not successfully improve the personality competencies. Therefore, the study program needs to give more emphasis on this competency development. With good learning programs related to personality development since the first Semester, probably this aspect does not develop anymore during the learning process. However, considering the average score of this aspect is still very low. It means learning has not been well implemented yet, or students do not equip the experience.

Personality competencies are personal competencies reflecting the excellent personality and noble characters. Personality describes a unique psychological quality that influences the behavior, mindset, and feeling of an individual in various situations and time [32], [33]. A teacher has an essential role to be a model, inspiration, and guidance for others [31]. The research finding shows that the personality of a teacher influences student efficacy but does not influence learning achievement [34], also influences student empowerment [35]. This result emphasizes that a good personality will change students' behavior through role models shown by the teacher.

The difference in personality score in this research supports studies conducted in the longitudinal studies. The studies found that personal changes in their personality level and the change of personality traits that possibly occurs in early adulthood [36]. This result can explain that students seek and get benefits from people that are similar to them in their life phases, including in the personality match between students and the teacher [37].

## V. CONCLUSIONS

The result of this research shows that gender does not influence the competencies. At the same time, the Semester influences the competencies. Gender and Semester together influence the competencies. There is an interaction between Gender and Semester on all aspects of the teacher competencies, except the pedagogy competencies. Generally, the male teacher candidates in the 6th Semester have higher competencies than students in the 2nd Semester. This phenomenon is slightly different from female students, so the interaction of the two variables occurred. There is no influence of gender on student competence. Nevertheless, in contrast, duration of study affects student competence. It means that professional, pedagogy, social, and personality competencies have not become the focus of the teacher training institutions. The learning process experienced by the teacher candidates (students) has not been able to improve the competencies significantly. The implication of the result shows that the learning process at the physics study program has not run effectively to build students' competencies. This result is by considering the average scores of the competencies that are lower than passing grade determined by MOEC. As a study program that prepares the teacher candidates, this result becomes the basis for the improvement of the curriculum and learning process that focuses more on the competencies as the Physics teacher candidates.

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