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# The effect of scaffolding techniques on the ability of student's reasoning ability and mathematics anxiety reviewed from gender

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Abstract

The research conducted in Madrasah Aliyah Negeri (MAN) Insan Cendekia Serpong with quasi-experimental design aims to find out the effect of scaffolding technique on students' ability of mathematical reasoning (KPM) and mathematical anxiety (KM) viewed from gender. The research sample is class X of science students (MIPA) which consist of 87 students; 41 male and 46 female obtained by cluster random sampling technique. The research data was obtained from the KPM test result and KM questionnaire filling and processed with two-track anava and t-test to answer the research hypothesis. The findings of this research are: (1) students' KPM who were taught with scaffolding technique is higher than the conventional; (2) there is no interaction between learning techniques and gender to KPM; (3) KPM of male students who were taught with scaffolding technique is higher than the conventional; (4) there is no difference of KPM between group of female students who were taught with scaffolding and conventional technique; (5) there is no difference of KM between group of students who were taught with scaffolding and conventional technique; (6) there is no interaction between learning techniques and gender to student's KM; (7) there is no difference of KM between male students who were taught with scaffolding and conventional technique; (8) there was no difference of KM between female students who were taught with scaffolding and conventional technique.



## 1. Introduction

Problems encountered in mathematics learning are the assumption of mathematics is difficult, the habit of memorization, and the inability to convey arguments over answers obtained from a mathematics problem. It is experienced by many students in Indonesia. As a result, generally their level of mathematics achievement is low. This fact is supported by data from TIMSS (Trends in International Mathematics and Science Study) which notes that Indonesia's position is far below Malaysia, especially compared to Singapore. Overall, the cognitive achievement of 8th grade Indonesian students is ranked 38th out of 45 participating countries of TIMMS in 2011.

According to NCTM (2000), the achievement of the ability to construct mathematical conjectures, develop and evaluate mathematical arguments, select and use representations are the standard things needed in the mathematical reasoning. Further, to assist students fulfilling these standards, NCTM emphasizes on the importance of classroom math discussion. Students do not only discuss reasoning with teachers and friends, but they can also explain the basis of their mathematical reasoning, both in writing and oral through discussion.

With regard to that symptom, the effective teachers will support students to make connections of knowledge by allowing them to engage in challenging tasks and giving chance that they can explain their solution and think the strategies, as well as listen to others' thoughts (Anghileri, 2006). In addition, they will help students to create, refine, and explore allegations on the basis

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evidence and use various arguments and verification techniques to confirm or disprove the allegations. As a result, students will be more flexible in their role as problem solver. For more, they will appreciate math more and be actively involved in mathematics learning. However, the students' positive attitudes and behaviors unlikely arise if they experience mathematics anxiety in learning process.

Mathematicz anxiety is a real problem faced by students and teachers. One of the contributing factors of students' mathematicz anxiety is the type of learning method used in the classroom (May, 2009). In line with that opinion, Steele & Arth (1998) state that the main source of mathematics anxiety is the "explanatory-practice-memorization" approach into teaching. Though, Clute (1984) explores how two methods of learning, discovery and expository, interact with students' mathematics anxiety in the core classes of undergraduate mathematics curriculum. He found that students with high levels of mathematics anxiety achieved high marks on achievement tests if they were taught using expository methods, and vice versa. Students who have low levels of mathematics anxiety got better value if taught by the discovery method. In addition, the postulate of Greenwood (1984) states that the main cause of mathematics anxiety can be found in teaching methods and mathematics classes in which it does not encourage the aspects of reasoning and understanding. Therefore, it is necessary to consider the methods or solutive learning techniques to solve the problems in mathematics learning, especially mathematics anxiety.

Scaffolding technique is a technique that gives a new skill by asking students to complete the tasks which are too difficult to solve by their own and teachers can provide full and continuous learning assistance. The students' mathematical reasoning abilities can be developed by providing meaningful guidance and support from the teacher. Such guidance and support become one of the characteristics of a learning strategy of scaffolding technique. In this case, it helps them to build an understanding of new knowledge and processes. Once the students get a sufficient and correct understanding, then by the time it can be reduced and even eliminated.

Moreover, scaffolding supports students to receive a good response. It does not only give a positive impact in the learning process, but also in building social relationships with students, both men and women. Therefore, scaffolding technique that applied in this study, was chosen to determine the effect on mathematical reasoning ability as well as students' mathematics anxiety in terms of gender aspect.

Then, a review of gender conducted in this study is based on the circumstance that gender development in boarding schools with religious nuances may differ from public schools. Male and female students who have different characters become interesting things to examine related to how mathematical reasoning ability and mathematics anxiety in scaffolding learning technique, considering the technique has already proved gives positive effect to the students' success in math class though, as revealed in the research conducted by Stragalinou (2012) and Frederick et al. (2014).

Based on the description of the background above, there are several research problems that can be drawn, as follows: (1) is there any difference in the ability of mathematical reasoning between students who are taught by scaffolding to conventional technique? (2) Is there an interaction between learning technique and gender to students' mathematical reasoning abilities? (3) Is there any difference in mathematical reasoning ability of male students who are taught by scaffolding to conventional technique? (4) Is there any difference in mathematical reasoning ability of female students who are taught by scaffolding to conventional technique? (5) Is there a difference in mathematics anxiety between students who are taught with scaffolding to conventional technique? (6) Is there an interaction between learning technique and gender to students' mathematics anxiety? (7) Is there a difference in mathematics anxiety of male students who are taught by scaffolding to conventional technique? (8) Is there any difference in mathematics anxiety of female students who are taught by scaffolding to conventional technique? Shortly, the research problems are summarized into a research objective that is to find out the effect of scaffolding technique on students’ mathematical reasoning and mathematics anxiety in terms of gender.

### *1.1. Mathematical reasoning abilities*

Reasoning is a special kind of problem solving (Dominowski, 2002). In other words, reasoning is a particular part of the problem-solving work that is part of doing mathematics. Completing a math task is the completion of the series of sub tasks with different characters and grain sizes. If the sub-tasks are not routine, then the following four steps can be used as a way of illustrating reasoning (Lithner, 2000), they are as follows: (1) problem situation is understandable, the difficulty is unclear how to proceed; (2) strategy selection, one possibility is to try to choose (in the broad sense: pick, remember, build, find, etc.) the used strategy to overcome difficulties. This choice is supported by the predictive arguments: will this strategy overcome difficulties? Otherwise, the students choose another strategy; (3) strategy implementation, it can be supported by verification argumentation: is the strategy overcoming difficulties? Otherwise, students repeat step (2) or (3), depending on if one thinks the problem is on the selection of strategy or in the implementation of the strategy; (4) conclusion, a solution has been obtained. As well mathematical reasoning ability which is based on the opinion of Kilpatrick et al. (2001), Brodie (2009), Lithner (2000), and Sidenvall et al. (2015) is the ability to create a line of thought or a chain of arguments in writing that is generated to convince oneself and / or others about the truth of a statement or doing math which involves the process of thinking skills, from understanding the problem, choosing and applying the strategy, until drawing deductive conclusions as well inductive.

### *1.2. Mathematics Anxiety*

Mathematics anxiety is described as panic, powerlessness, paralysis, and mental disorganization that arise between individuals when solving a mathematical problem (Tobias & Weissbrod, 1980). It is characterized with the anxiety when he or she is asked to do mathematical work, he or she avoids math classes until the last time, physical pain, fainting, fear, or panic, the inability to do the test, little success is obtained from the utilization of tutoring sessions (Smith, 1997). With regard to explanation above, mathematics anxiety can be seen from three symptoms; physical, psychological, and behavioral symptom. First, physical symptoms of mathematical anxiety are the increased heart rate, sweaty hands, abdominal pain, and lightheadedness. Second, psychological symptoms include an inability to concentrate and feelings of helplessness, worry, and disgrace. Third, behavioral symptoms include avoiding math classes, delaying math homework until the D time, and not learning regularly (Woodard, 2004).

The mathematical anxiety used in this research is cognitive, somatic, learning strategy, and attitude. These four aspects were adapted from two instruments, the mathematics anxiety instrument developed by Ko & Yi (2011) and Cooke et al. (2011). The indicators developed from these 4 aspects are created to measure the level of mathematical anxiety based on the students' experience in school situations.

### *1.3. Scaffolding*

Scaffolding instructions that support the development of reasoning and evidentiary capabilities are further investigated in a study by Meyer & Turner (2002). Teachers need to create a classroom environment so that students can be directed to create conjectures, generalizations, justifications, opening minds, listening, and reflecting on their peer contributions. Through questioning, teachers can build the environment as described by Martino & Maher (1999) which describe three types of question strategies. Questions that investigate justifications such as, "are you absolutely sure of that answer?", Questions that offer an opportunity for generalizations, such as "does that apply to all cases too?", Questions that trigger students to make a relationship, such as "what is the relation between the two things?". The definition of scaffolding is a learning technique applied to students in which there is selective intervention of teachers in providing assistance to students to some extents to develop their ability in completing tasks that previously seemed impossible to complete. Meanwhile, the scaffolding practices applied in this study were adapted from Anghileri (2006).

### *1.4. Gender*

The definition of gender which refers to the opinion of Blakemore, Berenbaum, and Liben (2009), Egan & Perry (2001) cited by Santrock (2011), also opinion Puspitawati (2013) is characteristic of a person as male or female through different functions, status and responsibilities to male and female as the result of socio-cultural constructions which are embedded through the process of socialization from one generation to the next and may change in its development, depending on the factors that influence it. Furthermore, the gender in this study is about male or female.

## 2. Method

Quasi-experimental designs were used because random allocations were practically difficult to do.

The experimental group is determined by an existing arrangement, such as the class chosen to be part of the treatment, while for the control group is a class which is similar to the experimental group. Meanwhile, this study did not make a new group, but used the existing groups of classes that have been naturally formed. The normality test, homogeneity, and average equality of four classes (two experimental classes and two control classes) use final exam of first semester (UAS- 1). For more, the number of female students in the experimental and control classes is same; 23, while the number of male students is respectively 21 and 20. The number of students in the experimental class is 44, whereas in the control class 43. Further, the form of the research design is as follows:

**Table 1.** Research Design

| Group determination | Treatment | Testing |
|---|---|---|
| R | X | O |
| R | – | O |

The data of this research were obtained through the students' filling on two types of instruments, namely the cognitive test of the ability of mathematical reasoning and non-test instrument to measure the affective aspect through the mathematical anxiety questionnaire. Both instruments are tested for validity and reliability. To determine the validity of mathematical reasoning instruments, content validation ratio was performed by five experts (three mathematics lecturers and two math teachers) and empirical validity (pilot test). Further, mathematics anxiety instrument is a non-test instrument in the form of rating scale with five choices of answers, they are never, rarely, often enough, often, and always. The higher the total student score will be, so will the level of mathematical anxiety. The questionnaire was constructively validated by two psychologists, two lecturers of mathematics, and two Indonesian teachers, while for empirical validity the product moment correlation coefficient formula was used. Above all, the result of the test instrument obtained by Alpha Cronbach coefficient is 0.92.

## 3. Findings and Discussion

The process of research data is done with the help of statistics software SPSS v23 and Excel. Mathematics anxiety data using Likert scale (ordinal data) is converted first with Method of Successive Interval (MSI) as for ordinal data is actually qualitative data. The interval successive method itself is the process of converting ordinal data into interval data. As for the Pearson correlation procedure, t test, and anova require interval-scale data. The data conversion is done with the help of Excel. The prerequisite test of the research data in the form of normality, homogeneity, and average equality is done before anova test.

### *3.1. Results of Mathematics Reasoning Ability Data Process*

The result of the data of mathematical reasoning ability (KPM) in Table 1 which is obtained from t and anava test with significance level $\alpha = 0{,}05$ shows that the mean score of KPM in the scaffolding technique learning group (A) is 73.98 with standard deviation of 12.83. Meanwhile the mean score of KPM in the conventional learning group (B) is 68.02 with the standard deviation of 11.65. In other words, the mean score of KPM in group A is 5.9 points higher than group B.

**Table 2.** Results of KPM Data from Two Groups

| Group | *N* | $\bar{x}$ | *SD* | *t_count* |
|---|---|---|---|---|
| Scaff (A) | 44 | 73,98 | 12,83 | 2,27 |
| Conv (B) | 43 | 68,02 | 11,65 | |

| *Df* | *F* | *p* | *ES* | *Power* |
|---|---|---|---|---|
| 85 | 5,13 | 0,026 | 0,057 | 0,61 |

Table 1 shows the value of t_count = 2.27, while t_table with $\alpha = 0{,}05$ and degree of freedom of 85 is obtained value 1.66. Because t_count > t_table, then $H_0$ is rejected, so it can be concluded that the average of KPM test scores of scaffolding technique students group is higher than conventional. It also can be seen from value $p = 0{,}026$ which is less than 0.05 (the rejected $H_0$ criterion is $p\, value < \alpha$) or a value $F = 5{,}13$ which is greater than *F* (0.05; 2; 84) = 3.11.

According to Cohen, 2000 (in Cohen et al., 2007), effect size (ES) is a simple way to quantify or measure the differences between two groups, such as experimental and control groups. Thus, it can be concluded that ES is a measure of the effectiveness of a treatment. It can be calculated in several different ways. Glass et al., 1981 (in Cohen et al., 2007) calculated the effect size through the formula:

$$\frac{\bar{x}_{experimental} - \bar{x}_{control}}{SD_{pooled}} \quad \text{with}$$

$$SD_{pooled} = \sqrt{\frac{(N_E - 1)SD_E^2 + (N_C - 1)SD_C^2}{N_E + N_C - 2}}.$$

Based on the criteria proposed (if using Cohen's *d*), the range of ES values is as follows: 0 – 0.20 = weak effect; 0.21 – 0.50 = modest effect; 0.51 – 1.00 = moderate effect; and ES> 1.00 = strong effect. Yet, if it is calculated by the formula, it is obtained that the value of *d* = 0.49 (category of modest effect, it means that the applied learning technique was not quite enough to affect the KPM).

The effect size is obtained from SPSS output with anava test (see partial eta squared, $\eta^2$ partial). Based on Cohen, 1988 (in Cohen et al., 2007), the reference of $\eta^2$ partial value is 0.01 = very small effect; 0.06 = moderate effect; and 0.14 = very large effect. Thus, in Table 1, the $\eta^2$ partial value = 0.057 includes to moderate effect. In other words, as much as 5.7% of the variance in the KPM variable can be explained through the instructional techniques, either by scaffolding or conventional learning technique.

Then, power is the ability of statistical tests to detect the effect of treatment on relationships or differences. It is also defined as the probability that a study will reject $H_0$ when it is false (Murphy et al., 2014). The relationship of power value with $\beta$ (the probability of making a type II error or the probability of failure to reject the incorrect $H_0$) is as follows: $Power = 1 - \beta$. The acceptable power value is 0.80 or more. In Table 1, the number of power obtained from anava is 0.61, so $\beta = 0{,}39$ is obtained.

The SPSS output of interaction test results between learning techniques and gender to KPM is presented in Table 2. From the table, it can be concluded that there is no interaction between learning techniques and gender to students' mathematical reasoning abilities. In Table 2, the *p* value (0.024, 0.073, and 0.590) indicates that there is one value (on the technique line) which indicates a difference (*p* value is less than 0.05), while the other two (on the gender line and interaction), there is a significant difference (*p* value is greater than 0.05). In addition, there is insufficient evidence to detect engineering effects, gender effects, or the interaction effects (observed power 0.62, 0.434, and 0.083, all is less than 0.80).

**Table 3.** The Anava Test Results of KPM Data

Dependent Variable: KPM_Score

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Observed Power[b] |
|---|---|---|---|---|---|---|---|
| Corrected Model | 1303,763[a] | 3 | 434,588 | 2,946 | ,038 | ,096 | ,680 |
| Intercept | 438558,586 | 1 | 438558,586 | 2973,125 | ,000 | ,973 | 1,000 |
| Teknik | 774,418 | 1 | 774,418 | 5,250 | ,024 | ,059 | ,620 |
| Gender | 485,747 | 1 | 485,747 | 3,293 | ,073 | ,038 | ,434 |
| teknik * gender | 43,246 | 1 | 43,246 | ,293 | ,590 | ,004 | ,083 |
| Error | 12243,134 | 83 | 147,508 | | | | |
| Total | 452540,000 | 87 | | | | | |
| Corrected Total | 13546,897 | 86 | | | | | |

a. R Squared = ,096 (Adjusted R Squared = ,064)

b. Computed using alpha = ,05

Table 3 shows that the t_count of independent t-test for male students in groups A and B of 1.89, while t_table = 1.69 ($\alpha = 0{,}05$ and *df* = 39). Because t_count > t_table, then $H_0$ is rejected, so it can be concluded that there is difference mean of KPM test scores between male students in group A and B. Then, on female students in group A and B obtained value t_count = 1.31, while t_table = 1.68 ($\alpha = 0{,}05$ and *df* = 44). Since t_count < t_table, then the criterion $H_0$ is rejected, so it can be concluded that there is no difference in the average KPM test scores among female students in groups A and B. The other component interpretations in Table 3 are analogues such as Table 1. The *p* score on male students and female in groups A and B are more than 0.05. The effect size with male students is 0.084 and female is 0,038

**Table 4.** The results of KPM Data Process in Terms of Gender

| Gender | Kel | N | $\bar{x}$ | SD | *t_count* |
|---|---|---|---|---|---|
| Male | A | 21 | 77,19 | 12,41 | 1,89 |
| | B | 20 | 69,80 | 12,59 | |
| Female | A | 23 | 71,04 | 12,76 | 1,31 |
| | B | 23 | 66,48 | 10,81 | |

| *F* | *p* | *ES* | Power |
|---|---|---|---|
| 3,58 | 0,07 | 0,084 | 0,455 |
| 1,72 | 0,20 | 0,038 | 0,249 |

*3.2. Mathematical Anxiety Data Process Results*

The result of data of mathematic anxiety (KM) in Table 4 with significance level $\alpha = 0{,}05$ shows that the mean score of KM in scaffolding learning technique group (A) is 68.70 with standard deviation of 12.85. The mean score of KM in the conventional learning group (B) is 67.07 with standard deviation of 11.78. In other words, the mean KM score in group A is 1.6 points higher than that of group B.

**Table 5.** The Results of KM Data from Two Groups

| Group | N | $\bar{x}$ | SD | t_count | df |
|---|---|---|---|---|---|
| Scaff (A) | 44 | 68,70 | 12,85 | 0,62 | 85 |
| Conv (B) | 43 | 67,07 | 11,78 | | |

| F | p | ES | Power |
|---|---|---|---|
| 0,38 | 0,54 | 0,004 | 0,094 |

Table 4 also shows the value of t_count = 0.62, t_table = 1.66 ($\alpha = 0{,}05$ and *df* = 85). Because t_tabel > t_count, it can be concluded that the KM scores of the students group of scaffolding learning technique are not different from the conventional. It is also seen from value $p = 0{,}54$ is greater than 0.05 or $F = 0{,}38$ which is less than *F* (0.05; 2; 84) = 3.11. Partial value $\eta^2$ = 0.004 which includes a very small effect. In other words, only 0.4% of the variance in KM variables which can be explained by learning techniques, either scaffolding or conventional learning techniques. Then, the value of power = 0.094 so $\beta = 0{,}906$. From the explanation above, it can be concluded that the probability of making a type II error is quite large, it is possibly due to sampling error.

The results of the interaction test between learning techniques and gender on KM are presented in Table 5. In Table 5, *p* values (0.573, 0.275, and 0.255) indicate that there is no significant difference for the techniques, gender, or interaction (*p* value is greater than 0, 05). There is also insufficient evidence to detect the effects of techniques, gender, or interaction (observed power 0.087, 0.190 and 0.203, all of them are less than 0.80). Thus, it can be concluded that there is no interaction between learning techniques and gender to students' mathematical anxiety. Moreover, with partial values $\eta^2$ = 0.016 then only 1.6% of the variance in KM variables which can be explained by the joint effect of learning techniques and gender.

**Table 6.** Anava Test Results of Mathematical Anxiety Data

Dependent Variable: Skor_Anxiety

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Observed Power[b] |
|---|---|---|---|---|---|---|---|
| Corrected Model | 440,827[a] | 3 | 146,942 | ,972 | ,410 | ,034 | ,256 |
| Intercept | 398745,572 | 1 | 398745,572 | 2637,281 | ,000 | ,969 | 1,000 |
| Technique | 48,461 | 1 | 48,461 | ,321 | ,573 | ,004 | ,087 |
| Gender | 179,295 | 1 | 179,295 | 1,186 | ,279 | ,014 | ,190 |
| Technique * gender | 198,483 | 1 | 198,483 | 1,313 | ,255 | ,016 | ,205 |
| Error | 12549,242 | 83 | 151,196 | | | | |
| Total | 414055,000 | 87 | | | | | |
| Corrected Total | 12990,069 | 86 | | | | | |

a. R Squared = ,034 (Adjusted R Squared = -,001)

b. Computed using alpha = ,05

Table 6 shows the t_count of independent t-test in male students in group A and B of -0.39, while t_table = 1.69 ($\alpha = 0{,}05$ and *df* = 39), so it can be concluded that there is no difference in average score of KM between male students in groups A and B. Then, in female students in groups A and B the value of t_count = 1.27, whereas t_table = 1.68 ($\alpha = 0{,}05$ and *df* = 44) or it can be concluded there is no difference in average KM test scores among female students in group A and B. 0.4% of the variance in the male KM variables can be explained by the instructional technique ($\eta^2$ partial = 0.004) and by 3.5% of the variance in the KM variables of female students can explained by the learning technique ($\eta^2$ partial = 0,035). The probability of making type II error in KM data of male students is 93.3% because power = 0.067, while the probability of making type II error in KM data of female students is 76,2% because power = 0,238.

**Table 7.** The Result of KM Data Process viewed from Gender

| Group | N | $\bar{x}$ | SD | *t_count* | *F* | *p* | *ES* | Power |
|---|---|---|---|---|---|---|---|---|
| A | 21 | 65,62 | 11,75 | –0,39 | 0,15 | 0,7 | 0,004 | 0,067 |
| B | 20 | 67,15 | 13,34 | | | | | |
| A | 23 | 71,52 | 13,42 | 1,27 | 1,62 | 0,21 | 0,035 | 0,238 |
| B | 23 | 67,00 | 110,54 | | | | | |

### *3.3. Discussion*

The findings of this study signify that students' reasoning ability can be developed in mathematics learning that is by scaffolding technique. The findings can be explained as follows, the practice of scaffolding applied to mathematics learning has a positive impact on student involvement in learning. The students' need to develop their mathematical reasoning abilities is reached because of the nature of learning with teacher meaningful assistance. Further, teacher assistance is done intensively and effectively, so they can get many information, such as knowledge that already gained by students, misconception, and learning difficulties experienced by students. In other words, teachers can actively diagnose the needs and understanding of students which is one of the elements of teaching with scaffolding technique (Hogan & Pressley, 1997). Then, the social interactions will be built, either between teachers and students or among students themselves in discussion situations. According to Yelland & Masters (2007), students can support each other through sharing strategies and articulating the reasons behind them. This causes a positive atmosphere in learning situation. For more, male and female students will be active and proactive in the classroom. Another impact of the learning situation developed is that students do not show significant mathematics anxiety. In other words, in scaffolding and conventional learning groups, there is no difference in mathematics anxiety between male and female students.

Based on the results of the data which lead to a reasonable conclusion that this study does not have sufficient evidence or power to detect significant influence even though in fact, such an effect exists. In this case, it may be because the number of sample is small (N = 87) and the error in sampling. All of power values shown in each table are less than 0.8. In addition, the value of effect size is also no more than 0.06. This research does not only refer from the p value in determining the criteria of conclusion, but also the effect size and power. The reason for the low power value is that the sample is too small to provide accurate and reliable results. A what Murphy et al. (2014) argue that a test would have statistical power at a higher level if the number of samples and effect sizes were enlarged, and the criteria for statistical significance were not rigid.

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## 4. Conclusion

The conclusions of the study which aims to determine the effect of scaffolding techniwue on mathematical reasoning ability (KPM) and mathematics anxiety (KM) of students are: (1) the KPM scores of students who were taught by scaffolding technique (group A) were higher than those were with conventional technique (group B); (2) there was no interaction effect between learning techniques and gender to KPM. It means that the influence of learning technique factors on KPM does not depend on gender factors, while the influence of gender factors on KPM does not depend on the factors of applied learning techniques; (3) KPM score of male students in group A is higher than group B; (4) there is no difference in KPM between female students in group A nad B; (5) there is no KM difference between students in group A and B; (6) there is no interaction effect between learning technique and gender to KM; (7) there is no difference in KM between male students in group A and B; (8) there is no KM difference between female students in group A and B.

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