

The Effect of Training Methods and Self-efficacy Toward Technological Pedagogical Competence and Content Knowledge (TPACK) of Early Childhood Education Teachers

Nita Priyanti*, Yetti Suprianti, Fasli Jalal
{*nita_priyanti63@yahoo.com}

Universitas Negeri Jakarta, Indonesia

Abstract. This study aims to know the effect of the training method and *self-efficacy* toward TPACK competence of early childhood education teachers. The sampling technique used the stratified multistage cluster random sampling. The experimental study used treatment design by level 2x2. The results showed that there is an effect of competence on the training method and *self-efficacy* toward TPACK of early childhood education teachers. The average score of teachers' TPACK competence with the *coaching* training method is higher than the mentoring method (32.82>31.87), the average score of teachers' TPACK competence with high *self-efficacy* used *coaching* training method is higher than the mentoring method (40.58>33.47), the average score of teachers' TPACK competence with low *self-efficacy* used mentoring training methods is higher than the *coaching* method (30.26>25.05). It can be concluded that the training method improves the TPACK competence of early childhood education teachers by taking into account the level of the teachers' self-efficacy.

Keywords: competence, efficacy, method, TPACK, and training.

1 Introduction

One characteristic of the 21st century is the development of modern technology and rapid information. The development of technologies provides a chance in the educational paradigm. Today, the educational chance is based on the development and control aspects of technology in modern times.

Mastering technology is part of the professional development of teacher competence in order to compete and take advantage of opportunities in this development era. Teacher competence is not limited to content and pedagogical mastery, but also needs to have knowledge in the integration of technology toward the process of teaching-learning in class so as to provide good benefits and bring children closer to the real world. Mastering the communication technology and information by teachers can help students develop skills in order to compete with the requirements of the time.

Teachers need to get stimulus from outside in order to get some competencies. One stimulus from outside that can help teachers in performing their profession is represented by training programs. Training programs followed by teachers are one of the factors that influence their self-development, especially in designing a learning process suitable for the modern era.

Based on previous observations conducted by researchers, it is showed that at this time there are still many early childhood education teachers who have not integrated

technology, pedagogy, and content knowledge (TPACK) in their teaching and learning process. It can be seen from teachers who still stutter in applying classroom learning. Another problem about training is material training, especially in the implementation of learning that is not fully integrated with technology. Therefore, it is necessary to improve the quality of early childhood education teachers in using training methods that are adjusted to their needs in the Banten Province. The average score of teacher competency test is still low, namely: Tangerang Selatan City (61.94), Tangerang City (59.11), Cilegon City (59.03), Serang City (57.32), Tangerang District (55.64), Serang District (53.44), Lebak District (52.61), and Pandeglang District (51.56). Thus, only 4 cities (South Tangerang, Tangerang, Cilegon, and Serang) in the Banten Province achieved their teacher competency test (UKG) above the national average achievement of UKG (56.69) [9]. Based on the explanation above, the researcher wants to examine the effect of training methods and *self-efficacy* on TPACK competence of early childhood education teacher in the Banten Province.

2 Research Method

The target population in this research included all early childhood education teachers in Banten who are studying S1-Education, a total of 673 teachers.

Samples are part of the population in which the research is conducted. [11]. Based on the description above, it can be concluded that the sample is part of the research object that represents the population produced by the procedure sampling with appropriate procedures if taking sampling is correct, representative and accurate so the research results can be generalized. The sampling technique used was the *Stratified multistage cluster random sampling technique*.

3 Research Findings

In general, the description of data on TPACK competence is the mastery of cognitive aspects of the training materials followed by the teacher for 6 days with 50 lesson hours. It is presented in the table below.

Table 2. Data of TPACK competence

	A1	A2	Σb
b_1	$n_1 = 19$	$n_2 = 19$	$nb_1 = 38$
	$\Sigma X_1 = 771$	$\Sigma X_2 = 636$	$\Sigma Xb_1 = 1407$
	$\Sigma X_1^2 = 32159$	$\Sigma X_2^2 = 22280$	$\Sigma Xb_1^2 = 54439$
	$\bar{X}_1 = 40.58$	$\bar{X}_2 = 33.47$	$\bar{X}b_1 = 37.03$
b_2	$n_3 = 19$	$n_4 = 19$	$nb_2 = 38$
	$\Sigma X_3 = 476$	$\Sigma X_4 = 575$	$\Sigma Xb_2 = 1051$
	$\Sigma X_3^2 = 12852$	$\Sigma X_4^2 = 19427$	$\Sigma Xb_2^2 = 32279$

	$\bar{X}_3 = 25.05$	$\bar{X} = 30.26$	$\bar{X} = 27.66$
	$nk_1 = 38$	$nk_2 = 38$	$nt = 76$
Σk	$\Sigma Xk_1 = 1247$	$\Sigma Xk_2 = 1211$	$\Sigma Xt = 2458$
	$\Sigma Xk_1^2 = 45011$	$\Sigma Xk_2^2 = 41707$	$\Sigma Xt^2 = 86718$
	$\bar{X}k = 32.82$	$\bar{X}k_2 = 31.87$	$\bar{X}t = 32.34$

Annotation:

A₁ : Group of teachers given the *coaching* method

A₂ : Group of teachers given the *mentoring* method

B₁ : Group of teachers with *high self-efficacy*

B₂ : Group of teachers with *low self-efficacy*

n : total of samples

\bar{X} : average score of TPACK competence

The statistical hypothesis testing in this research used analysis of variance (ANOVA) with two-lane and tested using the Tukey test. The two-lane variance was used to examine the main effect and interaction of independent variables with the dependent variable.

Table 3. Summary of Result Analysis

Variance sources	Db	JK	RK = JK/db	Fh = RK/RKD	Ft $\alpha = 0,05$	Ft $\alpha = 0,01$
raining method (A)	1	1667,58	1667,58	24,94**	3,97	7,00
<i>Self-efficacy</i> (B)	1	17,05	17,05	0,25ts	3,97	7,00
Interaction(A B)	1	720,47	720,47	10,77*	3,97	7,00
in	72	4815,00	66,88			
Total of Direduction	75	7220,11				

Annotation:

Dk = degree of freedom

Jk = sum of square

RJK = average of sum square

** = very significance pada $\alpha = 0.05$

* = significance pada $\alpha = 0.05$

Ts = not significance

To determine the strength of effect in each treatment group, the advanced Tukey test is conducted. The recapitulation of the results is presented below:

Table 4. Result of analysis on advanced stage with Tukey Test

Group	N	K	Fh	Ft
A ₁ - A ₂	38	2	0,71	2.86
B ₁ - B ₂	38	2	7,05	2.86
A ₁ B ₁ - A ₂ B ₁	19	4	3,78	3.67
A ₁ B ₁ - A ₁ B ₂	19	4	8,26	3.67
A ₁ B ₁ - A ₂ B ₂	19	4	5,49	3.67
A ₂ B ₁ - A ₁ B ₂	19	4	4,48	3.67
A ₂ B ₂ - A ₂ B ₁	19	4	-1,71	3.67
A ₂ B ₂ - A ₁ B ₂	19	4	2,77	3.67

4 Discussion

Based on the research finding, the discussion of the hypothesis results can be presented as follows:

4.1 TPACK competence of early childhood education teachers given the *coaching* method and the mentoring method.

Based on the statistical ANOVA test, it showed that $F_h > F_t$, $F_h = 24.94 > F_t (\alpha 0.05) = 3.97$. It found that the TPACK competence of teachers who are given *coaching* method is higher than the mentoring method. It also can be seen from teachers' TPACK competence test that the coaching method is 32.82 and the mentoring training method is 31.87.

The findings show that the use of coaching method is more effective in improving the TPACK competence of early childhood education teachers than the mentoring method in the Banten Province.

4.2 TPACK competence of early childhood education teachers with high *Self-efficacy* given the *Coaching* training method and Mentoring method.

There is an effect of the TPACK competence of early childhood education teachers with high self-efficacy given the *coaching* method and teachers with high *self-efficacy* given the mentoring method, because $q_h = 3.78 > q_t = 3.67$. It can also be seen from the average of the TPACK competence test result that teachers with high self-efficacy using the *coaching* method was 40.58 and those with high *self-efficacy* using the mentoring method was 33.47. The TPACK competence of early childhood education teachers with high *self-efficacy* using the *coaching* method is higher than the mentoring method.

4.3 TPACK competence of early childhood education Teacher with low *Self-efficacy* given the *Coaching* training and Mentoring method.

The TPACK competence of early childhood education teachers with low self-efficacy given the mentoring method is higher than the coaching method. Based on the statistical test (Tukey), there are differences but there are no significant differences ($q_h = 2.77 < q_t = 3.67$). Based on the empirical value, it shows the strength of the mentoring training method compared with the coaching training method for teachers with low self-efficacy, especially in

developing the TPACK competence. The average results obtained by teachers with low self-efficacy given the mentoring method were 30.26 and those with low self-efficacy given the coaching method were 25.05.

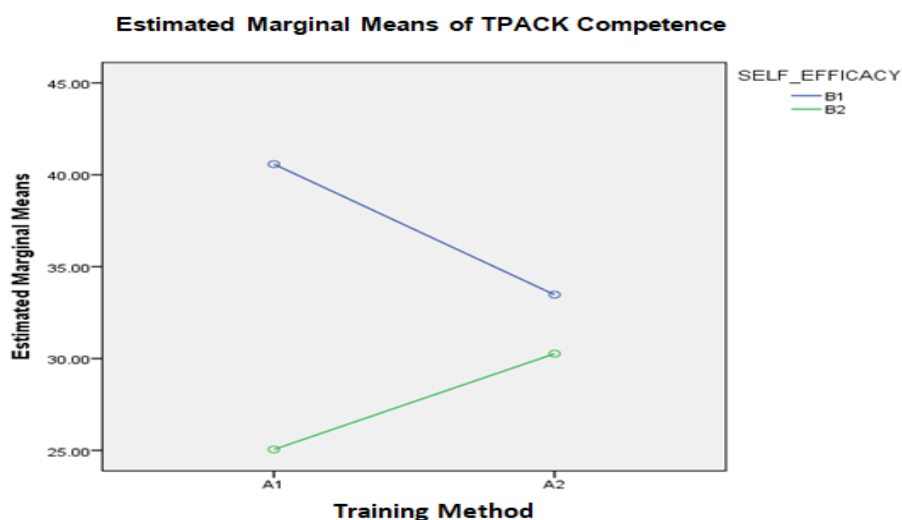


Figure 1. Visualization Effects of Training Methods and Self-efficacy Against TPACK Competence³

Conclusion

Based on the research results, it can be concluded that there is an effect of the training method and self-efficacy toward the TPACK of early childhood education teachers in the Banten Province. The average score of the TPACK competence of early childhood education teachers using the coaching training method is higher than the mentoring method (32.82>31.87), the average score of the TPACK competence of early childhood education teachers with high self-efficacy using the coaching training method is higher than the mentoring method (40.58>33.47), the average score of the TPACK competence of early childhood education teachers with low self-efficacy using the mentoring training methods is higher than the coaching method (30.26>25.05). It can be concluded that the training method can improve the TPACK competence of early childhood education teachers by taking into account the level of self-efficacy owned by the teachers.

References

- [1] Schoenl & fusarelli l.: Innovation, Nclb, And The Fear Factor: The Challenge Of Loading Schools In The 21st Century Educational Policy, 2008. pp. 181-203.
- [2] Niess, Margaret L.: Investigating TPACK: Knowledge Growth in Teaching With Technology J. Educational Computing Research, Vol. 44
- [4] Keengwe, J. G. & Onchwari, J.: *Technology And Student Learning: Toward A Learner-Centered Teaching Model*. aace journal, 17(2), 11-22. retrieved from <http://www.editlib.org/f/26258>. (2009).
- [5] Kathryn S. Lee, Shauna Smith, & Beth Bos.: *Pre-service Teachers' Technological Pedagogical Knowledge: A Continuum Of Views On Effective Technology Integration*. International Journal of E-

Learning & Distance Education, 29(2), 1-18. Available online at: <http://ijede.ca/index.php/jde/article/view/887/1540>, 2014. p.15

[6] Allanas, Edith. *Peran self-efficacy Dalam Mengembangkan Kemampuan pedagogic Content Knowledge (PCK) Calon Guru Kimia*. Tesis Magister Pendidikan Kimia 2015. h.

[7] Wang, L., Ertmer, P. A., & Newby, T. J.: *Increasing Preservice Teachers' Self-Efficacy Beliefs for Technology Integration*. Journal of Research on Technology in Education, 2004. 36(3).

[8] Lee, M. H., & Tsai, C. C.: *Exploring Teachers' Perceived Self-efficacy And Technological Pedagogical Content Knowledge With Respect To Educational Use Of The World Wide Web*. Instructional Science, 38(1), 1-21. DOI 10.1007/s11251-008-9075-4. 2010.

[9] <http://npd.data.kemdikbud.go.id/> diakses 22 April 2017