

Construct validity pedagogy competency instrument of teaching and learning practice program (TLPP) students: Unidimensional confirmatory factor analysis

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ABSTRACT

Pedagogy competency instrument is a tool to measure the achievement of teacher candidate students' ability of the teaching and learning practice program (TLPP). Various studies state the importance of this competency in supporting students in learning to use knowledge and action when teaching practices in the classroom. But there is a gap in the assessment because the instruments have not been able to measure this competency. Therefore, it is necessary to prove the validity of the construct to the items in the instrument. By looking to the concept, there are 4 dimensions which are used in composing the instrument such as effective classroom management, effective teaching practices, effective assessment, and technical skill. This study aimed to test that construct instrument validity. This study model used in design and development model. The data obtained from the experiment of teaching trial students were 177 persons observed by 67 teachers. Technic of data analysis to prove construct validity was first order confirmatory factor analysis (CFA) with the help of LISREL 8.70 software. The results showed that from all items which were 43, there was 1 item stated as invalid and 42 items were valid or unidimensional with T-Value on the loading factor value >1.96. This finding successfully proves that the unidimensional data parameter can measure the construct and give significant effects. It is expected that the finding of this research can complete the constructive knowledge of the items of pedagogical competency assessment of TLPP students and contribute to improving the quality of teaching into a good teacher in the present and future.

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1. Introduction

Teacher competency becomes the main issue and plays an important role in an education process. Teacher competency is not only needed in achieving a didactic duty based on curriculum, but also in developing students' competency in learning. This statement is in line with Selvi (2010) who stated teachers' competency influences value, behavior, communication, purpose, teaching and learning practice and it can increase the success of learning.

The competency which is directly related to the teacher professional and gets so many attentions in the learning process, it is pedagogy competency. This competency is very important and become the challenges in professional teacher perspective in the

21st century (Martínez, 2010). Besides that, this competency tends to be used in the minimum professional standard of the teacher which will increase the role of their profession his thing indicates that the low teacher's pedagogy competency which causes the quality of a learning process will be also low, so this component is urgently needed to be increased.

The development of pedagogy in the teacher education program is a need at the university. The development of this competency has many dimensions, including the development of person and specifically refers to the carrier that she or he chooses. Another dimension is that university develops pedagogical competency teaching and learning practice program to promote students who are ready with all of their abilities to serve in the education world. Third dimension is put the based design and procedural about the ability of teacher in relevant regulations. Fourth dimension is the development of competency based on national standard. Some strategies and approach has been

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conducted by universities in Germany as well in other European countries, mainly in the north and west Europe (Merk, 2017).

Some opinions above assert that the pedagogy competency becomes a very important thing to be taught to students, especially for student with teaching and learning practice program (TLPP) experience. This practice is a culmination point for students to prepare the obtained theory from lecturing and implement it to a field experience.

Some newest researches show the importance of pedagogy competency on TLPP, because this competency supports the learning in using knowledge and action when practice at the field (Zeichner, 2012; McDonnough and Matkins, 2010; Parker et al., 2016). This shows that the pedagogy competency supports and helps students to increase their ability through the experiences gained in the TLPP location.

The study in Indonesia shows that students at the TLPP period are still difficult to decide the method and learning tool/media which is appropriate to the material that will be taught in the class, complete the instrument or learning evaluation tool. The study in STKIP PGRI Pontianak shows that pedagogy competency of students who does TLPP has a tendency in enough category.

The study from Fanani (2016) showed almost all mentoring teachers did not believe in the ability of teacher candidate students in explaining the purpose of material, the benefit to learn material, and the ability to relate the lesson with real life. This shows that pedagogy competency of TLPP students is still not as expected.

Some results of researches above are contradictive with the final score got by students in that TLPP, those are the majority of students who were passed and got good marks (Fanani, 2016). The ability of TLPP students evaluated by the mentoring teacher is very high (>90%), this thing is influenced by the competency assessment instrument used. The knowledge assessment became the single core competency and the teachers had few difficulties in implementing the assessment (Retnawati et al., 2016). The highness of the TLPP final score of students indicates the gaps from assessment by using available instrument.

So it is needed to do a brief review of the pedagogy competency assessment instrument as mentioned in standard teacher competency and teacher competency test in the regulation from the Education and Cultural Ministry of Indonesia Number 57 Year 2012. Ideally, for the assessment of TLPP, It should be derived from competency becomes an indicator referring to the related theories which measure pedagogy competency. It means that, to believe in the instrument which is developed to measure pedagogical competency mastery of TLPP students and it should be a proof of the construct validity instrument to test whether the indicators which has been grouped based on latent construct (its variable) which consistently exist in that construct or not.

The teacher ideally should show some competencies as follow: (a) effective classroom management, (b) effective teaching practices, (c) effective assessment, (d) technology skill (Nessipbayeva, 2012).

Based on those four indicators, it is developed a pedagogical competency assessment instrument of TLPP students which is used along the time in Indonesia, and also to notice the items on the instrument used in assessing pedagogical competency of the teacher such instrument in teacher competencies test, and the instrument of teachers' performance assessment.

The question appears is: do all items in that instrument valid to measure pedagogical competency of TLPP students in Indonesia? To measure this question, it is needed the proofs of construct validity to all items an instrument. For that, it is conducted the measurement of *unidimensional* of each indicator and see the biggest contribution which compose its latent variable by using CFA (*Confirmatory Factor Analysis*).

This study is different to some previous researches in Indonesia, because from those previous researches are more focus to study about the effectiveness of TLPP and the description of students' pedagogical competency profile, and see the relation of pedagogical competency of students. This study aimed to answer some questions as follow: 1) Do all items in every dimension measure the construct, where all items in each dimension are fit with one factor model?, 2) Do all items in each dimension give significant effects?.

This study theoretically can be used as a reference developing pedagogy competency instrument of TLPP students. Practically, this research can be used to do improvement which is able to measure pedagogical competency of TLPP students.

2. The concept TLPP of teacher education's students in Indonesia

TLPP is a program which had been conducted as one of the requirements to get a bachelor degree at teacher education (Southgate et al., 2013; Whitford and Villaume, 2014).

TLPP as a field experiment is called as professional experience, field experience, teaching practice, demonstrational teaching, or teaching for students. This practice equips and prepares students to face various challenges as a class teacher, such as the skill of teaching and learning how to implement theoretical practice (Southgate et al., 2013).

Some findings in the research explain the importance of TLPP in the development of students in becoming a teacher and as appropriate media for students to implement the principles of teacher profession. Event TLPP is very important, but actually the characteristics of TLPP is very various in the development of teaching skill in every university (McDonnough and Matkins, 2010). TLPP is

implemented in the form of teaching practice and other educational activities at schools or other practice places.

The concept of TLPP in Indonesia is one of academic activities which cover teaching exercise and other guided educational assignments, directed and integrated to fulfill the requirements of professional workers in education, which is conducted step by step under the supervision of supervisor lecturer and the mentoring teacher (Fanani, 2016).

Standard of competence achievement of TLPP students in Indonesia is formulated by referring to the 4 demands of teacher competence, whether in the learning context or in the teachers' life context as a member of society just like as required the constitution of Number 16 Year 2015 about the teacher and lecturer, also as mentioned in the regulations of education and culture ministry of Indonesia Number 16 Year 2017 about teacher and lecturer academic qualification standard and teacher competence. Four teacher competencies are: pedagogical competence, professional competence, personal competence, and social competence".

There is an activity from TLPP students that can implement and practice the knowledge which has been obtained in the lecture when they practice at school or other practice places, so they can develop the competencies related to the teacher profession, such as pedagogical competence, personal competence, professional competence, and social competence. Hence, in practice, it is needed instruments to measure student pedagogy achievement as a teacher candidate.

3. The importance of pedagogy competence of TLPP students

Pedagogy competence is one of competence types which absolutely have to be mastered by TLPP students. Pedagogy competence is a series of effective principles in teaching. It means that in becoming a teacher, someone should have to realize the purpose of learning, able to manage and process the learning, this competency specially characterize and differentiate teacher profession with other professions. The mastery of development theories and learning theories is absolutely a must to have by the teacher. The teaching and learning process in the classroom should be supported by multimedia (Retnawati et al., 2017).

Pedagogy competence as a form of learning characteristics. There are three aspects of teacher professional practice which is integrated with pedagogy competence, such as: 1) thinking, to work the knowledge professionally, 2) implementing, to utilize professional skills, and 3) acting with integrity, to implement values in ethics profession (Shulman, 2005).

Based on the regulation of education and culture ministry of Indonesia Number 57 Year 2012 about teacher competence test, Pedagogy competence should be mastered by the teacher consist of the

ability to recognize the effective characteristics and potency of students, mastering the plan of curriculum development, mastering effective learning steps and mastering the system and mechanism and assessment procedure.

The dimension of teacher pedagogy competence ideally (Nessipbayeva, 2012), as follows:

- a. Effective classroom management, maximizing efficiency, maintaining discipline and morale, promoting team work, planning, communicating, focusing on results, evaluating progress, and making constant adjustments. A range of strategies should be employed to promote positive relationships, cooperation, and purposeful learning. Organizing, assigning, and managing time, space and activities should ensure the active and equitable engagement of students in productive tasks.
- b. Effective teaching practices, teaching and learning strategies should help engage students in active learning opportunities that promote the development of critical thinking, problem solving, and performance capabilities while helping them assume responsibility for identifying and using learning resources.
- c. Effective assessment, strategies should be developed that involve learners in self-assessment activities to help them become aware of their strengths and needs and encourage them to set personal goals for learning, example incorporating formal tests; responses to quizzes; evaluation of classroom assignments, student performances and projects, and standardized achievement tests to understand what students have learned.
- d. Technology skill, knowing when and how to use current educational technology, as well as the most appropriate type and level of technology to maximize student learning.

Based on the dimension, it is concluded that TLPP students as a teacher candidate should master those four dimensions and be able to implement them at school or other practice places, because a TLPP student at school is already considered as a teacher which also has an active role in the learning process at school. Hence, this research focus on the measurement of TLPP student pedagogical competence, those are: effective classroom management, effective teaching practices, effective assessment, and technology skill.

4. Methods

This research is a developmental research by using *design and development* (D&D) model, consists of: a) specification of the instrument, b) reviewing instruments that once existed, c) definition of constructs and definitions of concepts, d) create a component specification of the instrument construct, e) the development of the ending concept definition for each construct, f) build an operational definition, g) choose a scale and decide the indicator, 8) load

and pair items to construct, h) reviewing the item of instruments, i) make the last the assessment instrument, j) collect the data from trial test; k) analyze the trial result with *confirmatory factor analysis* (CFA).

The subject of experiment is TLPP students chosen from various schools as location from TLPP at the Islamic state university at Gorontalo Province, Indonesia.

The technique of sample collection is by using cluster random sampling. There is 1 regency cluster and 5 district clusters, and then from those cultures are randomized and it was got 4 schools as representation to each cluster district based on the primary school level, junior high school and senior high school, as served in the data [Table 1](#).

[Table 1](#) shows that the experiment subject in the study is 173 students of TLPP program and 67 mentoring teachers, who become observers and spread over 20 schools which become the location of TLPP 2017.

Table 1: Experiment subject

School Level	Σ Mentoring Teacher	Σ Students
Senior High School	16	38
Junior High School	13	36
Primary School	38	99
Total Subject	67	173

The data are collected from the experiment results with a pedagogy competence instrument of TLPP students. This research was conducted on November 2017 with total participant TLPP students as many 173 students. General profile of TLPP students was in 19-22 years old in age. For the qualification of mentoring teacher, such as the mentoring teacher who is relevant to the subject of lesson competence, has work time > 10 years and already got the bachelor of education title. The technique of data collecting used TLPP student pedagogy competence instrument trough an observation. The instrument consists of 43 items with outlines as [Table 2](#).

Table 2: The outlines of TLPP Student Pedagogical competence instrument

Dimension	Indicator	Item Number	Total Item
Effective management (ECM)	Recognize the characteristics of students	1,2,3,4	13
	Develop the curriculum	5,6,7,8	
Effective teaching practices (ETP)	Communicate effectively, empathic and polite to students	9,10,11,12,13	14
	Master learning theories and educated learning principles	1,2,3,4,5	
	Do the educated learning	6,7,8,9,10	
Effective Assessment (EA)	Facilitate the development of students' competence	11,12,13,14	8
	Do the assessment and evaluation on the process and results	1,2,3,4	
Technology skill (TS)	Utilize the result of assessment and evaluation	5,6,7,8	8
	The choosing of media/learning source	1,2,3,4	
	The use of media/source	5,6,7,8	
Total item			43

For the process of the highest assessment scoring on the statement "all accomplished" (ST), partially accomplished (TS), Accomplished enough (CT), less accomplished (KT) and the lowest is "not accomplished" (TT) those are with conditions as follow: ST = 5, TS = 4, CT = 3, KT = 2, TT = 1. The explanation about the number of pedagogy competence items can be seen at the [Fig. 1](#).

Data analysis to test validity construct of TLPP student pedagogical competence instrument has four dimensions where each dimension was composed by indicator, from that indicator is made item for ECM, ETP, EA, and TS, researcher used factor analysis approach such as *confirmatory factor analysis* (CFA).

CFA Analysis was chosen because the theory model could be tested and the relation among factors also could be seen. With this analysis, it can be known which analysis should be used in TLPP students' pedagogical competence measuring. For that, it was conducted the measurement of unidimensional for each indicator: ECM, ETP, EA, and TS on pedagogical competence by using First Order Confirmatory Factor Analysis method, that is an analysis of a latent variable which is measured based on some indicators which can be directly measured.

The test of CFA analysis was conducted by the help LISREL 8.70 software. Standard model referred to ([Retnawati, 2016](#)) is an expected model, because

it shows content factor (path coefficient from variable to variable).

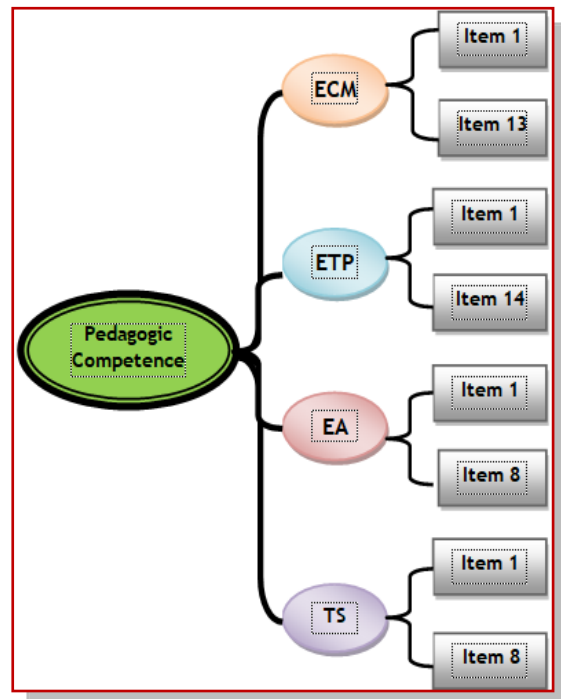


Fig. 1: The number of pedagogy competence item

Some experts stated that coefficient has value if it is not less than 0,4 and significance showed by T-

value does not have red color (for significance level 0.05, T-value<1.96). The analysis showed that all observable variables gave significant effect to measure latent variable, if the value of Chi-Square is not significant ($p > 0.05$), it means that all items only measure only one factor. But if Chi-Square value is significant ($p < 0.05$), so it does not need modification have tested measuring model.

5. Results and discussion

To prove all items in every latent variable such as ECM, ETP, EA, and TS measure pedagogical competence construct and every item in each dimension is fit (appropriate) with one factor model and also with every item in each dimension give significant effect based on the result of CFA analysis by using First Order Confirmatory Factor Analysis method which is described as follow:

5.1. Latent variable of effective classroom management (ECM)

This latent variable is measured trough 3 indicators with 13 items, those are: the indicator of recognizing the characters of students (ECM1) with 4 items (ECM1.1- ECM1.4), the indicator of developing curriculum (ECM2) with 4 items (ECM2.5 - ECM2.8), and the indicator of communicating effectively, emphatic and polite to all (ECM3) with 5 items (ECM3.9 - ECM3.13). For that, it is proved whether all13 items have *unidimensional* characteristics, which means it only measures latent variable of effective classroom management.

Based on the analysis of CFA by using First Order Confirmatory Factor Analysis, the result was not fit because the Chi - Square = 919.52, df = 77, P-value = 0.00000, RMSEA = 0.276. After being modified, the error of measurement on some items was allowed or freed to correlate with others, so it was obtained fit model with $P > 0.05$ (not significant). In the

beginning, df was 77 but after reached fit model, the remained df was only 57. It means that there were $77-57=20$ error correlation freed by Chi - Square = 64.76, df = 57, P-value = 0.2242, RMSEA = 0.037. It means that by using one factor (*unidimensional*) where all items only measure one single factor, which is ECM, as served on the Fig. 2.

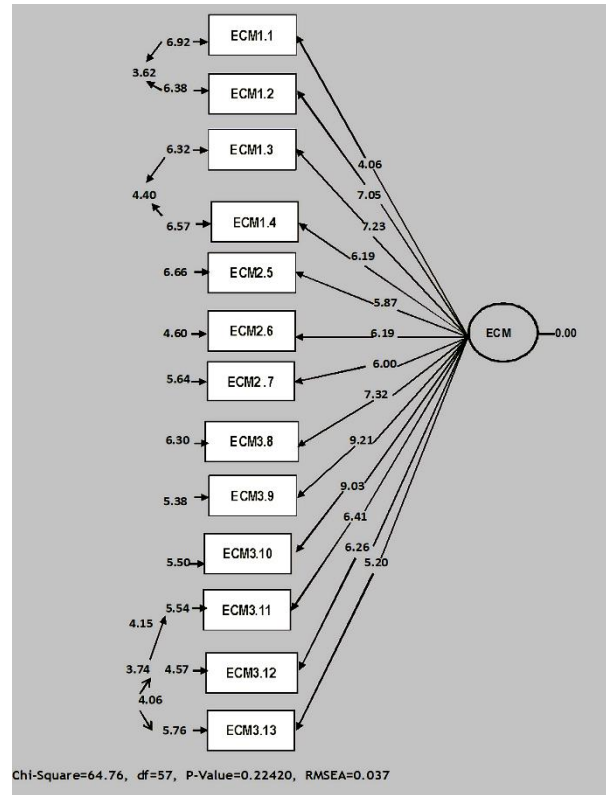


Fig. 2: Analysis of ECM latent variable confirmatory

The proof that all items give contributing significant to the ECM by seeing T-Value of every coefficient of factor content as described on the Table 3.

Table 3: Content of ECM Item factor

Indicator	Item	Coefficient	Standard Error	T-Value (t > 1.96)	Criteria
Recognize the characteristics of students	ECM1.1	0.81	0.12	6.92	Significant
	ECM1.2	0.41	0.064	6.38	Significant
	ECM1.3	0.34	0.053	6.32	Significant
	ECM1.4	0.32	0.048	6.57	Significant
Develop the curriculum	ECM2.5	0.70	0.10	6.66	Significant
	ECM2.6	0.77	0.12	6.60	Significant
	ECM2.7	0.75	0.11	6.64	Significant
	ECM2.8	0.31	0.049	6.30	Significant
Communicate effectively, emphatic and polite to students	ECM2.9	0.31	0.057	5.38	Significant
	ECM3.10	0.19	0.034	5.50	Significant
	ECM3.11	0.48	0.073	6.54	Significant
	ECM3.12	0.48	0.072	6.57	Significant
	ECM3.13	0.49	0.072	6.76	Significant

Table 3 shows factor content of all ECM items which have positive coefficient value and every item of T-Value is >1.96 so it is considered as significant. It means that, there is no eliminated item from the indicator of the model. Furthermore, the value of

variant-covariant matrix was tested by measuring the suitability of Goodness of Fit model, as shown on the Table 4.

Table 4 shows *goodness of fit* of the ECM item model before the modification actually does not

fulfill the criteria, so it was conducted modification model with all indicators by choosing the biggest modification indexes. After the modification of the model, it was obtained fit ECM model. It means this model is fit and feasible to be used to measure effective latent variable of classroom management. This was also proved by contribution value (R^2) in

every item before and after the modification as see on the Table 5.

Table 5 shows that contribution value (R^2) before the biggest modification from ECM item is 83% by ECM2.6. After the modification of value (R^2) gives the biggest contribution, that is 63% by ECM2.9.

Table 4: Goodness of Fit before and after modification of the ECM item

Criteria	Cut of Value	Before Modification	Status	After Modification	Status
Chi-Square	≤ 2 DF	919.52	Not Fit	64.76	Fit
P-Value	≥ 0.05	0.00000	Not Fit	0.22420	Fit
RMSEA	≤ 0.08	0.0276	Not Fit	0.37	Fit
GFI	≥ 0.90	0.055	Not Fit	0.91	Fit
AGFI	≥ 0.90	0.37	Not Fit	0.90	Fit
NFI	≥ 0.90	0.60	Not Fit	0.93	Fit
CFI	≥ 0.95	0.62	Not Fit	0.99	Fit
IFI	≥ 0.95	0.62	Not Fit	0.99	Fit

Table 5: Contribution value (R^2) before and after modification

Item	R^2 (Before Modification)	R^2 After (Modification)
ECM1.1	0.10	0.17
ECM1.2	0.20	0.43
ECM1.3	0.31	0.45
ECM1.4	0.20	0.35
ECM2.5	0.78	0.32
ECM2.6	0.83	0.35
ECM2.7	0.81	0.33
ECM2.8	0.25	0.45
ECM2.9	0.36	0.63
ECM3.10	0.33	0.62
ECM3.11	0.33	0.37
ECM3.12	0.37	0.36
ECM3.13	0.27	0.26

5.2. Effective teaching practices (ETP)

Based on CFA analysis result with *First Order Confirmatory Factor Analysis*, the result is not fit and get Chi - Square = 775.99, df = 77, P-value = 0.00000, RMSEA = 0.230. After the modification, where the error of measurement is allowed or freed to correlate with each other, so it is finally obtained fit model with $P > 0.05$ (not significant). In the beginning, df was 77 but after reached fit model, the remained df was only 57. It means that there is $77 - 57 = 20$ error correlation freed by the value of Chi - Square = 83.38, df = 57, P-value = 0.09900, RMSEA = 0.066 which means model with one factor (*unidimensional*) where all items measure only one factor that is ETP.

Fig. 3 showed on the path diagram, there is path coefficient with red sign or not significant < 1.96 that is ETP - ETP2.9, so those items considered as invalid and will be erased because its presence does not give any contributions and influences. Furthermore, to prove all items give significant contribution on ETP, it is conducted by seeing T-Value at every coefficient of factor content as showed on the Table 6.

Table 6 shows factor content of every ETP item has positive coefficient value and every T-Value is > 1.96 so it is stated as significant. Then, it is conducted the test of variant-covariant matrix value assessment by using appropriateness measuring of *Goodness of Fit* model, as shown on Table 7.

Table 7 shows *goodness of fit model* of ETP item before the modification and there are no fulfilled criteria, so it is conducted modification of the model with all indicators by choosing the biggest modification indexes. After the modification of model, it was obtained fit ETP model. It means that this model is fit and feasible to be used to measure latent variable on effective teaching practices. This thing is also proved by contribution value (R^2) as served on the Table 8.

Table 8 shows that contribution value (R^2) before the modification, is the biggest from ETP item as much 66% by ETP1.5. After the modification of value (R^2) give the biggest contribution as much 88% by ETP1.1.

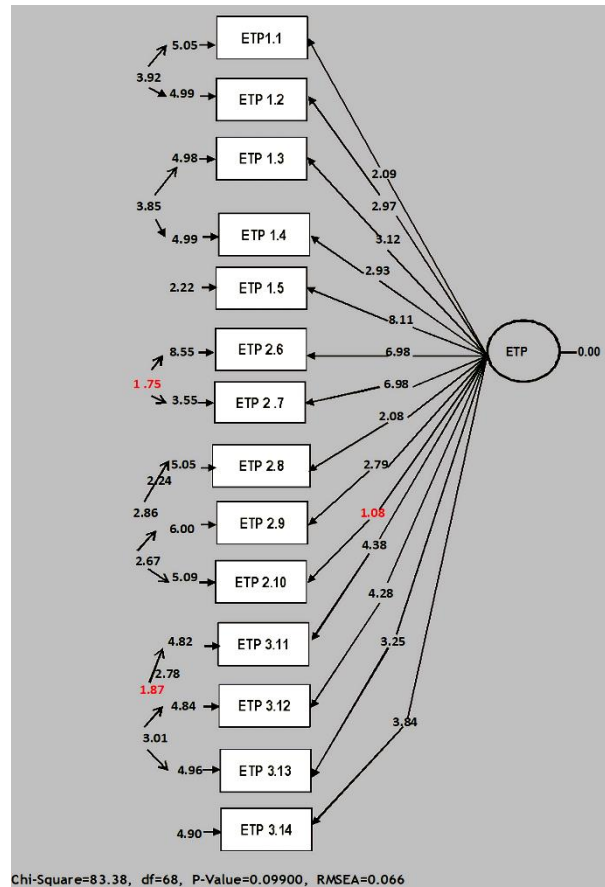


Fig. 3: Analysis of ETP latent variable confirmatory

Table 6: Factor content of ETP item

Indicator	Item	Coefficient	Standard Error	T-Value (t > 1.96)	Criteria
Master learning theories and educated learning principles	ETP1.1	0.92	0.18	5.05	Significant
	ETP1.2	0.58	0.12	4.99	Significant
	ETP1.3	0.43	0.086	4.98	Significant
	ETP1.4	0.39	0.078	4.99	Significant
	ETP1.5	0.13	0.057	2.22	Significant
Do the educated learning	ETP2.6	0.23	0.066	3.55	Significant
	ETP2.7	0.27	0.077	3.55	Significant
	ETP2.8	0.41	0.082	5.05	Significant
	ETP2.9	0.57	0.11	5.00	Significant
	ETP2.10	0.43	0.084	5.09	Significant
Facilitate the development of students' competence	ETP3.11	0.51	0.11	4.82	Significant
	ETP3.12	0.42	0.087	4.84	Significant
	ETP3.13	0.43	0.086	4.96	Significant
	ETP3.14	0.46	0.094	4.90	Significant

Table 7: Goodness of Fit before and after the modification of ETP Item

Criteria	Cut of Value	Before Modification	Status	After Modification	Status
Chi-Square	≤ 2 DF	775.99	Not Fit	83.38	Fit
P-Value	≥ 0.05	0.0000	Not Fit	0.09900	Fit
RMSEA	≤ 0.08	0.141	Not Fit	0.066	Fit
GFI	≥ 0.90	0.61	Not Fit	0.90	Fit
AGFI	≥ 0.90	0.47	Not Fit	0.91	Fit
NFI	≥ 0.90	0.54	Not Fit	0.98	Fit
CFI	≥ 0.95	0.57	Not Fit	0.99	Fit
IFI	≥ 0.95	0.58	Not Fit	0.99	Fit

Table 8: Contribution value (R²) before and after modification

Item	R ² Before Modification	R ² After Modification
ETP1.1	0.17	0.88
ETP1.2	0.28	0.17
ETP1.3	0.32	0.19
ETP1.4	0.26	0.17
ETP1.5	0.66	0.83
ETP2.6	0.57	0.69
ETP2.7	0.59	0.69
ETP2.8	0.15	0.088
ETP2.9	0.27	0.15
ETP2.10	0.067	0.024
ETP3.11	0.45	0.34
ETP3.12	0.42	0.32
ETP3.13	0.30	0.20
ETP3.14	0.35	0.27

of Chi - Square = 23.40, df = 15, P-value = 0.07599, RMSEA = 0,066 which means model with one factor (*unidimensional*) where all items measure only one single factor, that is EA, as described on the Fig. 4.

5.3. Effective assessment (EA)

This latent variable is measured through 2 indicators with 8 items, those are: Indicator of conducting assessment and process evaluation and result (EA1) with 4 items (EA 1.1- EA 1.4), and indicator utilizes the result and evaluation (EA2) with 4 items (EA2.5 - EA2.8). For that, it is conducted the proof whether 8 items have *unidimensional* character or not, means that it is correct that by only measure latent variable of effective assessment.

Based on the result of CFA Analysis with First Order Confirmatory Factor Analysis, the result is not fit and obtain Chi - Square = 188.34, df = 20, P-value = 0.00000, RMSEA = 0.221. After the modification, the error of measurement on some items is allowed or freed to correlate each other, so it is finally obtained fit model with P>0,05 (not significant). In the beginning, the df was 20, but after reached fit model, the remained df as only 15. It means that, there was 20-15=5 error correlation freed by value

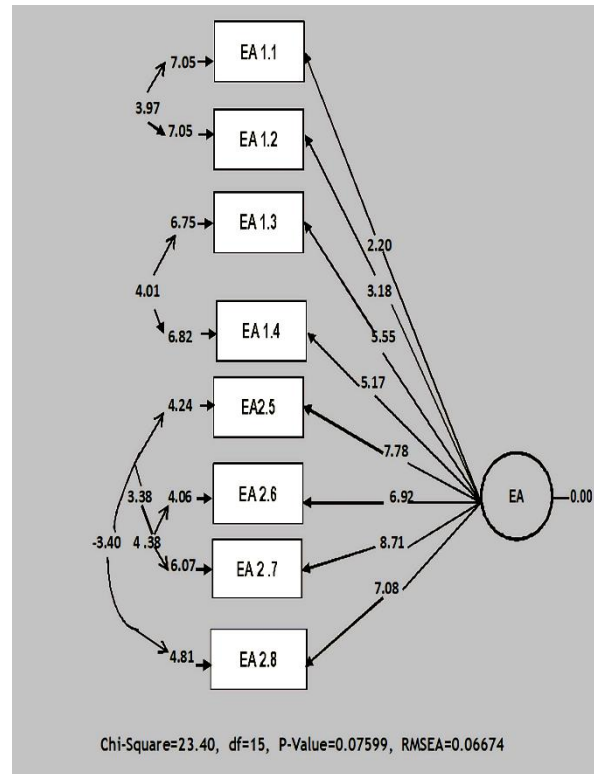


Fig. 4: Analysis of EA latent variable confirmatory

Fig. 4 showed on path diagram, there is no path coefficient with red sign or its path coefficient is >1.96 significant. Furthermore, to prove that all items give significant effect to EA, it is conducted by seeing T-Value in every coefficient of factor content.

Table 9 shows factor content of every EA item has positive coefficient and every item of T-value is >1.96, so it is stated as significant. It means that, there is no eliminated indicator in the model.

Furthermore, it was conducted the appropriateness measuring of Goodness of Fit model as displayed on the Table 10.

Table 9: Factor content of Item EA

Indicator	Item	Coefficient	Standard Error	T-Value (t >0.96)	Criteria
Do the assessment and evaluation on process and result	EA1.1	0.63	0.90	7.05	Significant
	EA1.2	0.47	0.067	7.05	Significant
	EA1.3	0.50	0.074	6.75	Significant
	EA1.4	0.41	0.060	6.83	Significant
Utilize the result of assessment and evaluation	EA2.5	0.33	0.079	4.24	Significant
	EA2.6	0.26	0.063	4.06	Significant
	EA2.7	0.48	0.079	6.07	Significant
	EA2.8	0.25	0.052	4.81	Significant

Table 10 shows goodness of fit model of EA Item. EA before modification is not fulfills the criteria, so it was carried out modification of model with all indicators by choosing the biggest modification indexes. After the modification of the model, it was

obtained fit EA model. It means that, this model is fit and feasible to be used to measure latent variable of effective assessment. This thing is also proved with contribution value (R²) of every item before and after the modification, as shown on the Table 11.

Table 10: Goodness of fit before and after the modification of EA item

Criteria	Cut of Value	Before Modification	Status	After Modification	Status
Chi-Square	≤ 2 DF	188.34	Not Fit	23.40	Fit
P-Value	≥ 0.05	0.00000	Not Fit	0.07599	Fit
RMSEA	≤ 0.08	0.221	Not Fit	0.074	Fit
GFI	≥ 0.90	0.79	Not Fit	0.95	Fit
AGFI	≥ 0.90	0.61	Not Fit	0.97	Fit
NFI	≥ 0.90	0.70	Not Fit	0.93	Fit
CFI	≥ 0.95	0.72	Not Fit	0.97	Fit
IFI	≥ 0.95	0.72	Not Fit	0.97	Fit

Table 11: Contribution value (R²) before and after modification

Item	R ² Before Modification	R ² After Modification
EA1.1	0.10	0.15
EA1.2	0.10	0.13
EA1.3	0.29	0.26
EA1.4	0.26	0.27
EA2.5	0.58	0.59
EA2.6	0.66	0.72
EA2.7	0.36	0.69
EA2.8	0.50	0.29

Table 11 shows that contribution value (R²) before the modification, is the biggest from EA item as much 66% by EA2.6 item. After modification, the value (R²) gives the biggest contribution as much 72% by EA2.6 item.

finally obtained fit model with P>0.05 (not significant).

In the beginning, df was 20, but after reached fit model, the remained df was only 15. This means there is 20-15=5 error correlation which is freed with value of Chi - Square = 21.40, df = 15, P-value = 0.20878, RMSEA = 0.065 which means model with one factor (*unidimensional*) where all items measure only one single factor, that is TS, As served on the Fig. 5.

5.4. Technology skill (TS)

This variable latent is measured trough 2 indicators with 8 items, those are: indicator of the choosing of media/learning source (TS1) with 4 items (TS 1.1- TS 1.4), and indicator of the using of media/learning source (TS 2) with 4 items (TS 2.5 - TS 2.8). For that, it was conducted the proof whether those 8 items had *unidimensional* character or not, it means that, it was correct by only measure latent variable of technology skill.

Based on the result of CFA analysis with First Order Confirmatory Factor Analysis, the result is not fit and obtain Chi - Square = 176.82, df = 20, P-value = 0.00000, RMSEA = 0.214. After the modification where the error of measurement on several items is allowed and freed to correlate each other, so it is

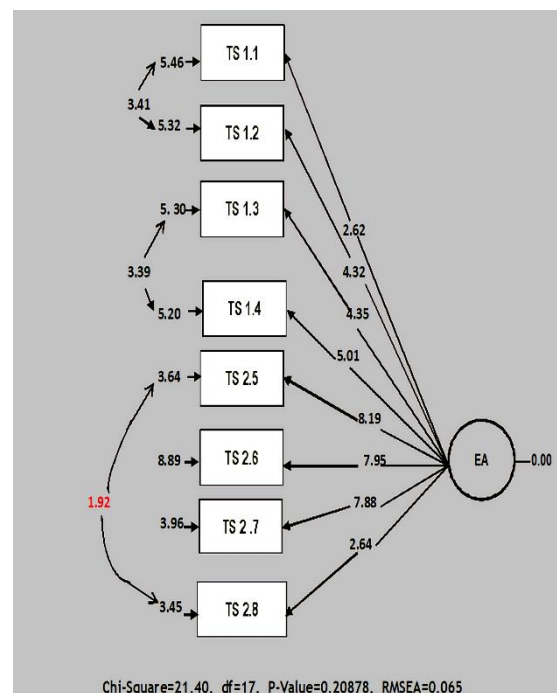


Fig. 5: Analysis of TS latent variable confirmatory

Fig. 5 shows at path diagram, there is path coefficient with red sign or its path coefficient which all of them is >1.96 significant, but the result of modification between TS2.6 and TS2.8 does not

show significant relation. Furthermore, to prove that all items give significant contribution to TS conducted by seeing T-Value at coefficient of factor content, as shown on Table 12.

Table 12: Factor content of TS item

Indicator	Item	Coefficient	Standard Error	T-Value (t > 1.96)	Criteria
The choosing of media/ learning source	TS1.1	0.68	0.12	5.48	Significant
	TS1.2	0.45	0.084	5.32	Significant
	TS1.3	0.42	0.079	5.30	Significant
	TS1.4	0.40	0.077	5.20	Significant
	TS2.5	0.25	0.069	3.64	Significant
The use of media/source	TS2.6	0.22	0.057	3.89	Significant
	TS2.7	0.22	0.055	3.96	Significant
	TS2.8	0.42	0.077	5.45	Significant

Table 12 shows factor content of every TS item has positive coefficient value and every T-Value item is >1.96 so it is stated as significant. It means that, there is no item from eliminated indicator of the model. Hence, it is conducted the test of variant-covariant matrix value by using appropriateness measuring of *Goodness of Fit* model as shown on the Table 13.

Table 13 shows *goodness of fit* model of TS item before it was modified, and it does not fulfill the criteria, so it is conducted the modification of model with all indicators by choosing the biggest

modification indexes. After the modification, it was obtained the fit TS model. It means that, this model is fit and feasible to be used to measure latent variable of technology skill. This also proved by the contribution value (R²) of every item before and after the modification as shown on the Table 14.

Table 14 shows that the contribution value (R²) before the biggest modification of the TS item, as much 69% by TS 2.5 item. After the modification of value (R²) give the biggest contribution, that is 74% by TS 2.6 item.

Table 13: *Goodness of Fit* Before and After the Modification of TS Item

Criteria	Cut of Value	Before Modification	Status	After Modification	Status
Chi-Square	≤ 2 DF	176.82	Not Fit	21.40	Fit
P-Value	≥ 0.05	0.00000	Not Fit	0.20878	Fit
RMSEA	≤ 0.08	0.214	Not Fit	0.065	Fit
GFI	≥ 0.90	0.80	Not Fit	0.92	Fit
AGFI	≥ 0.90	0.63	Not Fit	0.93	Fit
NFI	≥ 0.90	0.76	Not Fit	0.91	Fit
CFI	≥ 0.95	0.78	Not Fit	0.97	Fit
IFI	≥ 0.95	0.78	Not Fit	0.97	Fit

Table 14: Contribution value (R²) before and after modification

Item	R ² Before Modification	R ² After Modification
TS1.1	0.17	0.12
TS1.2	0.32	0.28
TS1.3	0.39	0.29
TS1.4	0.46	0.36
TS2.5	0.69	0.74
TS2.6	0.72	0.71
TS2.7	0.64	0.71
TS2.8	0.19	0.72

A construct validation procedure starts from an identification and restriction regarding the variables to be measured and is expressed in terms of a logical construct based on the theory of those variables. If the result is in line with expectations, the instrument is considered to have good construct validity (Retnawati, 2016).

The findings prove the construct validity of TLPP student pedagogy competency instrument by using the first order *confirmatory factor analysis* approach show that the item is unidimensional. From those 43 items, there are 42 items in every dimension measure pedagogy competency construct, where each item in each dimension is fit (appropriate) with one factor model and every item in each dimension give significant contribution, even though there is 1

item stated as invalid on latent variable of the effective teaching practice indicator of both items with 9 path coefficient with the red sign or not significant <1.96. The assumption of unidimensional can only be shown if the test contains only one dominant component which measures the achievement of a subject (Retnawati et al., 2015).

On the previous study especially in Indonesia, it has been developed an instrument of teaching field competency of teacher candidate students which shows the result of confirmatory analysis shows that all T-Value is >1,96 for pedagogical competence. The study from Hasli (2015) developed an instrument for elementary classroom teacher pedagogical competency, but to prove its validity only focus on content validity by expert team from material sides that is to show a valid instrument. Furthermore, it was conducted an experimental test and it was analyzed quantitatively that show 1 (one) item which is on the valid category while 30 (thirty) items other items are in valid category.

Besides that, there are some people develop an instrument for teaching aptitude. The result of confirmatory factor analysis shows that teaching aptitude instrument is fit. Combined reliability coefficient is high. Multi trait multi method analysis

shows that the correlation between pedagogy creativity score and IQ score is low.

Those researches are generally limited on the development of competency instrument and teaching aptitude of TLPP students. The development of pedagogical competency instrument has been carried out, but it does not clearly describe construct validity from pedagogical competency instrument of TLPP students in proving the items in every fit (appropriate) dimension with one factor model in giving significant contribution, so the findings of the research are different with previous research. The weakness of this research is construct validity of competency instrument only experimented on very limited research subject. In consequence, to get better result it is suggested to do experiment on larger scale.

6. Conclusion

The proof of construct validity of pedagogical competency instrument of TLPP students is measured by four latent variables, 43 items from their composed indicator show that *loading factor* significantly influenced as *unidimensional* to its latent variable at the first order confirmatory factor analysis, that is T-Value at loading factor value >1,96. But, there are some estimations which need modification to get a good measurement model, because the contribution value of latent variable and its indicator is various, starts from small until big. Therefore, it will be better to do measurement until the Second Order Confirmatory Factor Analysis, and also it is needed a modification on the indicator which has low contribution.

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