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Professional competency instrument validity of assessment on teacher work performance

Validez del instrumento en la competencia profesional de evaluación del desempeño en el trabajo docente

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ABSTRACT

The purpose of this research is to examine professional competency instrument validity on the assessment of teacher work performance based on the analysis of Aiken's V and confirmatory factor analysis (CFA). The conclusions in this research, namely: 1) the results of testing the validity of Aiken's V content of 0.75 in the professional competence instrument, this indicates that the instrument can be used because it has been fulfilled substantially, construction, and language aspects; 2) the validity test result by confirmatory factor analysis shows that the 16 items on professional competency can be used to assess teacher work performance.

Keywords: professional competency, quantitative descriptive, validity, work performance.

RESUMEN

El propósito de este estudio es examinar la validez del instrumento de competencia profesional en la evaluación del desempeño docente basada en la V de Aiken y el análisis factorial confirmatorio (CFA). Las conclusiones de este estudio, a saber: 1) los resultados de la prueba de validez de contenido V de Aiken de 0,75 en la competencia profesional del instrumento, indican que el instrumento puede usarse porque ha cumplido sustancialmente los aspectos de construcción y lenguaje; 2) El resultado de la prueba de validez mediante el análisis factorial confirmatorio muestra que los 16 ítems sobre competencia profesional pueden usarse para evaluar el desempeño del maestro.

Palabras clave: competencia profesional, descriptivo cuantitativo, desempeño laboral, validez.

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1. INTRODUCTION

In 2011, the totals of teachers in Indonesia were 2,306,015, which were planned to be certified gradually until 2021. However, this situation becomes a new problem for the government when the teacher work performance that has been certified has decreased even does not occupy the certification standards. The decline of teacher work performance can be caused by several things; one of them can be caused by the sum of more tasks that must be carried out by the teacher. The law of the teachers and lecturers mentions that teachers must have academic qualifications and competencies. These competencies include pedagogic competence, personal competency, social competency, and professional competency (Andersson et al.: 2011, pp65-78).

Work performance is the work that can be achieved by a person or group in an organization suitable with the authority and responsibility of each in achieving the objectives of the organization concerned legally, in accordance with the moral and ethics (Aritonang: 2005, pp.1-16; Ganyi: 2016, pp.16-30). Teacher's performance divided into two dimensions, namely: cognitive and affective. The cognitive dimension is conveyed that effective teacher shows extensive knowledge or they have pedagogical content to educate students and develop themselves. Whereas in the affective dimension, the teacher is able to express student interest and promote student performance in the classroom (Long & Hoy: 2006, pp.303-314).

The teacher is a role model for students both at school and outside. It is appropriate if the teacher must have extensive knowledge, mature personality, good social attitude, and professionalism at work. In general, this is stated in the Teacher and Lecturer Law which is packaged into teacher competency. Competency is a set of knowledge, skills, and attitudes that must be possessed, lived, and mastered by the teacher in carrying out professional duties.

Anggara & Chotimah (2012) argued that competency is a set of skills and abilities of a teacher that must be possessed in order to carry out its performance optimally so it produces a learning process as desired (Anggara & Chotimah: 2012, pp.107-203). Teachers as an educator have an important role in education, so it needs to be developed as a dignified profession as a professional educator. Timperley, Wilson, Barrar, & Fung (2008) many factors must be mastered by the teacher in the learning process (Wilson et al.: 2008). In addition to the knowledge factor, a teacher is required to manage student attitudes through real practice. This professionalism must be owned by the teacher.

Professional competency is the teacher's ability to master the knowledge in the fields of science, technology, art and culture that they are capable of. Professional competency, consisting of: 1) mastery of subject matter widely and in depth appropriate with the standard content of the education unit program, subjects, groups of subjects to be taught; 2) scientific concept and its method, technology or art disciplines that are relevant conceptually coherent with the education unit program, subject, groups of subjects to be taught. There are at least 10 professional competencies which are aspects of the teacher's basic abilities, namely: (1) mastering learning materials, (2) managing the learning process, (3) managing classes, (4) using technology media, (5) mastering the foundation of education, (6) interacting in the learning process, (7) assessing students, (8) conducting guidance and counselling program in school, (9) conducting school administration, (10) understanding the principles of educational research (Huling & Resta: 2001).

One of the efforts in improving the education quality can be done with an appropriate assessment system, both assessment of individual student and teacher as an educator. Therefore, assessment holds an important role in education. A good assessment system will push the student to learn better while a good assessment for the teacher can improve classroom learning strategies and their work performance. Johnson et al., (2008: p 2) suggests that work performance assessment is a system that includes: 1) the purpose of assessment, 2) tasks (or prompts) that elicit the performance, 3) a responses demand that focus the examinee's, 4) systematic method for rank assessment (Johnson et al.: 2008).

Wilkerson & Lang (2007: p 14) suggested one of the standards for measuring teacher competency, that is by looking at the completeness standard tests related to the validity and reliability of a test device. The

standard has been recognized to carry out a valid, reliable and impartial test. Therefore, it is necessary to develop a good assessment instrument to be able to assess the actual ability of the teacher (Wilkerson & Lang: 2007).

A good instrument should be able to measure what should be measured. In addition, good instruments can measure variables that are determined accurately. So that, an instrument is considered good for measuring certain variables when their level of validity and reliability is fulfilled (Ramadani et al.: 2017, pp.180-188; Kopackova & Libalova: 2019, pp.1-12). The validity of a test device can be interpreted as the ability of a test to measure what should be measured.

Validity is a way to showing the support of empirical fact and theoretical reason for the interpretation of the test score or instrument score and related to the accuracy of measurement (Retnawati: 2016; Ardakan et al.: 2018, pp.29-33). Criteria validity is called predictive validity, it is the validity of a test device in making predictions, it can predict the success of students in the future. The predictive validity of a test device can be seen from the correlation between test device with specific desired criteria, which is called the criteria variable (Edeme: 2018, pp.28-33; Albalaw: 2017, pp.111-131).

2. METHODS

1- Design

This research was conducted with a quantitative method approach and it was descriptive research. This research was done to find out the elements of teacher performance. In addition, this research was conducted to explore the abilities or professional competencies possessed by the teacher. The method in this research used a quantitative approach because the researcher wants to explore and collect data as much as possible about the teacher's work performance through professional competency assessment. This research was conducted in Bantul, Yogyakarta Special Region. The place to obtain data was done in both public and private elementary schools, which became the PGRI University of Yogyakarta school laboratory.

2- Population, Sample, and Sampling Technique

The population in this research was all high-grade teachers, both public and private elementary schools, who became PGRI University of Yogyakarta school laboratory. The total population in this research was 52 elementary schools consisting of 11 sub-districts in Bantul. Furthermore, the researcher did not select individuals separately, but the researcher takes samples from each sub-district in the group (Edson, et al.: 2017, pp.340-358). Therefore, determining the sample of each sub-district used the Cluster Random Sampling technique. This technique was carried out through the grouping of SD / MI in each sub-district in Bantul. The numbers of samples used in the teacher work performance assessment research were 144 teachers. The validation process is a collection of evidence to provide scientific basic for the interpretation of a test score. In order for the instrument used in the research to measure the teacher's work performance well, so the researcher does the validity test of the instrument used.

3- Data Collection

Data collection technique assesses teacher work performance using the test instrument. The test instrument used by the researcher is a multiple-choice objective test with a politomousscale, that is each test answer option has a different score. The highest score is four and the lowest score is 1. Professional competency instruments are a measuring tool that will be used to assess teacher work performance. Therefore, the instrument used by the researcher is a valid instrument. One of the conditions for obtaining a good instrument is good validity complied. This is done so that the instrument is able to measure precisely when used to measure teacher work performance in different places.

Validity is a way to showing the support of empirical fact and theoretical reason for the interpretation of the test score or instrument score and related to the accuracy of the measurement. While the validation process is a collection of evidence to provide the scientific basis for the interpretation of a test score, in order for the instrument used in the research to measure the teacher's work performance well, so the researcher does the content validity and construct validity test of the teacher professional competency instrument.

Content validity carried out through expert judgment continued using the Aiken's V formula, which is one of the statistics to show the content validity of each item. In order for the instrument used to comply with the content validity, the preparation of the item begins with reviewing the variable and indicator tested through a grating. Based on the grating, items were then made. The items that have been made are then asked to be reviewed by the experts who are considered capable by paying attention to the material, construction, and language used in the item. The content validity review was carried out by an expert team in accordance with the field of research conducted by the researcher. The expert team consists of lecturer in accordance with the scientific field studied and teachers who already have sufficient teaching experience and they have passed teacher certification. Test items that have Aiken's $V > 0.60$ can be accepted and it considered good to use. Therefore, in this research, the instrument statement is considered valid if it complies with these criteria.

The construct validity used in this research uses factor analysis, which functions to summarize or reduce observation variables into new dimensions that present the main variables (factors). The construct validity test used is exploratory factor analysis (EFA) which aims to investigate the factors contained in the points of observation and confirmatory factor analysis (CFA) with the aim of affirming a measurement theory in order to compare theoretical with the empirical result.

Factor analysis carried out through the extraction and rotation factor method. The factor analysis used principal components extractions, which aim to determine the factor loading of each item and varimax rotation that aims to clarify the points that enter the factor. Construct validity testing is used in all instruments of teacher work performance assessment research, both test instruments and non-test instruments to obtain the dimensions in the proper grouping. The results of the EFA were further analyzed using CFA.

3. RESULTS

Content validity is done through expert judgment. The teacher professional competency instrument consists of 16 multiple choice objective test items with a politomous scale, that is, each test answer option has a different score. The assessment of teacher test instruments was carried out by three experts and the value of the experts was used to calculate the coefficient magnitude of Aiken's V content validity. The results of content validity analysis of teacher test instruments are presented in Table 1.

	Item Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Aiken's V	1	0.83	1	0.8	0.75	0.8	0.7	0.83	0.7	0.83	0.92	0.9	0.92	0.92	1	0.83

Table 1. Aiken's V Score of Professional Competency Instrument

Table 1 shows that the content validity coefficient of Aiken's $V \geq 0.60$ in each item. Based on the content validity criteria stated by Retnawati (2016), it can be stated that as many as 13 items have the highest validity categories and three items have high validity categories. The summary of the testing analysis results of Aiken's V content validity is presented in Table 2.

Indicator	Item Number	Description
Mastering the material, structure, concept, and scientific mindset	1, 2, 3, 4, 6, 8,	Extremely high validity
	10, 11, 12	High validity
	5, 7, 9	High validity
Mastering competency standard and basic competency	13, 14	Extremely high validity
Utilizing information technology and communication	15, 16	Extremely high validity

Table 2. The Summary of Aiken's V Professional Competency Instrument Result

The summary results show the first indicator with 12 items indicating that the coefficient of 9 items is ≥ 0.80 and it is included in the extremely high validity category. While, the other three items have a high validity category with the coefficient $0.60 < r_{xy} \leq 0.80$, which is item number 5, 7, and 9. The number of items arranged on the second indicator is 2 items and both have extremely high validity categories with a coefficient 0.92. The questions total used in the third indicator of professional competency instruments on the teacher work performance are two items. The content validity testing result of the item included in the category is extremely high, respectively with the coefficient 1.00 and 0.83.

This is appropriate with what was presented by Retnawati (2016) that the item was extremely high validity (very good) if it had Aiken's V between $0.80 < r_{xy} \leq 1.00$ and $0.60 < r_{xy} \leq 0.80$ for high validity (good). So that from the 16 test items, 13 items can be said to be very good and three other items in the good category.

The form of the teacher instrument was a test instrument consisting of 16 items multiple choice objective test with a polytomous scale which had been validated by experts and then it given to 144 respondents that are elementary school teachers (teachers in grades IV, V, and VI). Data obtained from respondents were analyzed using quantitative descriptive. The construct validity calculation, the data were analyzed using exploratory factor analysis and it was continued using confirmatory factor analysis. The following stages were factor analysis until to get the desired results.

3.1. Exploratory Factor Analysis

The exploratory factor analysis results on the sample adequacy showed the Chi-Quadrate value in the Bartlet test in the amount of 570,634 with 120 freedom degree and p-value less than 0.01. This shows that the 144 sample size used in this factor analysis is sufficient. In addition, the sample adequacy analysis results were strengthened by the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of 0.802, which is greater than 0.5.

Based on the sample adequacy analysis, it can be concluded that all items in the test instrument can be further analyzed. The value of anti-image correlation analysis results if the value is $> 0,5$ so that the statement item can be used and if $< 0,5$, then the item is not used. The anti-image correlation shows that all items in the professional competency instrument are accepted because the anti-image correlation value of each item is more than 0.5 (> 0.5). It can be concluded that all items in the professional competency instrument can be used.

Based on the Eigen's value of the factor analysis result, it can be obtained that the respondent's data on the professional competency instrument of teacher performance contains four eigenvalues greater than 0.1 (> 0.1). It can be said that that professional competency instrument in assessing teacher performance has four components from 16 test items with a percentage value of 54.90%. So that the analysis result interpretation becomes clearer, the researcher looks at the scree-plot of eigenvalue resulting from the analysis of these factors.

The scree-plot show that the eigenvalue generated from factor analysis obtained graphs consisting of one steep. This shows that there is one dominant component that is measured in the professional competence

instrument of teacher work performance assessment. The scree-plot result show eigenvalue starting to slope on the third component is presented in Figure 1.

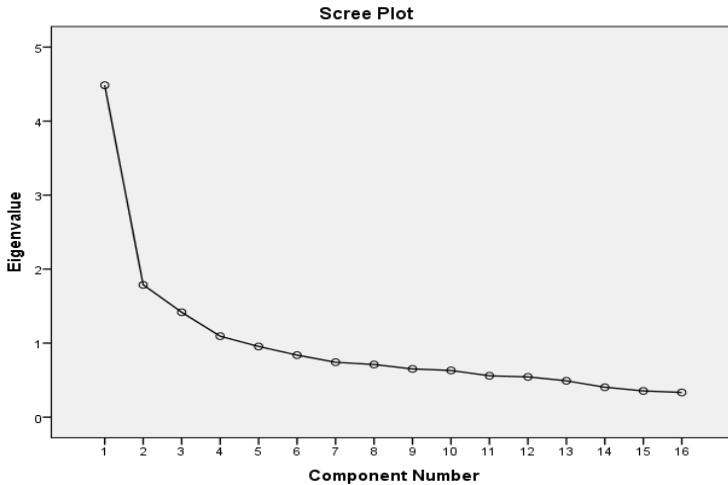


Figure 1. Scree-plot of professional competency instrument analysis factor

3.2. Confirmatory Factor Analysis

Before testing the construct validity of the professional competency instrument using Confirmatory Factor Analysis (CFA) with Lisrel 8.54 software, the researcher first tested the normal distribution assumption. The normal distribution assumption test obtained from the professional competency instrument data that is done to find out whether the normality assumption data is fulfilled or not. The normality test result can be seen from univariate normality, which describes a sample of one variable distribution, and multivariate normality which gives a description of the joint distribution from all variables in the sample. The univariate normality analysis results are presented in Table 3.

	Skewness		Kurtosis		Skewness and Kurtosis	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
D.1.1	1.531	0.126	-5.533	0.000	32.960	0.000
D.1.2	-0.634	0.526	-7.766	0.000	60.710	0.000
D.1.3	-1.482	0.138	50.142	0.000	2.516.422	0.000
D.1.4	-0.084	0.933	63.932	0.000	4.087.281	0.000
D.1.5	-2.841	0.004	-3.947	0.000	23.648	0.000
D.1.6	-1.891	0.059	-5.025	0.000	28.823	0.000
D.1.7	-2.466	0.014	-8.197	0.000	73.271	0.000
D.1.8	-1.070	0.285	-8.839	0.000	79.280	0.000
D.1.9	1.573	0.116	-11.235	0.000	128.701	0.000

	Skewness		Kurtosis		Skewness and Kurtosis	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
D.1.10	-1.048	0.295	-4.560	0.000	21.888	0.000
D.1.11	-0.438	0.661	-14.247	0.000	203.170	0.000
D.1.12	-1.235	0.217	-9.279	0.000	87.618	0.000
D.2.1	0.934	0.350	-7.513	0.000	57.324	0.000
D.2.2	0.040	0.968	49.187	0.000	2.419.330	0.000
D.3.1	-1.861	0.063	-27.623	0.000	766.501	0.000
D.3.2	1.216	0.224	-21.562	0.000	466.414	0.000

Table 3. Univariate Normality Test Result of Professional Competency Instrument

Based on the output in Table 3, it can be seen that the data does not comply with the normal distribution assumption (univariate normality). This was seen by the p-value in the univariate normality test of the skewness and kurtosis column, which showed that all test items were still, less than 0.05 (< 0.05). A data can be considered to comply with the normal distribution assumption if the p-value in Skewness and Kurtosis is greater than 0.05 (> 0.05) (Ullman & Bentler: 2003, pp.607-634). Furthermore, the multivariate normality result indicates that the data is not normal simultaneously. This can be seen from the p-value of the skewness and kurtosis column which is still less than 0.05 (< 0.05). The multivariate normality results are presented in Table 4. Based on the output in Table 4 and Table 5, it can be concluded that the data used does not comply with the univariate assumption and multivariate normal. Univariate normal distribution of each item is needed in this research.

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
66.507	4.863	0.000	400.959	1.523	0.128	25.971	0.000

Table 4. Multivariate Normality Test Results of Professional Competency Instrument

However, multivariate distribution is more important because the data that does not have a univariate normal distribution, so it will produce a multivariate non-normal distribution (Eketu: 2018, pp.42-46). Furthermore, the researcher uses an alternative estimation method because the data is not normal, that is Robust Maximum Likelihood (RML), this is done by adding an asymptotic covariance matrix, which is useful for correcting the chi-square statistical value and it is known as Satorra-Bentler Scaled Chi-Square.

Based on the exploratory analysis, four components or clusters of 16 statement items were obtained and the data were analyzed using confirmatory factor analysis (CFA). CFA calculations were performed to determine the suitability of the model with the Lisrel 8.54 support. The run result for the model compatibility is done once.

The analysis result by CFA obtained Root Mean Square Residual (RMR) = 0.303; Goodness of Fit Index (GFI) = 0.788; and Root Mean Square Error of Approximation (RMSEA) = 0.060 or < 0.080 (good fit) and Satorra-Bentler Scaled Chi-Square = 130.58 with p-value 0.05286 or < 0.05 (good fit). Once it is known that the criteria for good fit have been fulfilled, the researcher looks at the load factor results of each item on the standardized solution. The load factor of each factor is presented in Figure 2.

Based on Figure 2, it can be seen that at least three items that have load value factor of ≤ 0.50 , while, the other 13 items have a good load value, which is above 0.05 (≥ 0.50). In addition, the researcher uses t-

value in determining the suitability model on a professional competency instrument. The t-value on professional competency instruments analysis are presented in Figure 3, as follows:

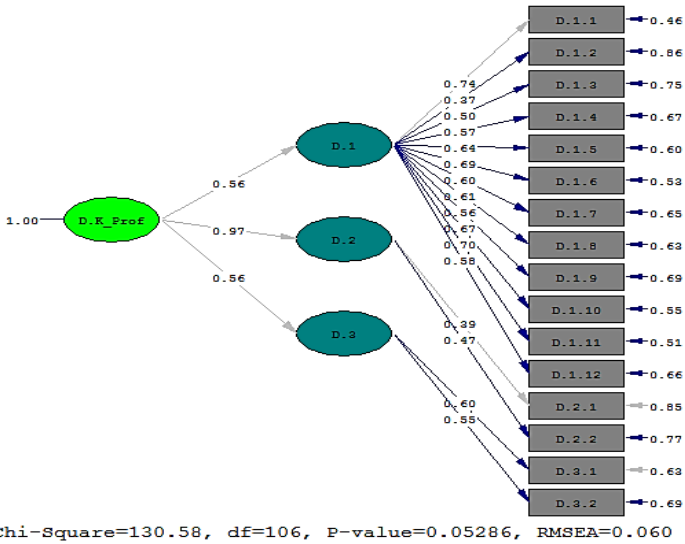


Figure 2. Basic Model Standard Solution of Professional Competency Instrument

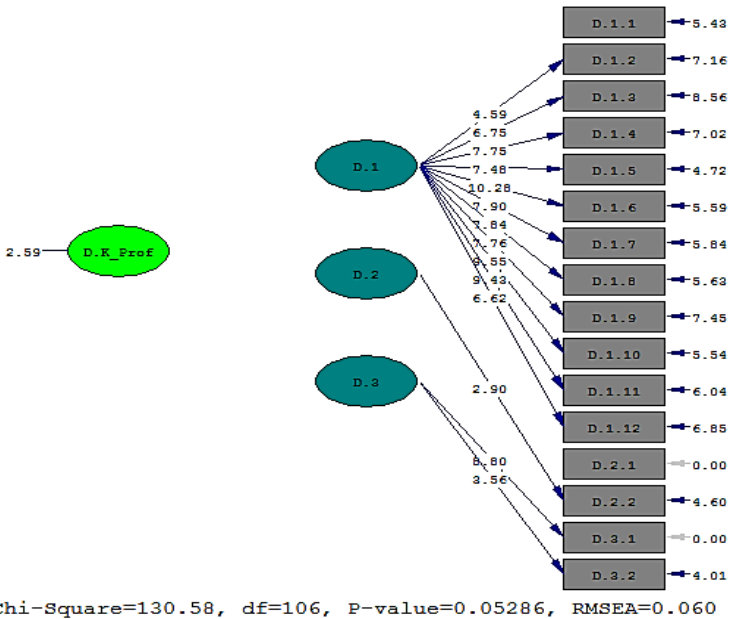


Figure 3. Basic Model T-Value of Professional Competency Instrument

Based on Figure 3, it can be seen that all items are significant with a good factor load of the value above 0.4 (> 0.4). When we see from the result and the suitability model shows that the proposed model has good conformity / the proposed model matches with the data and the items that are conceptualized to measure the latent variable; Items that are correlated caused by an identical statement.

Based on the factor analysis result, the standardized loading factor and t-values summaries to show the validity are presented in Table 5. Based on Table 5, it shows the quality coefficient significance result of the 16 test items that comply with the suitability model. There are values in Standardized Loading Factors (SLF) showing 3 (three) items that have low load factor less than 0.5, which are at D.1.2, D.2.1, and D.2.2. Whereas t-value for all items more than 1.96 (> 1.96). This shows that the test items used are significant.

Item Number	Standardized Loading Factors (SLF) ≥ 0.5	Standard Errors	t-value ≥ 1.96	Error Variance	
D.1.1	1	0.74	0.46	fix	5.43
D.1.2	2	0.37	0.86	4.59	7.16
D.1.3	3	0.50	0.75	6.75	8.56
D.1.4	4	0.57	0.67	7.75	7.02
D.1.5	5	0.64	0.60	7.48	4.72
D.1.6	6	0.69	0.53	10.28	5.59
D.1.7	7	0.60	0.65	7.90	5.84
D.1.8	8	0.61	0.63	7.84	5.63
D.1.9	9	0.56	0.69	7.76	7.45
D.1.10	10	0.67	0.55	9.55	5.54
D.1.11	11	0.70	0.51	9.43	6.04
D.1.12	12	0.58	0.66	6.62	6.85
D.2.1	13	0.39	0.85	fix	0.00
D.2.2	14	0.47	0.77	2.90	4.60
D.3.1	15	0.60	0.63	8.80	0.00
D.3.2	16	0.55	0.69	3.56	4.01

Table 5. CFAResult Summary of Professional Competency Instrument

4. CONCLUSION

Based on the results, it can be concluded that researcher involves the expert judgment to validate professional competency instrument of teacher work performance assessment. The content validity testing result with the Aiken's V formula of professional competency instrument shows that the instrument is suitable for use because it has been fulfilled substantially, construction, and language aspects; the constructive validity testing result through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) show that the 16 items on professional competency are appropriate to be used to assess teacher work performance.

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