Developing Competency Test Instrument of Senior High School Physical Educator

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Abstract The main objective of this study was to produce an instrument of competency test for High School Physical Educator, which was validated empirically. At present, researchers have not yet found an instrument that tests the competency of teachers involving 4 competencies, particularly in Indonesia. This study was a research and development design following the form of procedural models, which are steps that must be followed to produce standard instrument products. The steps were: (1) Finding Potential Problems, (2) Information gathering, (3) Product Design, (4) Design Validation, (5) Design Improvement, (6). Product Trial, (7). Product Revision, (8). Usage Tests, (9) Product Revisions, (10) Mass Product Manufacturing. The test subjects in this study were high school teachers in Padang and FIK UNP alumni amounting to 323 people. Sampling technique used was purposive sampling. Based on data taken from the field of secondary education in Padang City Education Office, the number of high school teachers in Padang was about 146 people, and FIK alumni were 177 person. In the first phase, a limited trial was carried out on 30 samples of the total population. The second phase was tested on 293 people. The standardization process is carried out by carrying out various tests, namely: (1) Validity test, (2) Reliability Counters, (3) Difficulty level test, (4) Different grain power test, (5) Practicality test, (6) effectiveness test. All data were analyzed by using IBM SPSS software and significance level was $p < 0.05$. Based on the research processes and procedures carried out, a standardized instrument can be used to test the four Physical Educators

competencies, namely Pedagogic competence, Professional Competency, Personality competence, and Social competence.

Keywords Competencies, Physical Educators, Senior High School

1. Introduction

Teacher education reformation throughout the world has been oriented towards functional teacher preparation, which aims to develop the competencies they need in practice (Pantić&Wubbels, 2010). Teaching and learning activities are processes that have a level of complexity. Various attempts have been made to increase effectiveness, in a deep understanding of the nature of teacher work (Ovens, Hopper, & Butler, 2013). Therefore, teacher competency testing needs to be done.

In this study, teacher competency is defined as a set of personal characteristics, knowledge, skills and integrated attitudes needed for effective performance in various teaching contexts (Arifin, Rasdi, Anuar, & Omar, 2018; Stoof, Martens, Van Merriënboer, & Bastiaens, 2002; Tigelaar, Dolmans, Wolhagen, & Van Der Vleuten, 2004). Performance theory is a basic concept for competence which believes maximum performance is to occur when people's abilities are in accordance with the needs of the job (Boyatzis, 1982). Where, one's abilities

are explained by personal philosophies, visions, values; knowledge; competence; life and career stages; style and interests (Arifin et al., 2018).

According to the concept of competency, teacher competency is divided into four domains, those are; (1) pedagogical knowledge (2) knowledge content of professional subject matter, (3) personality knowledge, (4) social knowledge (Gudmundsdottir&Shulman, 1987). The first domain in the measurement framework, teaching competence requires the ability of teachers to integrate theory and practice in classroom activities (Diep& Hartmann, 2016; Salyakhova&Valeeva, 2015). In this case, physical educator must be able to design teaching and learning goals (Loewenberg Ball, Thames, & Phelps, 2008). Considering this, physical education teachers need to use different teaching techniques and use practical approaches to reflect teaching objectives.

Professional competence ensures that physical education teachers master knowledge content with the latest information needed by students (Grollmann, 2008). This professional competence, determines broad professional knowledge, and has skills (Education & International, 2015). The third domain that represents the work of physical education teachers is personality competence. This domain is a picture of self, ethics, and personal goals are personal traits that can increase the level of competence of teachers in education services for effective performance (Yusof, Roddin, &Awang, 2015).

The concept of social competence is the last part that presents conceptualization and assessment in learning (Waters &Sroufe, 1983). To provide knowledge to students, teachers should have communication skill (Oluwasola, 2014). This ability helps teachers to make effective communication with students (HasrilAmiruddin, 2015). The four domains of teacher competence, it is important to make an instrument to test especially in the physical education teacher profession (Spöttl& Becker, 2016). This, aims to see the strengths and weaknesses of individual teachers in certain areas of competence (Aqtash et al., 2017; Cumberland, Herd, Alagaraja, &Kerrick, 2016; Greenstein, 2012).

However, previous studies have not shown empirical studies related to the measurement instruments for teacher competency testing as an important domain of the teaching profession. Until now there is still limited literature related to teacher competency tests. Where the competency aspects tested in the UKG are "pedagogical competence and professional competence in the cognitive realm" (Permendikbud No. 57 of 2012 Teacher

Competency Test). This has not yet tested the four domains of teacher competence in the framework of education. Therefore, the main objective of this article is to develop a teacher competency test instrument to measure the four competency domains for Physical Education teachers in Indonesia.

2. Methodology

Research Design

This study used research and development design. In this research, the development model used was procedural models, involving several steps that must be followed to produce standard instrument products. The development procedures carried out include ten steps, namely: (1) Finding Potential Problems, (2) Gathering information, (3) Product Design, (4) Design Validation, (5) Design Improvement, (6) Product Trial, (7)) Product Revision, (8) Usage Trial, (9) Product Revision, (10) Mass Production.

Sampling Technique

This research involved high school physical educator in Padang and alumni of FIK UNP, amounting to 323 people. Sampling was done by using purposive sampling. Based on data taken from the field of secondary education in Padang Secondary Education Affair, the number of high school teachers in Padang, both teachers who are civil servants (PNS), foundation teachers and honorarium teachers are 146 people, and FIK alumni taken as subject of research are 177 people. In the first phase, a limited trial was carried out on 30 of the total population. The second phase was tested on 293 people from the total population.

Development model

Having known that the teacher competency test conducted was still not complete and complex, the researcher compiles the teacher competency test instrument based on four domains namely (1) pedagogical competence, (2) professional competence, (3) personality competence, and (4) social competence. It was aimed to reflect current needs in the teaching profession. This article focuses on aspects of developing a teacher competency test instrument (UKG), which is a conceptual model of developing that instrument.

Figure 1. Steps in Producing Standardized Physical Educator Competency Test Instruments

Data analysis

Descriptive statistical analysis aims to describe the general level of assessment of the instruments compiled. Furthermore, the construct validity test was determined by an analysis of the average scores of five expert judgments. The analysis is done by looking at the average difference between the five expert judgments. The difficulty of an item is determined by comparing the passing rate among the five expert judgments for each item through chi-square analysis. Internal reliability is determined by item-total correlation (ITC) using the Pearson moment product correlation coefficient. $ITC \geq 0.15$ is considered acceptable because it examines the extent to which all test questions on a test measure a single construction (Varma, 2006). Internal consistency is measured through Cronbach's alpha (Nunnally, 1978). Cronbach's Alfa ranging from 0.6 to 0.7 is considered to show acceptable internal consistency, 0.7 to 0.9 good internal consistency > 0.90 as excellent internal consistency (George, D., & Mallery, George, & Mallery, 2003). Furthermore, to create a standard instrument, the steps were then proceeded by:

1. Test the validity of items, which relate to how far the measuring instrument is able to measure what should be measured.
2. Test the reliability of items, which is related to trust issues.
3. Test the level of difficulty items, to see the proportion of test participants answer correctly to the test items.
4. Test of item discrimination. It is a test that seeks to show the level of ability of the test items to distinguish groups of high achievers (upper group) from groups of low achievers (lower groups) among test takers.
5. Test the practicality of the instrument, which relates to how far the practicality of the use of the instrument made.
6. Test the effectiveness of the instrument, which is related to the extent of the efficiency of the use of the instrument made (Cury, Arias Astray, & Palacios Gómez, 2019; Kane, 2013).

All data were analyzed by using IBM SPSS software. Significance was determined at the level of $p < 0.05$.

3. Result

Descriptive statistical analysis aims to describe the general level of assessment of the instruments compiled. Furthermore, the construct validity test was determined by an analysis of the average scores of five expert judgments. The analysis is done by looking at the average difference between the five expert judgments. The difficulty of an

item is determined by comparing the passing rate among the five expert judgments for each item through chi-square analysis. Internal reliability is determined by item-total correlation (ITC) using the Pearson moment product correlation coefficient. $ITC \geq 0.15$ is considered acceptable because it examines the extent to which all test questions on a test measure a single construction (Varma, 2006). Internal consistency is measured through Cronbach's alpha (Nunnally, 1978). Cronbach's Alfa ranging from 0.6 to 0.7 is considered to show acceptable internal consistency, 0.7 to 0.9 good internal consistency > 0.90 as excellent internal consistency (George, D., & Mallery, George, & Mallery, 2003). Furthermore, to create a standard instrument, the steps were then proceeded by:

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- 6) Test the effectiveness of the instrument, which is related to the extent of the efficiency of the use of the instrument made (Cury, Arias Astray, & Palacios Gómez, 2019; Kane, 2013).

All data were analyzed by using IBM SPSS software.

Significance was determined at the level of $p < 0.05$.

Table 1. The construct validity test

Appropriateness	Inter rater Validity (median)	Note
Core Competency Dimension	8	Valid
Core Competency and Indicator	8	Valid
Indicator and items	8	Valid

The table above shows the construct validity test conducted by experts having a median value (1) 8 for conformity dimensions with core competencies being in good categories, (2) 8 for core competency suitability with indicators being in good categories, (3) 8 for indicator conformity items are in good categories.

Table 2. Expert Judgement of the Reliability of Physical Education Teacher Competency Instruments

Appropriateness	Inter rater Reliability	Note
Core Competency Dimension	0,753	Reliable
Core Competency and Indicator	0,819	Reliable
Indicator and items	0,816	Reliable

$p > 0,90$

The table above shows the results of calculations using SPSS showing that the competency of Physical Education teachers in terms of pedagogically, personally, socially and professionally in Cronbach's Alpha reliable coefficient are (1) 0.753 for conformity between dimensions and core competencies in the good category, (2) 0.819 for conformity between core competencies and indicators are in the good category, (3) 0.816 for suitability between indicators and items in the good category.

Table 3. Results of Analysis of Competency Test Instruments for Physical Education Teachers (Limited Trials)

No	Competency	Frequency	Percentage	Reliability Coefficient	Conclusion
1	Pedagogic				
	Validity Test				
	Valid	54	90%		54 items are valid
	Not Valid	6	10%		
	Σ	60	100%		
	Reliable			0.989	
	Level of Difficulty				
	Difficult	5	8.33%		Repaired
	Average	46	76.67%		
	Low	9	15.00%		
	Σ	60	100%		
	Item Discrimination				Repaired
	Very Good	55	91.67%		
	Good	2	3.33%		
	Fair enough	1	1.67%		
	Poor	2	3.33%		
	Σ	60	100%		
2	Professional				
	Validity Test				
	Valid	56	93.33%		56 items are
	Not Valid	4	6.67%		
	Σ	60	100%		
	Reliable			0.991	
	Level of Difficulty				repaired
	Difficult	3	5%		
	Average	42	70%		
	Low	15	25%		
	Σ	60	100%		
	Item Discrimination				Repaired
	Very Good	55	91.67%		
	Good	1	1.67%		
	Fair enough	3	5.00%		
	Poor	1	1.67%		
	Σ	60	100%		
3	Personality				
	Validity Test				
	Valid	44	91.67%		44 items are valid
	Not Valid	4	8.33%		
	Σ	48	100%		
	Reliability			0.886	
4	Social				
	Validity Test				
	Valid	29	90.63%		44 items are
	Not Valid	3	9.38%		
	Σ	32	100%		
	Reliability			0.905	

The table above shows that, (1) pedagogical competencies have 54 valid questions, (2) provisional competencies have 56 valid questions, (3) personality competencies have 44 valid statement items, and (4) social competencies have 44 valid statement items. Figure2 shows the results of the analysis of limited trials can be seen in the following chart 1.

Figure 2. Histogram of Physical Education Teacher Competency Test Instruments (Competency Trials)

Table 4. Results of Analysis of Competency Test Instruments for Physical Education Teachers (Broaden Trials)

No	Competency	Frequency	Percentage	Reliability Coefficient	Conclusion
1	Pedagogic				
	Validity Test				
	Valid	53	98.15%		53 items are valid
	Not Valid	1	1.85%		
	Σ	54	100%		
	Reliable			0.949	
	Level of Difficulty				Repaired
	Difficult	5	9.26%		
	Average	24	44.44%		
	Low	25	46.30%		
	Σ	54	100%		
	Item Discrimination				Repaired
	Very Good	53	98.15%		
	Good	0	0.00%		
	Fair enough	1	1.85%		
	Poor	0	0.00%		
	Σ	54	100%		
2	Professional				
	Professional				54 items are valid
	Validity Test	54	96.43%		
	Valid	2	3.57%		
	Not Valid	56	100%		
	Σ			0.952	
	Reliable				repaired
	Level of Difficulty	3	5.36%		
	Difficult	42	75.00%		
	Average	11	19.64%		
	Low	56	100%		
	Σ				Repaired
	Item Discrimination	54	96.43%		
	Very Good	1	1.79%		
	Good	1	1.79%		
	Fair enough	0	0.00%		
	Poor	56	100%		

Table 4 Continued

3	Personality			
	Validity Test			
	Valid	44	97.78%	44 items are valid
	Not Valid	1	2.22%	
	Σ	45	100%	
	Reliability			0.846
4	Social			
	Validity Test			
	Valid	29	100.00%	29 items are valid
	Not Valid	0	0.00%	
	Σ	29	100%	
	Reliability			0.825

Table 4 shows that, (1) pedagogical competencies have 53 valid questions, (2) provisional competencies have 54 valid questions, (3) personality competencies have 44 valid statement items, and (4) social competencies have 29 valid statement items. Table three of Figure 2 shows the results of the limited trial analysis can be seen in the following chart 1;

Figure 3. Histogram Analysis of Competency Test Instruments for Physical Education Teachers in Broad Trials

Practicality of Instruments

Table 5. Frequency Distribution of Practicality (Physicality) Instrument of Competency Test for Physical Education Teachers

Interpretation	Frequency	Percent	Valid Percent	Cumulative Percent	Interprestasi
Practical enough	4	13.33%	13.333	13.333	
Practical	21	70.00%	70.000	83.333	
Very Practical	5	16.67%	16.667	100.000	85,96 (practical)
Missing	0	0.00%	13.333		
Total	30	100%			

The practicality value of the Physical Education teacher competency test instruments can be visualized in the following chart;

Figure 4. Practicality of Competency Test Instruments for Physical and Physical Education Teachers

The data shown in table 5 above reveals that of the 30 teachers tested (Physical Education teachers) who provided an assessment of practicality of the Physical Education Teacher's Competency Test Instrument, 5 teachers rated with very practical interpretation, 21 teachers assessed with practical interpretation, and 3 teachers rated the interpretation quite practical. The average score of achievement (practicality) is obtained 85.96 with practical interpretation.

Instrument Effectiveness

Table 6. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Post-test	30	85.42	3.154	.576

Table 7. One-Sample Test

Test Value = 0						
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference		
				Lower	Upper	
Post-test	148.319	29	.000	85.417	84.24	86.59

Based on the table above, the average value was found to be 85.42 with a standard deviation of 4745 exceeding the estimated average value (value of 80). The t value is 148,319 while the t-table value is df (n-1) = 29 with alpha 0.075 = 2.04. Thus it can be interpreted that the value of t arithmetic > from t table (148,319 > 2.04) with the conclusion of H1 which says the Physical Education teacher competency test instrument of a value of 80 is acceptable.

4. Discussion

From the various analyzes conducted, it was obtained that the standard instrument of teacher competency test (UKG) for Physical Education of secondary education was produced. The results consists of four domains namely (1) pedagogical competence has 53 items, (2) professional competence has 54 items, (3) personality competence has 44 statement items, and (4) social competence has 29 statements. The use of the four basic competency domains of the classes has also been tested in practicality with an average achievement of 85.42 and effectiveness with an average achievement of use of 85.96 (practical). Thus, in the development of this instrument, all valid methods have been developed to make the teacher's basic competency instruments, as well as make an assessment of the competencies possessed for his work (Missaghi-Wedefalk, Lindh, Schön-Ohlsson, & Willén, 2012).

The results of previous studies by Weber, Marie (1977) carried out the same rare steps to create teacher competency test instruments on professional competence. The teacher competency test instrument can show teacher competencies related to student learning outcomes (Vogt&Rogalla, 2009). The teacher competency test instrument is the basis for describing teacher quality. In contrast to potential tests, competency assessments must photograph the behavior of the samples displayed in work situations. The Teacher and Lecturer Law requires 4 competencies that must be possessed by teachers, namely pedagogical competencies, professional competencies, personal competencies, and social competencies. However, the Indonesian government only tests pedagogic and professional competence (Andina, 2018).

In addition, teacher competency test instruments are used only to measure mastery and professional mastery of teacher competencies in all subject matter and all levels of schools in Indonesia (Bakri& Budi Raharjo, 2015; Sumaryanta, Mardapi, Sugiman, & Herawan, 2018). This means that the teacher competency test instrument used in Indonesia only tests two competencies, namely; pedagogic competence and professional competence.

Achievement of teacher competency goals stated by the government is a greater competence and accountability. Therefore, the teacher competency test instrument truly tests the four teacher's competencies, with instruments that have ecological and consequential validity (Portelli, Solomon, Barrett, & Mujawamariya, 2005). Therefore, it is necessary to have a teacher's personality and social competency test instrument, to complete the four teacher's basic competency tests beforehand. Some analysis show that the personality and social competence of a teacher has a real impact on student achievement (Corcoran & Tormey, 2010).

5. Conclusions

Based on our research, this is the first study that produces a standardized test instrument that can be used to test the four Physical Education teacher's competencies, namely Pedagogic competencies, Professional Competencies, Personality competencies, and Social competencies. This instrument has been tested practically and effectively in testing the competency of High School Physical Education teachers.

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