

HIGH VALIDITY AND RELIABILITY OF SCHOOL READINESS QUESTIONNAIRE MEASURING INSTRUMENT FOR KINDERGARTEN CHILDREN IN INDONESIA SAMPLE

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Abstract

School readiness refers to children's competence and to get accustomed to school demands. Measuring children's school readiness is deemed useful to recognize their initial achievement and to restrict any potentials of low achievement occurrence. However, the shortage of standardized measuring instruments for school readiness is the most exclusive reason why this research is of importance to bring up. This research, in essence, aims at elaborating an equitable and made consistent measuring school readiness instrument for kindergarten student Grade B in Indonesia using the School Readiness Questionnaire that has six primary aspects: academic competence, essential thinking skill, socio-emotional maturity, physical ability and motor development, self-discipline, and communicative competence. The sample of this study is 260 students (aging between 5-7 years old) from 42 kindergarten schools throughout the Malang City in Indonesia, using a quota sampling technique. The procedures of this current research comprised translating, testifying the content validity by experts, confirmatory factor analysis used to analyze construction validity using confirmatory factor analysis, and testing the internal reliability with Cronbach's Alpha. The results show that (1) the 34-item school readiness questionnaire has high

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validity; (2) there is high internal validity (α from 0.81 to 0.93). Therefore, the scale of school readiness is an entirely and highly valid and reliable scale, and it would be a useful tool for educators and scholars for measuring children's readiness for school.

Keywords: kindergarten children; readiness questionnaire measuring; instrument; reliability; validity.

Introduction

School readiness is defined as a particular condition where children have been able and skillful to perform their responsibilities and be accustomed to school situations (Magdalena, 2014), children's competences and achievement when they attend the kindergarten (Quirk, Mayworm, Furlong, Grimm, & Rebelez, 2015), a competence of making some achievements in school context based on particular standard of curriculum (Carlton & Winsler, 1999), and a capability possessed by children to meet all demands at schools, such as comfort in exploring and asking questions, listening and paying attention to teachers, playing with friends, and keeping in mind and obeying rules at school (Janus, 2006).

Children must be healthy and socially competent, and be able to comply with teacher authority and able to communicate in English and to have basic competence, which was essential to learn (Piotrkowski, Botsko, & Matthews, 2000). Those who are still unready yet for school are very potential to get difficult to follow any activities during classroom instruction (Al-Hassan & Lansford, 2009). School readiness, furthermore, has been of urgent necessity in behalf of helping students adapt with any trials at school (Fayez, Ahmad, & Oliemat, 2016) and has become a basis for skill enhancement that will significantly contribute to children's future success (Cunha, Heckman, Lochner, & Masterov, 2005). For children, school readiness can help them control their emotions, which is allowed to facilitate them for interaction with their friends (Shaul & Schwartz, 2014). Meanwhile, for teachers, it will be so meaningful for proper classroom management (Akman, Kükürtcü, Tarman, & Sanli, 2017). There are direct and indirect factors that affect children's school readiness performance, such as academic achievement and social competence (Gullo & Miller, 2018).

In accordance with data from Ministry of Education and Culture in 2016/2017 in Indonesia, there were found as many as 361,215 students retaking primary school education, with the following detail of distribution at each grade (from the highest to the lowest): 1st grade 149,972 students; 2nd grade 76,816; 3rd grade; 63,396; 4th grade 40,809; 5th grade 28,735; and 6th grade 1,487. The data above have denoted that the first graders have not been ready enough for school (Hambleton & Lee, 2013).

There is a study (Fayez et al., 2016) to indicate that six primary aspects illustrated children's school readiness, comprising: academic competence, essential thinking skill, socio-emotional maturity, physical ability and motor development, self-discipline, and communicative competence. In addition, school readiness is influenced by parental involvement those who regularly spend time with their parents have shown a higher level of school readiness (Shaul & Schwartz, 2014); and communication between mothers and children (Magdalena, 2014; Connell & Prinz, 2002). Factors of parent's education, occupation, and age, along with teachers' roles, also contribute to children's school readiness (Tunçeli & Akman, 2013). Children whose parents have more home-based parental involvement activities during school effects have excellent performance in reading and mathematics at kindergarten entry (Puccioni, 2018).

Commodari (2013) had shown that students' closeness to their teachers in kindergarten level had a significant interconnectedness to linguistic development and psychomotor skill, which was said to be contributive to school readiness and risk of learning difficulty. Students' experiences during such class activity as social interaction with teachers and friends are also considered as influencing factors of children's school readiness (Hatfield, Burchinal, Pianta, & Sideris, 2016). Davies, Janus, Duku, and Gaskin (2016) argued that it was of urgency to set a holistic measurement upon children's school readiness, specifically on cognitive and non-cognitive concerns. Such a measurement might be allowed to identify students' initial potential and to terminate any probability of low-rank achievement at school. However, in Indonesia, it is difficult to identify children's school readiness due to the lack of measuring instruments as a result of limited researches about measuring instruments, primarily on the adaptation of measuring (Kongres, Supratiknya, & Susana, 2010). Several factors become obstacles to the development of measuring instruments in

Indonesia, because of the majority of people living below the poverty line reside in rural areas making the development of measuring instruments less priority (Brinkman et al., 2017), an individual measurement instrument that is tendentious clinical and performed by psychologists and the administration of school readiness test should be managed by experts and could not be directly conducted by teachers without any guidance (Sutter et al., 2017), and inconsistency of some item in some school readiness test as a measuring instrument which is some items had under 0.25 and non-discriminatory power (Quirk et al., 2015).

Thus, this study aims to determine the validity and reliability of school readiness measurement tools that are suitable for measuring the school readiness of kindergarten children in Indonesia. This research is expected to make a positive contribution to educational institutions and teachers in order to understand the school readiness of kindergarten students from an early age so that students can increase their potential and achievement in school.

Adaptation of School Readiness Measurements

Children's school readiness is a holistic concept that is related to several areas at the stage of development that will show a child's ability to meet the demands of the school such as comfort in exploring and asking questions, listening and paying attention to the teacher, playing together with other children, and remembering and obeying the rules in school (Janus, 2006), a source of personal readiness for a child who will be taken to school to help him adapt to the challenges at school (Fayez et al., 2016). The school readiness characteristics found in the study of Lara-Cinisomo, Fuligni, Ritchie, Howes, & Karoly, 2008) are the emotion aspect (confident and motivation), physical aspect (health and have good motor skill) and have good social skill. Graue (2006) indicate that readiness is the result of the interaction of various complex systems of institutions, individuals, social groups, and businesses that create the maturity of children's development from the ages 0 to 5 years. In the aspect of individuals characterized by individuals who have good development in terms of: health and physical development, social and emotional development, approaches to learning, language development and communication, cognitive and general knowledge.

Fayez et al. (2016) stated 6 aspects of school readiness, namely: (1) academic knowledge (children's knowledge related to letters, numbers, and basic shapes of objects such as triangles, squares, and circles that support children's abilities in reading, writing, and mathematics), (2) Basic Thinking Ability, Relating to the Children's Ability to Understand Objects based on Size, Size, and Colour, Preparing Relationships about Same and Different Objects, More and Less, (3) Socio-emotional maturity is related to prosocial, empathy, aggression, hyperactive behaviour, and conflict and conversation and feeling comfort during school, (4) Physical abilities and motor development shape the physical readiness of children who are active in activities in school, (5) Self-discipline is related to the competence and ability of children to work together with others, answer and follow the rules, (6) Communication skills relate to the ability of children to express their desires and opinions clearly and can be understood by adults and peers.

Children's school readiness becomes an important topic to study, and there are even some experts who tried to develop school readiness measurement tools. Graue and Shepard (1989) investigated validity school readiness composite (SRC) as an intellectual instrument concurrent with Wechsler preschool and primary scale of intelligence-Revised (WPPSI-R). The finding of this study showed that SRC correlated very highly with the WPPSI-R verbal IQ (.76), but overlap with the area of language development, and lower correlation with WPPSI-R performance scale IQ. Csapó, Molnár, and Nagy (2014) explores the potential of using online tests for the assessment of school readiness and for monitoring early reasoning. They have transferred four tests of a face-to-face-administered school readiness test battery with four indicators as speech sound discrimination, relational reasoning, counting, and basic numeracy, and deductive reasoning and a paper-and-pencil inductive reasoning test to an online platform and administered at the beginning of school to samples of first-grade children. The result of this study was the computer could be assessed only certain items of the numeracy test, and the reliability of the shortened test decreased, and latent analyses indicated that measurement invariance did not hold.

A measuring instrument commonly used to testify school readiness in Indonesia is the *Nijmeegse Schoolbelwaamheids Test* (NST), which is designed by Monks, Rost, and Coffie (Mariyati & Affandi, 2016). The NST constitutes an individual measurement instrument that is tendentiously clinical and

performed by psychologists; thus, the administration of the NST should be managed by experts and could not be directly conducted by teachers without any guidance. Also, Cronbach's Alpha value of the NST was found as 0.85 (Mariyati & Affandi, 2016). Despite its consistency as a measuring instrument, there are some items to take into account, especially on the grape, cycle, television, and butterfly sub-items. The mentioned items are essential to be considered as they are equipped with a low discriminatory power index (under 0.25). Discriminatory power could be used to differentiate high achievers from low ones. The existence of low discriminatory power is a result of that children have not received any information about the particular object and its function to make it difficult to differentiate the specific function of a particular object. As an example, it can refer to children's knowledge about a specific flower with the most robust smell among similar flowers.

In addition that instrument, there is the Early Development Instrument (EDI), which is a measuring instrument for children development in respect to physical health and prosperity, social competence, emotional maturity, linguistic and cognitive development, and communicative competence and general information (Davies et al., 2016; Brinkman et al., 2017; Janus, 2006). The instrument has been adopted by different Chinese cultures, with high validity value (*i.e.*, ranging between 0.70 to 0.95 on each aspect) (Ip et al., 2013). Furthermore, in Indonesia, the instrument results in average validity and reliability values (Brinkman et al., 2017). However, the Offord Centre for Child Studies (OCSS) takes full control over the copyrights and privilege of the instrument, and thus, it is a paid instrument. Moreover, there is also another measuring instrument for school readiness, named as School Readiness Questionnaire. This instrument is more accessible and more compatible to be administered by users than others but has yet to meet Indonesian standardization, which means that adaptation over the instrument is of urgency (Hambleton, Merenda, & Spielberger, 2004).

Graue (2006) states that school readiness measurement must focus on the construction of definitions where readiness must cover all aspects of development, including multidimensional construct and instrument, will probably underestimate the complexity. Likewise, the adaptation of measuring instruments is enlarged where they can be used on subjects from different cultures through 4 stages: 1) Review the consistency obtained, 2) Language Transfer Phase with the aim that the material is easily understood and can be

used in local languages and cultures consist of forwarding translation and backward translation, 3) The empirical stage is the result of an adapted psychological test. All items can be seen by Differential Item Functioning (DIF) through Confirmatory Factor Analysis, 4) Revalidation and standardization stages are carried out to determine the validity of the measuring instruments that have been adapted to be appropriate for use in other socio-cultural environments. The standardization phase supports the setting of administrative, scoring and reporting standards tailored to the new social cultural environment (Hambleton et al., 2004).

The second aim of this study to examine is the school readiness questionnaires can be used to measure the school readiness of kindergarten students in Malang City of Indonesia? and to determine the description of the kindergarten students' school readiness in Malang in terms of gender-based on a school readiness measurement tool based on a school readiness questionnaire from Fayez et al. (2016).

Validity, reliability and factor analysis process

The next stage of the adaptation process is to measure the validity and reliability of the school's readiness measurement tool. Validity is the process of drawing the right conclusions from the measurement results (Hambleton & Lee, 2013). Validity will indicate the accuracy of the data obtained with the required aspects consist *face validity* and *logical validity*), criterion-related validity and construct validity which can be done using a *multitrait-multimethod* dan factor analysis method (Creswell, 2002).

Reliability is the consistency or the severity of the measurement results in a certain time interval in three ways: (a) retest method where a measuring instrument is tested on a group of objects twice, (b) parallel form method, namely by providing two measuring devices that are parallel to the group in successive time, and (c) one-time testing method with *Cronbach's alpha of test*. A measuring instrument can be said to be reliable when it has a reliability score between 0.6 and 0.7, however, Creswell (2002) more suggest the reliability score > 0.7 .

The final process of measuring instrument adaptation is the factor analysis test. Factor analysis test is the process of testing whether a set of items can be defined as a construct using statistical analysis tests to explain the

relationship between variables in a limited set of variables or factors consist of *Exploratory Factor Analysis* (EFA) to find out the number of factors that appear to explain the construct and *Confirmatory Factor Analysis* (CFA) to find out how the theory is and *Confirmatory Factor Analysis* (CFA) to illustrate how the theory underlying these factors fits the actual data (Raykov, 2012). Factor fit test is known through testing of *Goodness of Fit Statistics* (Hambleton & Lee, 2013; Raykov, 2012).

The third purpose of this study is to conduct a factor analysis test for each item in the school readiness test tool to see how far the Faye's school readiness questionnaire can be used for kindergarten students in the city of Malang, Indonesia.

Method

Participants

The study used a convenience sample of 260 students from 46 kindergarten schools in Malang City, Indonesia. It used a quota sampling technique. The specific criteria were as follows: Students in the second year of kindergarten (Level B), ages between 5-7 years old. The researchers had distributed 295 research scales in total, and as many as 265 returned. 5 participants incompletely respond. As a result, the final participant and analyses for the present study focus on 260 students. The 260 participants met the criteria for adequate sample at least 5-10 times the total number of items on tool (Hambleton, Merenda, & Spielberger, 2004). In this research, there are self-developing 42 items analyzed. The quota of the sample constitutes 210-420 students.

The demographic characteristic of the participants in the present study can be seen in table 1:

Table 1. The demographic characteristic of the participants

	Characteristic	N	M	SD	Std Error
Age	5	1	145.00	-	-
	6	109	141.60	12.058	1.155
	7	150	143.65	10.956	.895
	Total	260	142.80	11.434	.709
Gender	Boys	128	142.91	12.158	1.075
	Girls	132	142.68	10.730	.934

Table 1. The demographic characteristic of the participants - *continued*

Characteristic	N	M	SD	Std Error	
Total	260	142.80	11.434	.709	
Order of birth	1 st children	130	143.14	11.255	.987
	2 nd children	93	141.82	11.545	1.197
	3 rd children	27	144.19	11.087	2.134
	4 th children	9	144.56	15.117	5.039
	>4 th children	1	136.00	-	-
Total	260	142.80	11.434	.709	

The subject had an age range of 5 to 7 years in which the largest number was 7-year-old children (M=143.65), followed by the number of children aged 6 years (M=141.60), and only 1 child aged 5 years (M=145.00). the number of girls students is slightly greater (M=142.68) than the number of boys students (142.91). Most of the subjects are 1st child (M=143.14), then 2nd children (M=141.82), and the 3rd child (M=144.19).

Measures

The measured variable is school readiness. It refers to any competence or ability children can perform for adaptation with school demands and consists of six main aspects, namely academic competence, necessary thinking skill, socio-emotional maturity, physical ability and motor development, self-discipline, and communicative competence. In order to collect data, our researcher made use of the School Readiness Questionnaire, which had been designed based on the six aspects of school readiness (Fayez et al., 2016). This scale of this version comprises 42 items in the form of a *Likert* scale ranging from "1 = not important" to "5 = very important". In previous research, the scale was occupied to identify a teacher's belief upon some aspects related to school readiness. Further, in this research, the researchers employed the scale as a self-report for the identification of kindergarten children in terms of school readiness. The researchers defined some criteria of assessment as follows: "1 = not able, 2 = less able, 3 = moderately able, 4 = properly able and 5 = excellently able". The School Readiness Questionnaire was adapted into the Bahasa Indonesia and completed by significant others; in this case, teachers with a good understanding of students' development in recent three months. After the adaptation process on the scale, there were 34 items valid (Boone & Boone, 2012).

Procedure

The development of measuring instrument in this current research was making an adaptation on the *School Readiness Questionnaire* into the Bahasa Indonesia (Kongres et al., 2010) and examining the equality of translation result to the experts for the sake of high relevance level of each item which could accommodate and support the validity of the scale content (Hambleton et al., 2004; Azwar, 2012). This current research employed a confirmatory factor analysis on construct validity test. It was performed to identify if the translation result of the scale was understandable based on Indonesian culture and had been fit-and-proper to school readiness construct. On confirmatory factor analysis, the researchers modified the model of the scale by selecting some items with a high value of λ or those with $\lambda \geq 0.5$ (Kline, 2015) and eliminated others with a low value of λ or those with $\lambda < 0.5$. Such a modification was made to meet the criteria fit of the instrument for school readiness. The modification on the model was conducted three times: the first model comprising 42 items; the second 36; and the third 34. Meanwhile, the model under modification was the measuring model on aspects of academic competence, physical ability and motor development, and communicative competence.

Statistical Analysis

The analysis was performed using two statistical analyses. Firstly, using an independent sample t-test to study differences in kindergarten students' readiness between boys and girls. Secondly, using LISREL 8.8 program on construct validity test through confirmatory factor analysis (Kline, 2015). Further, confirmatory factor analysis was equipped to identify the fit of the measuring model compared to field data. The model was developed by selecting numerous items with factor content (λ value) ≥ 0.5 (Tabachnick, Fidell, & Ullman, 2007). Further, the IBM SPSS Statistics 21 version program was also occupied for the reliability test using Cronbach's Alpha analysis. To be specific, a measuring instrument would be considered reliable only if the value of Cronbach's Alpha signified > 0.70 (Tabachnick et al., 2007).

Results

Description of kindergarten student's school readiness in terms of gender

The above table states that boys students have greater school readiness in aspects of academic competence ($M=28.34$), basic thinking skills

(M=28,55), and social-emotional maturity (M=28.55) than girls students, while girls students have more school readiness in aspects of physical ability and development motor (M=28.45), self-discipline (M=28.39) and communicative competence (M=28.55) than boys students (*see* table 2).

Table 2. Descriptive statistic for student's school readiness

The aspect of School Readiness	Gender	N	M	SD	Std. Error Mean
AC	Boys	128	28.34	3.698	.327
	Girls	132	27.83	3.215	.280
BTS	Boys	128	28.55	3.376	.298
	Girls	132	28.23	3.606	.314
SEM	Boys	128	28.23	3.713	.328
	Girls	132	27.55	3.569	.311
PAMD	Boys	128	28.31	3.562	.315
	Girls	132	28.45	3.660	.319
SD	Boys	128	27.90	3.390	.300
	Girls	132	28.39	3.408	.297
CC	Boys	128	28.46	3.727	.329
	Girls	132	28.55	3.535	.308

Note: AC=Academic Competency, BTS=Basic Thinking Skill, SEM=Social-Emotional Maturity, PAMD=Physical Ability and Motor Development, SD=Self -Discipline, CC=Communicative competence

Table 3. Analysis of significances of kindergarten student's school readiness

		Levene's Test for Equality of Variances			
	Aspect School Readiness	F value	p value	Sig. (2-tailed)	M Diff.
AC	Equal variances assumed	6.874	.009	.236	.510
	Equal variances not assumed			.237	.510
BTS	Equal variances assumed	.978	.323	.461	.320
	Equal variances not assumed			.461	.320
SEM	Equal variances assumed	.896	.345	.137	.674
	Equal variances not assumed			.137	.674
PAMD	Equal variances assumed	.057	.812	.751	-.142
	Equal variances not assumed			.751	-.142
SD	Equal variances assumed	.681	.410	.241	-.496
	Equal variances not assumed			.241	-.496
CC	Equal variances assumed	1.024	.312	.851	-.085
	Equal variances not assumed			.851	-.085

The analysis data showed that all aspects of school readiness have a value > 0.05 (see table 3). This shows that there are no differences in school readiness in all aspects of the school readiness between boys and girls kindergarten students in Malang.

The Construct Validity Test

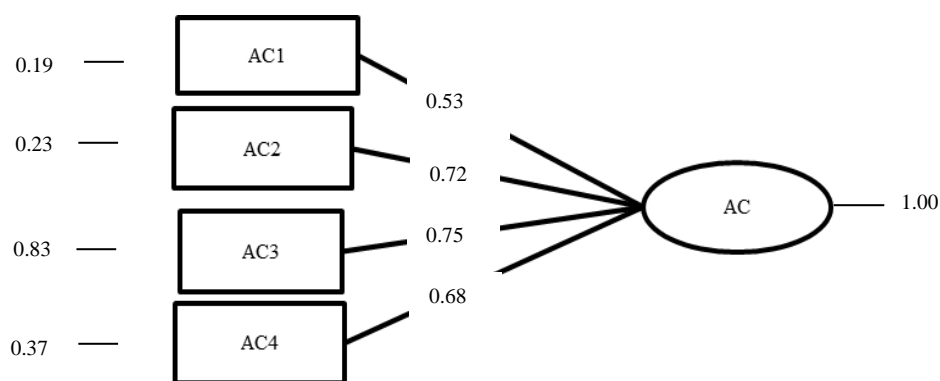
The construct validity test was conducted by the researchers by means of confirmatory factor analysis in order to identify if the translated version of the scale was understandable based on Indonesian context and construct of school readiness through a sorting process on the items with λ values ≥ 0.5 and elimination on the items with lower λ values or < 0.5 (Kline, 2015). For gaining a proper measuring model that met the criteria fit, the administration was run three times, with the first model on 42 items, the second 36, and the third 34 (see table 4). Alluding to validity test result on the six aspects of school readiness, the following was the result of construct validity test:

Table 4. Analysis of Construct Validity school readiness scale (Sholihah, 2018)

Aspects	N	χ^2 value	p-value	RMSEA	CFI	RMR	GFI
Academic Competence	M1(7)	100.41 **	0.000**	0.154	0.95	0.036	0.90
	M2(5)	6.42 ns	0.268ns	0.033	1.00	0.014	0.99
	M3(4)	1.36 ns	0.507 ns	0.000	1.00	0.010	1.00
Basic Thinking Skill	M1(7)	148.07**	0.000**	0.192	0.94	0.043	0.86
	M2(7)	148.07**	0.000**	0.192	0.94	0.043	0.86
	M3(7)	148.07**	0.000**	0.192	0.94	0.043	0.86
Social-emotional Maturity	M1(7)	101.37**	0.000**	0.155	0.96	0.037	0.90
	M2(7)	101.37**	0.000**	0.155	0.96	0.037	0.90
	M3(7)	101.37**	0.000**	0.155	0.96	0.037	0.90
Physical Ability and Motor Development	M1(7)	43.74**	0.000**	0.091	0.98	0.015	0.95
	M2(4)	3.71 ns	0.157ns	0.057	1.00	0.008	0.99
	M3(3)	0.00 ns	1.000 ns	0.000	-	-	-
Self-Discipline	M1(7)	134.84**	0.000**	0.183	0.95	0.037	0.87
	M2(7)	134.84**	0.000**	0.183	0.95	0.037	0.87
	M3 (7)	134.84**	0.000**	0.183	0.95	0.037	
Communicative Competence	M1(7)	49.72**	0.000**	0.099	0.98	0.018	0.95
	M2(6)	39.60**	0.000**	0.115	0.98	0.016	0.95
	M2(6)	39.60**	0.000**	0.115	0.98	0.016	0.95

Note: M1= The First Model; M2= The Second Model; M3=The Third Model; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index, RMR= Root Mean Square Residual; GFI= Goodness of Fit Index.

The third model had shown a better index fit compared to the first and second (*see* Figure 1). The range of chi-square (χ^2) value on the third model was between 0.00 ($p=1.000$) for physical ability and motor development to 46.07 ($p=0.000$) for basic thinking skill. Physical ability and motor development had a perfect model fit index ($\chi^2=0.00$; $p=1.000$; $RMSEA=0.000$) compared to other aspects of school readiness. Despite incomplete criteria of the model fit index, overall, the third model was acceptable as it had three criteria fulfilled (CFI, RMR, & GFI).



Chi-Square = 1.36, $df=2$, P-value= 0.50560, $RMSEA=0.000$

Figure 1. A Model of Measuring Academic Competence

On the academic competence aspect, there were 4 out of 7 original items with λ values ≥ 0.5 and scores ranging from 0.53 to 0.75. The highest value of λ existed on item Academic Competence (AC) 3, which was 'being able to recognize Roman alphabets' (with $\lambda=0.75$). In addition, the lowest value of λ occurred on item AC 1, which was 'being able to count from 1-10 or more' (with $\lambda=0.53$).

On the basic thinking skill aspect, it was evident that all items were equipped with values of $\lambda \geq 0.5$, which ranged from 0.51 to 0.72, and all of which were valid (*see* Figure 2). The highest value of λ (signifying 0.72) occurred on item Basic Critical Thinking (BTS) 7 which was 'being able to complete simple counting operation by means of pictures or abacus' and BTS 1

which was 'being able to classify things based on single dimension (*e.g.s* color, shape, size, etc.)' with the lowest value of λ (constituting 0.51).

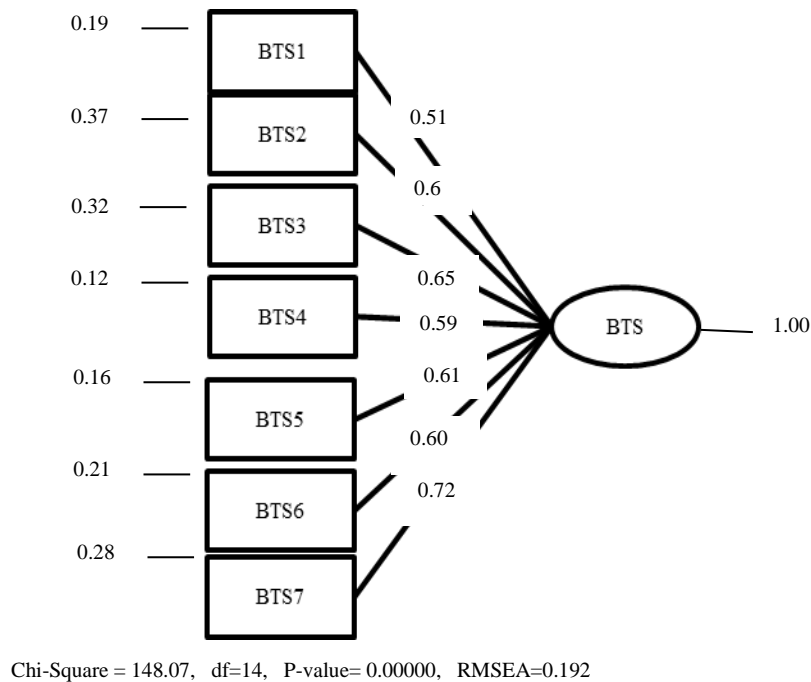
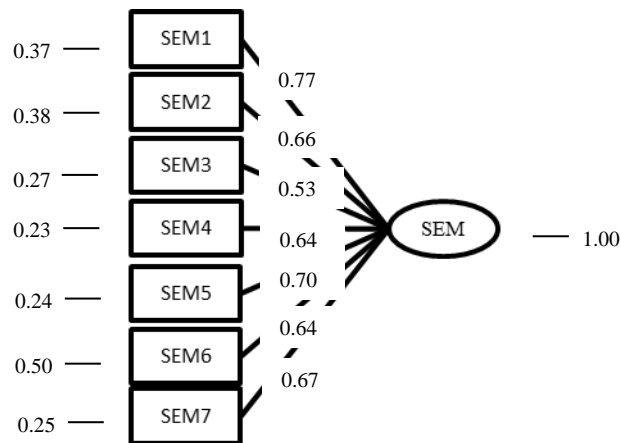


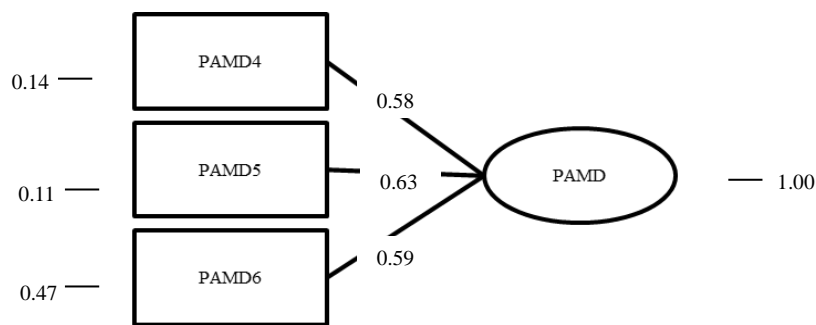
Figure 2. A Model of Basic Thinking Skill

Figure 3 had shown that all items on socio-emotional aspects were valid due to λ value ≥ 0.5 , which ranged from 0.53 to 0.77 with the highest λ value (constituting 0.77) on Socio-emotional maturity (SEM) 1 which was 'being able to control self-emotion intense, anger, or frustration conditions'; while the lowest λ value (signifying 0.53) occurred on item SEM 3 which was 'being willing to join any activities with other children'.



Chi-Square = 101.37, df=14, P-value= 0.00000, RMSEA=0.155

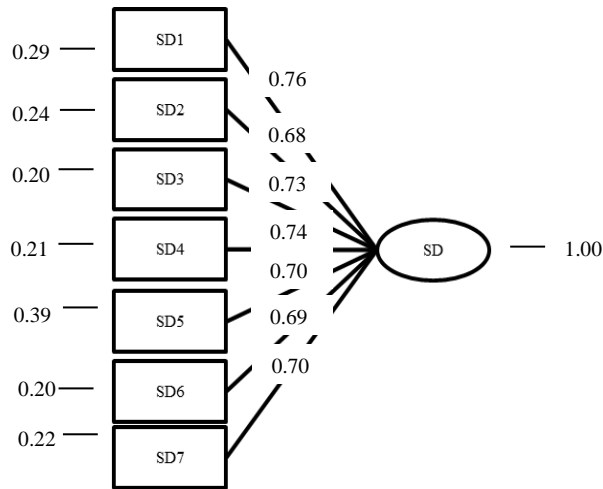
Figure 3. A Model of Measuring Socio-Emotional Maturity



Chi-Square = 0.00, df=0, P-value= 1.00000, RMSEA=0.000

Figure 4. A Model of Measuring Physical Ability and Motor Development

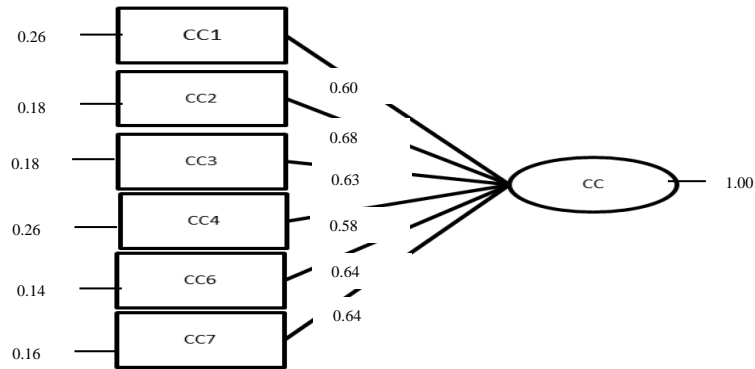
There were three items found with λ value ≥ 0.5 , which ranged from 0.58 to 0.63. The items were on Physical Ability and Motor Development (PM) 4 (with λ value=0.58) which was 'being able to dress on and off independently', PM 6 (with λ value=0.59) 'being able to tie up shoelace by their own', and PM 5 (with λ value=0.63) 'being able to perform bathroom activities' (see figure 4).



Chi-Square = 134.84, df=14, P-value= 0.00000, RMSEA=0.183

Figure 5. A Model of Measuring Self-Discipline

A model to measure self-discipline had shown that there were not any items on the self-discipline aspect eliminated for all the items were equipped by λ value ≥ 0.5 (see Figure 5), ranging from 0.68 to 0.75. The highest λ value was found in Self-Discipline (SD) 1, which was ‘being able to sit down quietly and peacefully during the class’ (with $\lambda=0.75$). Moreover, the lowest λ value was identified on SD2, which was “not disturbing classroom activities (with $\lambda=0.68$).



Chi-Square = 39.60, df=9, P-value= 0.00001, RMSEA=0.115

Figure 6. A Model of Measuring Communicative Competence

In Figure 6, it was evident that there were six items on the Communicative Competence (CC) aspect of which λ value ≥ 0.5 . The highest λ value (0.68) occurred on CC2, which was 'being able to express their feelings through proper language.' Meanwhile, the lowest λ value (0.58) was seen on CC 4, which was 'being able to show polite behaviors, such as saying thanks and greeting others.'

On the academic competence aspect, there were 4 out of 7 original items with λ values ≥ 0.5 and scores ranging from 0.53 to 0.75. On the basic thinking skill aspect, it was evident that all items were equipped with values of $\lambda \geq 0.5$, which ranged from 0.51 to 0.72, and all of which were valid. All items on socio-emotional aspects were valid due to λ value ≥ 0.5 , which ranged from 0.53 to 0.77. On the physical Ability and Motor Development. There were three items found with λ value ≥ 0.5 , which ranged from 0.58 to 0.63.

On self-discipline had shown that there were not any items on the self-discipline aspect eliminated for all the items were equipped by λ value ≥ 0.5 , ranging from 0.68 to 0.75. There were six items valid on the Communicative Competence (CC) aspect of which λ value ≥ 0.5 .

Reliability of the School Readiness Scale

The reliability test was set on 34 items of the school readiness scale that was referred to as the result of confirmatory factor analysis. The result of the reliability test showed that Cronbach's Alpha scores from those 34 items ranged from 0.814 to 0.933.

Table 5. Reliability Values of the School Readiness Scale

Aspects	Cronbach Alpha
Academic Competence	0.81
Basic Thinking Skill	0.92
Socio-Emotional Maturity	0.90
Physical Ability and Motor Development	0.82
Self-Discipline	0.93
Communicative Competence	0.92

Discussion

This current research aims at developing an equitable and systemized measuring instrument for children's readiness of school in Indonesia based on the existing measuring instrument which had been developed by (Fayez et al.,

2016). Measuring school readiness had become an urgent need for it could define and predict students' potentials when attending primary education (Hambleton et al., 2004); Brinkman et al., 2017). In addition, to collect the accurate and precise data of school readiness, a valid and reliable measuring instrument was of necessity, along with adapted items, to be applicable based on Indonesian cultural and linguistic contexts due to its extreme rarity. The findings presented in this current research was supposed to contribute to solving a specific problem as expected and giving teachers assistance for identification need of students' school readiness.

The school readiness scale from Fayeze was commonly occupied with measuring school readiness level on kindergarten students, covering six main aspects that might define school readiness, namely: academic competence, basic thinking skill, socio-emotional maturity, physical ability and motor development, self-discipline, and communicative competence. This research was also the first research in Indonesia to take into account kindergarten students as the research subjects. The research had shown that items of Fayeze (Fayeze et al., 2016) were applicable for the identification of school readiness on kindergarten students in Indonesia.

The result of analysis independent sample t-test, there was no difference in school readiness between male and female students, but when viewed from the difference test by aspect, while female students had school readiness in the aspects of Physical Ability and Motor Development ($M=28.45$), Self-Discipline ($M=28.39$) and Communicative competence ($M=28.55$). this is due to the readiness of schools influenced by various dimensions of development both a biological dimension, maturations', environmentalist, social constructionist who interact with one another, so a deep assessment needs to be done (Graue, 2006).

The result of confirmatory factor analysis portrayed that all aspects of school readiness had met the model criteria fit index. This research had proven that only 34 out of 42 items were applicable in Indonesia. This disparity in number occurred due to the elimination of items with low λ values, which were below 0.5, for the sake of a valid measuring model that fitted to model criteria fit index. The elimination, further, was set in uniformity amid a series of thoughts from some experts of factor analysis who suggested eliminating items with $\lambda < 0.5$ (Tabachnick et al., 2007). Items would be of validity only if they were equipped by λ value > 0.7 (Kline, 2015). However, in its development, the

range of values from 0.50 to 0.60 was still acceptable. Due to initial development, the researchers made use of λ value ≥ 0.5 to define the validity status of the particular item.

Another unique finding was that physical ability and motor development were shown to have a perfect fit index compared to four other aspects in FayeZ with chi-square (χ^2) value signifying 0.00. Accurate and precise measurement on aspects of physical ability and motor development was deemed necessary as both would be primary bases on future development (FayeZ et al., 2016).

Revisiting several aspects of the school readiness scale, it was found that the socio-emotional maturity aspect in the Indonesian sample was quite dominant to define school readiness with λ value of 0.77, specifically on item SEM1 stating "being able to control emotion intense, anger, and frustration conditions." This was in line with research which revealed that socio-emotional maturity did influence academic achievement (Leighton, Guo, Chu, & Tang, 2018). In addition, another related research also unveiled that an ability to manage emotion closely correlated to academic performance besides generating a good relationship with teachers and classmates (Eisenberg, Valiente, & Eggum, 2010; Blair & Raver, 2015). Further, there were found two aspects contributing to students' ability to read and do counting operation; one of which was spotted on AC3 in academic competence aspect with the highest λ value stating "being able to recognize Roman alphabets" (with $\lambda=0.75$) and on BTS7 in basic thinking skill aspect with the highest λ value stating "being able to complete simple counting operation by means of pictures or abacus" (with $\lambda =0.72$). Both aspects, in research from (Duncan et al., 2007), could predict the potential of future achievement.

Moreover, concerning the aspect of physical ability and motor development, PAMD5 became the primary basis for school readiness stating "being able to perform bathroom activities independently". This was supported by (Santrock, 2011) who argued that the central development of preschool children relied on how they learned about independence and self-caring, which meant that they were demanded to take care of themselves without anybody's assistance when in school. Moving to the self-discipline aspect, item SD1 reached the highest λ value with 0.75, stating "being able to quietly and peacefully sit calmly during class". In terms of communicative competence, it was seen that the highest λ value occurred on CC2 stating "being able to

express feelings through proper language” with a λ value of 0.68. Both mentioned aspects proved that not only did academic competence need serious attention to children’s school readiness, but also their behaviors. Research from (Lin, Lawrence, & Gorrell, 2003) exhibited that, to kindergarten teachers, students’ ability to express what they needed and thought of, to behave calmly or not disturb others, to follow instruction, and to take a turn and share with friends was part of school readiness.

Besides the correct item, there were some items eliminated primarily on the three aspects of school readiness, namely academic competence, physical ability, and motor development, and communicative competence. The items were eliminated due to unspecific meaningfulness like what was listed in academic competence aspects, such as on items of “being able to mention and differentiate colors,” “being able to mention shapes of basic geometry (triangles and rectangles),” and “knowing senses and body parts”. A similar thing was also found in physical ability and motor development aspect which stated “being able to hold the pencil properly”, “being able to catch balls with two hands,” and “being healthy and consuming good nutrition.” On such items, it was evident that there were no absolute and specific criteria included, like the minimum number of colors to differentiate, the number of geometry shapes to mention, the phrase of “other body parts,” and distance between children and teachers in the catching-ball activity. In addition, such terms as “correctly” and “good” had a risk of misinterpretation from the users. The unspecific terms were very potential to drive teachers confused in answering responses and to result in various interpretations upon the words used in writing the items. For instance, Teacher A gave an ‘excellent’ assessment to a student who was able to mention five kinds of colors, while Teacher B gave ‘good’ assessment since only those able to mention seven kinds of colors deserved ‘excellent’ assessment. According to Beatty, these unspecific items needed betterment, especially about positive and negative behaviors (Groth-Marnat, 2009) commented that useful items were defined obviously to fit in the purpose of measurement; so, there would be no longer various interpretations. Another eliminated item was in communicative competence aspect stating “not to cut off people talking”. The item was likely to imply high social desirability in which the content of the item was strictly related to social norms in common - therefore, it was probably answered normatively (Hambleton et al., 2004). For that reason, the translation version of the item was changeable to be “being able

to take a turn in communication”.

The result of reliability test had shown that school reliability scale had relatively good values of Cronbach's Alpha in each aspect, specifically on academics (0.81), basic thinking skill (0.92), socio-economic maturity (0.90), physical ability and motor development (0.82), self-discipline (0.93), and communicative competence (0.92). It was comparing these results to a notion from (Tabachnick et al., 2007) that a measuring instrument was said to be reliable only if it gained Cronbach's Alpha value >0.7 . Thus, the level of reliability shown in this current research was acceptable. This was supported by the idea from (Davidshofer & Murphy, 2005) stating that Cronbach's Alpha value ≥ 0.8 was interpreted as relatively high reliability. Therefore, it could be said that the level of reliability of each aspect in the Indonesian school readiness scale was still categorized satisfactory. The values of the original school readiness scale from Fayez (Fayez et al., 2016) experiment in Jordan had shown as follows: academic competence ($M=0.91$), basic thinking skill (0.94), socio-emotional maturity (0.89), physical ability and motor development (0.89), self-discipline (0.95), and communicative competence (0.56). Compared to the adapted version of Cronbach's Alpha, it was shown that the values were not significantly distinctive, but on the communicative competence aspect. The distinction of Cronbach's Alpha values on communicative competence was potential due to a specific reliability coefficient on a particular situation and group of subjects (Cumming & Berwick, 1996; Haladyna, 2004). For that reason, it could be summed up that the estimation of Cronbach's Alpha values in a group of subjects in Jordan was equipped with different coefficient from a group of subjects in Indonesia. In Indonesia, the number of different items in school readiness scale between the original and adapted version could influence the measurement reliability coefficient. This was in the same logic highlighting that addition and elimination on items in a measuring instrument were significant to reliability coefficient (Haladyna, 2004).

Conclusion

The result of this study showed that measuring instrument for school readiness designed by Fayez et al. (2016) could be adopted to define school readiness of kindergarten students in Indonesia with 34 items in total and

equipped with relatively good validity and reliability score (based on *Cronbach's Alpha*) in each indicators: academic competence (0.814), basic thinking skill (0.920), social-emotional maturity (0.903), physical ability and motor development (0.819), self -discipline (0.933), and communicative competence (0.923). The implications of this research for kindergarten teachers are expected to have knowledge related to school readiness. So, they can make a holistic assessment of students' abilities to improve growth and increase aspects in school readiness of student.

Our findings may be of interest to others working in school readiness measurement in other cities looking for wider comparability and for generalization. The research could not be generalized over those from different areas other than the Malang City. Regarding increasing the representative and to result in better Indonesian scale of school readiness, further researches can add the number of participants involved from all over regions of the country. So, the outcome gained might be more representative and could be generalized over all the individuals, with the assistance of local languages. Alternatively, this study suggests that prospective researchers are also allowed to add validity analysis other than construct validity, such as convergent validity using measuring instrument parallel to school readiness scale.

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Appendix A

Description item from the six aspects of school readiness and the result of construct validity test

No	Item	Construct Validity		
		MI	M2	M3
1. Academic Competence (AC)				
AC1	Can count to 10 or more	0.53	0.54	0.53
AC2	Knows Arabic alphabet	0.63	0.70	0.72
AC3	Knows English alphabet	0.70	0.78	0.72
AC4	States Address	0.67	0.69	0.75
AC5	Names and distinguishes colors	0.46	-	-
AC6	Recognize the basic shapes of geometric (square and triangle)	0.52	0.46	-
AC7	Knows the five senses and the parts of their body	0.41	-	-
2. Basic Thinking Skill (BTS)				
BTS1	Using the single dimension to classify the object (e.g., shape, color, and size...)	0.51	0.51	0.51
BTS2	Using the pictures to retell 4-5 sentences of story	0.65	0.65	0.65
BTS 3	Understand and explains the chronologies of event	0.65	0.65	0.65
BTS 4	Distinguishes the shapes of many pictures	0.59	0.59	0.59
BTS 5	Recognizes the picture object of other groups	0.61	0.61	0.61
BTS 6	Realizes the status of an object, such as: behind, in front of, last, right, first, last, more, less...	0.60	0.60	0.60
BTS 7	Using pictures or abacus to solve a simple numerical issues	0.72	0.72	0.72
3. Social-Emotional Maturity (SEM)				
SE1	Controls the depressed, frustrated and angry emotion	0.77	0.77	0.77
SE2	Not showing the aggressive behavior (biting, beating, kicking, or hurting other children	0.66	0.66	0.66
SE3	Joint other children activities	0.53	0.53	0.53
SE4	Share playthings and device with others	0.64	0.64	0.64
SE5	Comprehension the other children feeling and respond with infatuation	0.70	0.70	0.70
SE6	Able to do school works independently or with a little assist.	0.64	0.64	0.64
SE7	Exhibit adequate social behaviors in a specific time situation	0.67	0.67	0.67
4. Physical Ability and Motor Development (PAMD)				
PM1	Hold a pencil correctly	0.42	-	-
PM2	Captures a soccer-size softball with two hands	0.44	-	-
PM3	Uses scissors without hurting self	0.51	0.48	-
PM4	Dresses/undresses self independently	0.60	0.60	0.58
PM5	Can use the bathroom independently	0.58	0.61	0.63
PM6	Ties shoes independently	0.58	0.59	0.59
PM7	Healthy and well-nourished	0.35	-	-
5. Self -Discipline (SD)				
SD1	Sits still and calm in the classroom	0.75	0.75	0.75
SD2	Does not interrupt classroom activities	0.68	0.68	0.68

Description item from the six aspects of school readiness and the result of construct validity test - *continued*

No	Item	Construct Validity		
		MI	M2	M3
SD3	Pays attention to teacher direction	0.73	0.73	0.73
SD4	Takes care of classroom belongings	0.74	0.74	0.74
SD5	Allocate a job seat work within the control time	0.70	0.70	0.70
SD6	Washes the carriages objects to where they belong	0.69	0.69	0.69
SD7	Moves from one activity to another easily	0.70	0.70	0.70
6. Communicative competence (CC)				
CC1	Comprehends and pursue orientation of two steps or more	0.61	0.60	0.60
CC2	Express in word feelings using appropriate language	0.68	0.68	0.68
CC3	Makes eye-to-eye contact	0.63	0.63	0.63
CC4	Uses community respect, such as saying thank you and respond to the greeting of the other appropriately	0.59	0.58	0.58
CC5	Takes turn in the conversation	0.45	-	-
CC6	Arrangement easy and accurate pronouncement that others can perceive easily	0.64	0.64	0.64
CC7	Gain in discussion (full sentences, listens and react to others)	0.64	0.64	0.64

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