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Development of Assessment Instrument Android-Based Students' Interest In Learning Mathematics SMP With CPS Model

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Abstract

Information about students' interest in learning mathematic SMP as a consideration when conducting managerial evaluations which is required by the teacher, and there is no standard assessment instrument. The purpose of the study is to produce guide book of the teacher and application on android phones about an assessment instrument of students' interest based on Android on mathematics learning at junior high school CPS model with a valid, consistent, reliable and practical. The data obtained at SMP N 4 Pemalang with research subject 128 students and 7 mathematics teacher. The instrument data collector in the interview guidelines, expert validaty sheet, and questionnaires. The study used a research and development. The development model modifies the 4-D model by Thiagarajan et al. Analysis of data using triangulation sources, validity, internal consistency, reability, and confirmatory factor analysis. The results of the study showed from examine the expert team, 35 item early instrument worthy trialled. The result of 1) 32 item valid, and consistent; 2) The number of component had four factors; 3) The total of variant percentage of interest to be explained by four factors amounted to 60.016%; 4) The reliability coefficient is 0.965. The result of practicality number of instrument for teachers is 95.429 with very practical interpretations. The result of practicality number of instrument for students is 97.1 with very practical interpretations. From the result data analysis, it can be concluded that an instrument for assessing the interest of android-based student in learning mathematics for Junior High School with a Creative Problem Solving model has been valid, consistent, reliable, and practical. Product result are expected to be able to assess students' interest.

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INTRODUCTION

The mathematics learning process is a student learning activity that produces learning experiences, thinking skills, behaviour change, and skills. Djemari (2008: 102) explained that the characteristics of learning outcomes in the education aspect according to Bloom (1976) include thinking typical related to the cognitive domain, typically acting related to the psychomotor domain, and typical feelings related to the affective domain.

Information about student learning outcomes in learning is obtained through assessment. Huba & Freed (2007) defines assessment as the process of gathering and discussing information during the learning process of students in the form of knowledge and learning outcomes (Masrukan, 2014: 5). Each student has different learning outcomes. Sutarto & Syaifudin (2013: 3) argues that the affective domain influences students' success (affective conditions include attitudes and interests). Affective characteristics in learning include interests, attitudes, self-concepts, and values (Sukanti, 2011). Anderson (2013: 9) presented affective characteristics of human include attitudes, interests, values, preferences, self-esteem, self-control, and anxiety. Suharsimi (2013: 178) proposes the purpose of affective assessment to get feedback, to know students' self-concept changes, right learning conditions and to know the background of their learning activities.

Interest instruments aimed to obtain information about students' interest in subjects then used to increase students' interest in a subject (Djemari, 2008: 109). Assessment of students' interest by the teacher requires a valid instrument and to be able to measure what is being measured, as well as appropriate procedures. Problems experienced by teachers related to the assessment reinforced in online news published that Ani Rusilawati conducted a survey of 20 of 23 junior high school teachers in Semarang with 66% (15 of 23 teachers) having difficulty in understanding of learning models and 79% (18 of 23 teachers) difficulties in making learning instruments (Margaret, 2013: 1).

An educator must have the ability to choose the right model to deliver a learning material so that learning objectives can be achieved. Opinions were reinforced by Mc Inernay & Mc Inerney (Gurses, 2010: 1015) that learning is an activity to organize student learning situations to stimulate students in learning to achieve learning goals.

Learning model of Creative Problem Solving (CPS) is a learning model which focuses on teaching and CPS skill of problem-solving followed by strengthening skills (Pepkin, 2004). Shame as Sophonhiranraka (2015: 2132) stated that CPS is a combination of the problem solving process with creative thinking. Creative in mathematical thinking will find solutions with new ideas. Opinions were reinforced by Wittrock (2010: 41) that concept understanding of material comes from the owned potential in order that it brings new creative ideas.

Observations in August 2nd, 2017 in class VII of SMP N 4 Pemalang obtained the results that the mathematic teachers conducted an assessment of learning outcomes on three domains. The mathematic teachers told that the teacher is still constrained when assessing the affective domain. Affective domain assessment includes an assessment of aspects of students' interest aspect in mathematic learning. The development of increasingly sophisticated information technology motivates teachers to learn to follow the latest technology.

The facts mentioned become an important basis for developing assessment instruments of students' interest. Students' interest information obtained after assessment can be used by teachers when designing mathematics learning for other material, so learning based on the student's desires and student's interest increase in mathematics learning. The development of students' interest instruments was designed to provide solutions for educators in the form of developing an Android-based student' interest instrument in mathematics learning of junior high school with the CPS model.

METHOD

The method used is research and development of the students' interest assessment instrument. The development model modifies the 4-D model (Four D model) by Thiagarajan et al., Through stages: defining, designing, developing, and disseminating. The instrument developed in the form of a Likert scale. The research subjects were 7 mathematics teachers and 128 students at SMP Negeri 4 Pemalang on odd semester in academic year 2017/2018. from the 128 students taken 40 students as the subject of the trial of instrument I, and 128 students as the subject of the instrument try out II.

At the first step, data is obtained from the results of interviews, observations, and document studies in SMP 4 Pemalang. The results of interviews, observation and study of documents were analyzed using source triangulation. The Data of interviews result, observations, and document studies were analyzed using qualitative descriptive in the form of narratives then checked for factual data sources in SMP 4 Pemalang.

In the instrument development phase, data were analyzed using qualitative descriptive. The content validation through expert validation (expert judgment). The validator consisted of one person of child psychologist, and two mathematics teachers with an analysis use the Aiken's V formula. The construct validity was analyzed through confirmatory factor analysis with the IBM SPSS 23 program on the try out results of the instrument II. The score of try out result of the instrument I and the instrument II that calculation of internal consistency used the product moment correlation formula from Karl Pearson, and the reliability used the Cronbach's Alpha technique. Practicality analysis of instruments for students and teachers, using a simple statistical approach that is focus to the number of items, number of score choices, and number of assessors then made practical interpretations based on the score range obtained.

RESULTS AND DISCUSSION

Factual Conditions of Android-Based Students' Interest Assessment Instrument on Mathematics Learning at SMP with CPS model

The results of the data triangulation conclude that factual condition of students' interest assessment in learning mathematics in SMP N 4 Pemalang as the basis of the researchers to develop interest assessment instruments. The summary of conclusions obtained as follows.

1. Mathematics teachers have not done students' interest assessment by using standard instruments. The teacher assesses students' interest based on direct observation, see the of students' activeness when participating in the learning process.
2. There is no standard instrument which can be used by teachers to assess students' interest in learning mathematics in SMP Negeri 4 Pemalang.
3. Mathematics teachers need information about interest assessment and an instrument of students' interest assessment in learning mathematics as one of the considerations when evaluating in order that teachers can improve the learning process and learning objectives are achieved.

Validity, Internal Consistency and Reliability of Developed Instruments, and Practicality of Instruments

Instruments of students' interest before being tested on the subject (students) are reviewed by experts to get feasibility approval or the first instrument valid instrument from the validator. According to Retnawati (2016: 27) that expert judgment is someone has expertise in their fields. 35 instrument items of the experts stated all valid instrument items with revisions according to the advice of experts. Azwar (2015: 134) explained that the analysis of content validity can be done with the formula Aiken's V. The assessment results of the experts, then analyzed the content validity. Nugroho, Djuniadi, & Rusilowati (2016: 4) stated that the

results of the Aiken's V coefficient of more than 0.3 it means that instrument developed has adequate content validity. Content validity results in Aiken's V coefficient value more than 0.3 or an instrument of students' interest assessment can be used in tryout data of instrument I.

In the trial of instrument I, the results of the internal consistency index calculation obtained 35 items of consistent instrument with rhit values of more than 0.3. In the trial of instrument II, the results of the internal consistency index showed that in item number 21 rhit = 0.205, item 26 rhit = 0.181, and item 31 rhit = 0.152, while the other item number had rhit value more than the same rhit 0.3. The results of the internal consistency test of the students' interest assessment instrument developed which concluded that there were three inconsistent items of 35 instrument items. Three items of inconsistent instrument items discarded are items number 21, 26, and 31. Thus, the final instrument obtained are 32 items of assessment instruments of Android-based student interest in mathematics learning at SMP with a consistent CPS model.

The reliability results of the instrument students' interest assessment in the trial of instrument I and the trial of instrument II as follows.

Tabel 1. Reliability Statistics On The Trial Of Instrument I

Cronbach's Alpha	N
0.967	35

Table 1. showed that results of the reliability values on the trial of instrument I more than 0.7. This means that the items in the assessment instrument of Android-based students' interest in mathematic learning at SMP with the CPS model are concluded reliably.

The reliability test results of students' interest assessment instrument on the trial of instrument II can be seen in Table 2.

Tabel 2. Reliability Statistics On The Trial Of Instrument I

Cronbach's Alpha	N
0.965	32

Table 2. showed that results of the reliability value in the trial of instrument II, the reliability index is more than 0.7. This means that the items in the assessment instrument of Android-based students' interest in mathematic learning at SMP with the CPS model are concluded reliably.

The construct validity was calculated on the trial data results of the instrument II has been reliable and consistent with the instrument items of 32 items. The results of the confirmatory analysis obtained KMO values in the instrument of students' interest assessment can be seen in Table 3.

Tabel 3 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.92
Bartlett's Test of Sphericity	Approx. Chi-Square	2918.041
	df	496
	Sig.	0.000

From Table 3, the KMO value ≥ 0.50 it means that 32 items in the developed instrument can be further analyzed.

In the trial of instrument II after extracting the statement items grouped into 4 components with the rotational coefficient value of the matrix component in each item more than 0.3. The grouping results of items into each component are: component 1 consists of items number 4, 5, 7, 9, 10, 11, 14.16, 20, 22, 24, 28, 29, 30, and 32; component 2 consists of items number 1, 8, 13, 19, 23, 26, and 31; component 3 consists of items number 2, 3, 6, 17, 18, and 21; component 4 consists of items 12, 15, 25 and 27.

The value of component transformation matrix can be seen in Tabel 4.

Tabel 4 Component Transformation Matrix

Component	1	2	3	4
1	0.639	0.492	0.442	0.393
2	-0.680	0.646	0.335	-0.810
3	-0.320	-0. 522	0.504	0.609
4	-0.162	0.259	-0.662	0.685

From Table 4, the correlation value of the fourth components formed is bigger than 0.5, so the fourth components are appropriate in collecting 32 items of students' interest assessment statements. Thus the Android-based student' interest assessment instrument is valid constructively.

The result of output total variance explained in the trial of instrument II trial can be concluded that the developed instruments are able to reveal variables of android-based students' interest in mathematic learning at SMP with the CPS model of 61.539%, and the remaining 38.461% is decided by other factors.

The practicality of the instrument for the teacher based on the interpretation of the score 95.429, with a very practical interpretation. Furthermore, the practicality of the instrument for students obtained an average score of 97.1, with a very practical interpretation.

The assessment instrument development of Android-based students' interest in mathematics learning at SMP with the CPS model based on conceptual definitions, operational definitions, instrument lattices, and items of students' interest assessment instruments. Instrument assessment techniques use a Likert scale which consists of 4 categories.

The developed instrument was an application on an android cell phone and a guidebook for the use of an instrument assessment of Android-based students' interest in mathematics learning at SMP with the CPS model. The Students' interest assessment instrument arranged in an application on android phones have several menus related to the assessment of student interest. An application of assessment instrument of Android-based students' interest in mathematics learning at SMP with the CPS model described as follows.

1. Initial display

The initial display shows the name of the students' interest assessment application, namely: SIPEMIWA (students' interest assessment system). The initial display screen contains a selection containing username, password, and log in. The application can be enabled by filling username and password in the available options, then select enter. The initial appearance of an Android-based students' interest assessment application in mathematics learning at SMP with the CPS model is shown in Figure 1.

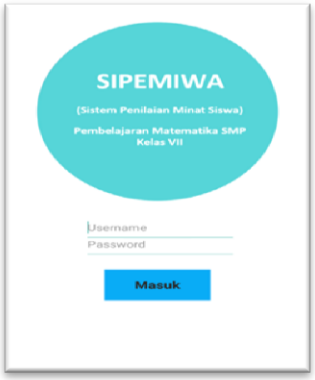

Figure 1. Application Initial Display of The Students' Interest Assessment in Learning Mathematical SMP with CPS Model

2. Display of the menu

The menu display can be seen in Figure 2.

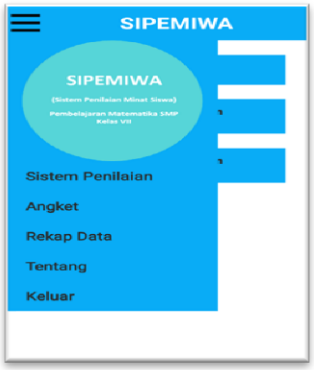

Figure 2. Application Menu Display Application of Students' Interest assessment in Learning Mathematic SMP with CPS Model

The menu display screen contains options such as.

2.1 Assessment System

Assessment system contains information about students' interest assessment.

2.2 Questionnaire

In the questionnaire display there are choices such as: students' interest questionnaire, instrument practicality (students' respondents), and instrument practicality (teachers' respondents). The questionnaire display screen can be seen in Figure 3.

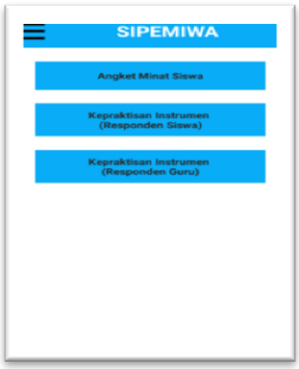

Figure 3. Questionnaire Display Application of Students' Interest instrument in Learning Mathematics SMP with CPS Model

2.3 Recapitulation Data

Display Recapitulation data there are choices such as: diagram of students' interest categories, practical diagram of students' questionnaire, and practicality diagram for teacher questionnaire. The data recapitulation screen can be seen in Figure 4.

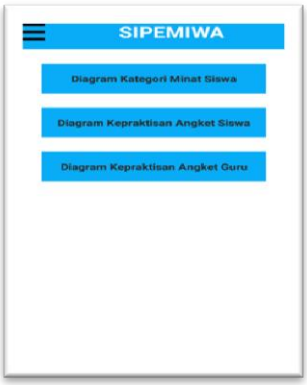

Figure 4. Data Recapitulation Display of assessment Application of Students' Interest in Mathematical Learning SMP with CPS Model

2.4 About

In the choice about containing information of description of the SIPEMIWA application.

2.5 Exit

In the exit option is the end of menu to close the SIPEMIWA application. When the user chooses to exit, the screen displayed shown on the application such as Figure 5.

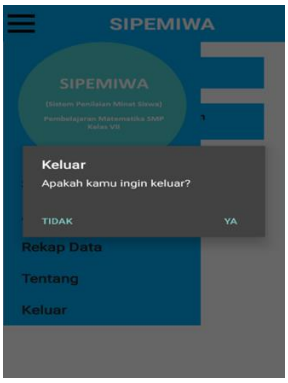

Figure 5. The Final Display Application for Assessing Students' Interest in Learning mathematic SMP with the CPS Model

Mirdamiwati, Supriyadi, & Sarwi (2016: 73) stated evaluation of learning with the help of IT will be more effective and efficient. The SIPEMIWA application is designed to facilitate teachers in assessing students' interest in Android-based. Based on the data retrieval process through android application which found several advantages and disadvantages of the SIPEMIWA application. The SIPEMIWA application has the following advantages and disadvantages.

The advantages of the SIPEMIWA application include.

1. The teacher easily obtains information on students' interest in learning mathematics.
2. The results of the students' interest questionnaire can be seen immediately after filling out the questionnaire.
3. The teacher can see the students' interest category after filling out the questionnaire.
4. Application is very practical operated by students.
5. Students' interest data can be stored.

6. The application can be installed easily by the teacher on the Android version mobile 4.0 to the further version.

Lack of SIPEMIWA applications among others:

1. The application requires an internet network.
2. The application requires storage space more than 30MB.
3. The application can only read data of the most 50 respondents.
4. Stored data needs to be emptied first when the application will be used by a group of other respondents.

The results of the assessment instrument development of students' interest Android-based are stated valid, consistent, reliable, and very practical. The final results of the students' interest instrument item were 32 items. The developed product is very practical, which is practical for students or practical for the teachers. The SIPEMIWA application can be used by teachers to retrieve students' interest data in the mathematics learning process. The SIPEMIWA application is operated through the internet network and the teacher easily uses it online. The same with Sofwan's thought (2016: 37) that technology via the internet network made it easy for teachers and students in the learning process. The SIPEMIWA application provides practical solutions for teachers because it is supported on sophisticated Smartphone devices with easily. Same as the results of research by Putri, et al., (2016: 157) which stated that Android-based applications to be right choice because most people today are Android users. The SIPEMIWA application is expected to be used by teachers to retrieve data on students' interest in the learning process.

CONCLUSION

Based on the results of the study and discussion, it can be concluded that the results obtained from the Android-based students' interest assessment instrument in learning mathematic SMP with a valid CPS model, consistent and reliable with a total of 32 instrument items. The results of the instrument practicality test for the teacher obtained an average score of 95.429 with a very practical interpretation. The results of the instrument practicality test for students obtained an average score of 97.1 with a very practical interpretation. The final product of the development of students' interest assessment instrument android-based in Learning Mathematic SMP with CPS models included guidebooks and applications on android phones. The product development results are expected to facilitate the teacher when assessing students' interest in learning Mathematic SMP. The teacher can evaluate the learning process one of which is through consideration of the results of students' interest assessment that supported by student' interest assessment instruments are valid, consistent, reliable and practical student interest assessment instruments.

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