DEVELOPING MATHEMATICS LEARNING KITS IN STATISTICS COMPETENCY BY PROBLEM BASED LEARNING APPROACH IN TERMS OF MATHEMATICS LEARNING ACHIEVEMENT FOR JUNIOR HIGH SCHOOL STUDENTS

By: Wulandari1), Dr. Heri Retnawati2)
1)2) Jurusan Pendidikan Matematika FMIPA UNY 1)wuwugreentha@gmail.com,
2) retnawati_heriuny@yahoo.co.id

Abstract

This study aimed to develop mathematics learning kits such as lesson plan and student worksheet by Problem Based learning approach in statistics competency for junior high school student grade VII, and to know the quality of learning kits based on validity, practicality, and effectivity aspects. This study was a developing research address to ADDIE developing model, those are Analysis, Design, Development, Implementation, and Evaluation.The quality of learning kits validity reached valid criteria, showed by mean of lesson plan validity was 4.11 from maximum score 5 with good qualification (x > 4,2)and mean of student worksheet validity was 4.01 from maximum score 5 with good qualification (x > 4,2).The quality of learning kits practicalityreached practical criteria, showed by mean of student response questionnaire was 3 from maximum score 4 with good qualification($2{,}8 < \bar{x} \leq 3{,}4$*), teacher response questionnairewas 3.01 from maximum score 4 with good qualification* ($2{,}8 < \bar{x} \leq 3{,}4$), *and observation result of learning activity was 95% with very good category. Beside that, the quality of learning kits saw from effecticity aspect reached effective criteria. It showed by mean of student study result test was 93.5 and its percentage of students graduationwas 100%.*

Keywords*: learning kits, Problem Based Learning, statistics competency, student achievement.*

INTRODUCTION

The period unfolded had resulted been firmly, especially in education. It forced the increasing of standard and quality for education. It could be useful for humans in accrossed and answered more complex problems time to time, surely it could help humans to survive their lifes. Exactly, an education with good standard and quality would be related to good standard and quality of curricula also. The main thing which could not be separated from education products. Hamalik (2013, pp. 16-18) said that curricula was a sum of lessons which should be reached by students to get a knowledge; an education program which was provided for students to learn; and a series of experiences. Beside that, curricula was a sum of planning content designed for students with education institution instruction which talked about static or dinamic process and competency should belonged (Ruhimat, 2013, p. 12). Although the fact said that curricula in Indonesia had many changing since a few years ago, it was being one of main instruction or idea to hold learning process that used by education institutions. Beside that, the government today gave the independent opportunity to each of schools for determining a choice between KTSP or Curricula 2013.

Based on the Rule of Culture and Education Ministry Number 103 in 2013 about The Learning in Elementary and Higher Education said that learning with Curricula 2013 was a learning by using students center approach. It meant that learning activities were done by students more, then the teacher was as facilitator. The teacher didnot act as learning source only, but should facilitated students to be attractive and capable in learning.

Mulyasa (2014, pp. 163-164) said that the implementation of Curricula 2013 was expected to create productive, creative, and inovative generations. These case were probably happenned because this curricula based on characters and competencies much, which conceptually had some appreciations, first: The Curricula 2013 used contextual approach, because it came, focused, and landed to students meaning for developing various competencies based on each of their potencies; second: The Curricula 2013 came from characters and competencies were probably being the main of others capabilities development; third: there were

certain subjects or lessons which in its development would be more clear if they used competency approach especially related to skill. It meant that Curricula 2013 provided manythings which showed the students to application of their ideas and knowledges by theirselves for learning a concept. Therefore, the researcher was being a Curricula 2013 learning as one of model.

Beside that, The curricula was related each other to education products, one of them was learning kits. Rusman (2012, p.126) said that learning kits was the things should be controlled, it aimed for learning process would be more clear to reach the competencies expected were. It meant that there were components needed to hold learning activity to reach the learning objectives. One of learning kits should be done in each of learning process was lesson plan. Amri (2013, p.50) said that lesson plan was explained from the silaby to showed students learning activity for reaching main competencies. Every teacher in education units had a duty to design lesson plan completely and systematically so that a learning could be held interractive, inspirative, pleasure, motivated students to be an active learner, and gave more spaces for creativity and self exploration based on their potencies, physical development, and students psychology also (Amri, 2013, p. 50). But, many teachers got difficulty for applying it in real. Thus, it needed a lesson plan developing so that it could help learning process done well and more as like as expectation.

A good learning was also coming from teachers who gave students more chances or opportunities to be an active and creative learner for exploring their mathematical capabilities in each of learning process. One of alternative that could be used to support learning situation and condition as like as expectation was using student worksheet. Amri (2013, p. 101) said that student worksheet was learning materials which provided student center activities. So far, we seldom heard about comments that student worksheet included exercises only, and students asked for doing it in free time or as their homework. Nevertheless, it was not exactly. It meant that student worksheet was a media for students to do the activities, it could be exercises or mathematical steps to find a math concept. The student worksheet were used today was still focused to formula were there, not to process for finding. Then, students would be usual to instant and memorize things, although they would be less for understanding. It would be unfortunately, because it could be decreased students competencies in thinking or analyzing a problem, certainly it would be influenced to students mentality and mindset development next. Beside that, it would be less the meaningful in a mathematics learning also. It refered to Dahar (2011, p.95) told about Ausubel theory in 1968. It talked about meaningful learning, was a process related new informations to relevant concepts were in someone cognitive structures. Remember about the function of student worksheet was for helping students to create their experiences, gave students a freedom to be creative in developing their ideas and thinkings, and confidence mentality and being brave in solving many problems. Therefore, it needed student worksheet which could be increased students creativity, so that students felt to be motivated in solving every problems were there.

As like as lesson plan and student worksheet developing, surely a good standard and quality of learning process could not be separated to a method or approach. The approach in a learning process would determined a comfortable and attractiveness of students. It should be showed the students to be more active in developing their capabilities, and created an experience for them. Retnawati & Farhan (2014, p. 230) said that PBL was a learning based on problems which could supported students in real situation of problems. It was relevant to Rusman (2014, pp. 229 & 247) said that PBL was a learning approach stimulated students fighting to be actively participated in their learning experiences, also an approach related to intelectual using from individual of a group or environment to solve meaningful, relevant, and contextual problems. The learning objectives by PBL approach based on Sanjaya (2011, p. 216) was students had capability to critical thinking, analitical, systematical, and logical for determining problem solving alternative by data exploration in growing up science attitude empirically. It meant by PBL approach, students was focused to create a mathematics learning experience which was more meaningful for them, because they felt more independent for applying their mathematics knowledges by theirselves.

Therefore, a meaningful learning should be much more related to daily life. One of material found more in daily life was statistics material. It

was a material learnt about how to collect, manage, and create a data. Data was something that certainly got from the fact which was clear related to daily life. The implementation of good standard and quality curricula, effective learning kits, the choosing of creative learning approach, and organizing variation of learning material, would showed students to a better achievemet also. In this case, Mulyasa (2014, p. 99) said that learning achievement was a result of student got after did learning activities, and learning was a concious done by someone to get their necessaries. The learning products mentioned above were components which supported learning activity to reach the learning achievement. So, this research aimed to develop mathematics learning kits such as lesson plan and student worksheet by PBL approach in terms of mathematics learning achievement for junior high school students.

RESEARCH METHOD

Type of Research

Type of this research was Research and Development by ADDIE model, consist of Analysis, Design, Development, Implementation, and Evaluation steps. ADDIE model was developed by Endang Mulyatiningsih (2014).

Date and Place of Research

This research held in 2015/2016 on May at SMPN 5 Yogyakarta.

Target or Subject of Research

The subject of this research were thirty two students of class VII.5 in SMPN 5 Yogyakarta.

The Procedure of Developing

1. Analysis

   The step of analysis done was analyzed characters and neccessaries of students, analyzed technology and situation of school (environment), analyzed the task, analyzed the concept, and created learning objectives.
2. Design

   This step consist of choosed the approach, designed lesson plan and student worksheet to develop learning kits, created learning kits cover developed, managed structure of writting part, template, and format of student worksheet, also collecting the materials would be used in designing learning kits. Here, the researcher collected references and pictures refered to statistics materials for designing lesson plan and student worksheet; designed the description of lesson plan and student worksheet based on PBL approach; designed learning result test.
3. Development

   This step consist of developing product which designed before to be mathematics learning kits products, then would be validated by the validator of material and media. Here, would produced some instruments, like the assessment of lesson plan and student worksheet; observation sheet of learning reached; also students and teacher response questionnaire; the product of lesson plan and student worksheet; and learning result test.
4. Implementation

   In this step, the try out process did. It was for statistics competency that participated by the teacher and students. The implementation in this research was a learning activity in mathematics for statistics competency. The implementation did by using the developed research objects and some instruments that support them also, like the lesson plan, student worksheet, and learning result test questions. The try out did for getting feedback or suggestion from related people.
5. Evaluation

   Here, there was a learning kits assessment after try out process of research, to know whether it was suitable as like as the expectation or not in real. In this step, there was an assessment for the developed product and measured the reaching of product developing objectives. Here, the researher did submission from teacher and students response questionnaire sheets.

Data, Instrument, and The Technique of Data Analysis

This research data formed qualitative and quantitative. Qualitative one was obtained from validators, teacher, and students suggestions when assessed the learning kits. Although, quantitative one was obtained from score of validator assessment, questionnaire of teacher assessment, questionnaire of students assessment, learning observation sheet, and learning test score. The instruments were tools or kits used to support validity, practicality, and effectivity of this research. They were assessment sheet of

lesson plan and student worksheet to measure validity of learning kits, questionnaires of teacher and students response to measure practicality of learning kits, observation sheet to measure learning process, and learning result test to measure effectivity of learning kits. They were consulted to lecturer before validated by the validators.

The Technique of Data Analysis

a. The Analysis of Validity

Data that used to determine the validity of products as obtained from validators assessment then would be analyzed. Data from validators assessment would be analyzed like these following below.

1) The tabulation data from validator s assessment did by giving the mark in assessment aspects with score 5, 4, 3, 2, and 1 based on Likert Scale (Widoyoko, 2009, p. 238) on the table 1.

Table 1. Scoring Assessment of Lesson Plan and Student Worksheet

Category	Score
Very Good	5
Good	4
Enough	3
Minus	2
Very Minus	1

2) Calculating mean of assessment. The formula was

$$Mean = \frac{Total\ Score}{Point\ of\ Questions}$$

$$Total\ Mean = \frac{The\ sum\ of\ mean}{Total\ Aspects}$$

3) Converting mean had been get to tabel of Scale 5 being qualitative value (Widoyoko, 2009, p. 238) as the table 2.

Table 2. Criteria of Lesson Plan and Student Worksheet Quality Assessment

Interval Score	Category
$\bar{x} > Mi + 1.8\ Sbi$	Very Good
$Mi + 0.6\ Sbi < \bar{x} \leq Mi + 1.8\ Sbi$	Good
$Mi - 0.6\ Sbi < \bar{x} \leq Mi + 0.6\ Sbi$	Enough
$Mi - 1.5\ Sbi < \bar{x} \leq Mi - 0.6\ Sbi$	Minus
$\bar{x} \leq Mi - 1.5\ Sbi$	Very Minus

Notes:

Mi = Ideal mean = ½ (ideal highest score + ideal lowest score)

Sbi = $^1/_6$(ideal highest score – ideal lowest score)

Ideal Highest Score = Σcriteria points x highest score

Ideal Lowest Score = Σcriteria points x lowest score.

Based on the tabel above, the result of learning kits assessed by the validators could be categorized like table 3:

Table 3. The Changing of Mean for Each Aspects being Qualitative Data

Interval Score	Criteria
$\bar{x} > 3,4$	Sangat baik
$2,8 < \bar{x} \leq 3,4$	Baik
$2,2 < \bar{x} \leq 2,8$	Cukup
$1,6 < \bar{x} \leq 2,2$	Kurang baik
$\bar{x} \leq 1,6$	Sangat Kurang baik

The products were developed would be valid if minimum level of validity reachment, based on validators asessment was in category Enough.

b. The Analysis of Practicallity

The Analysis of practicallity came from assessment of students and teacher response questionnaires sheet. Its analysis did by these following steps.

1) The tabulation of students assessment data by this scoring on table 4.

Table 4. Assessment of Positive and Negative Response Expressions

Negative Score	Positive Score	Criteria
1	4	SS(Very Agree)
2	3	S (Agree)
3	2	TS (Disagree)
4	1	STS Very Disagree)

2) Calculating mean of assessment. The formula as like as before. Converting mean was obtained as like as table 2.
Based on table 2, the result of practicality categorized on table 5.

Table 5. Practicality Criteria

Interval Score	Criteria
$\bar{x} > 4{,}2$	Very Good
$3{,}4 < \bar{x} \leq 4{,}2$	Good
$2{,}6 < \bar{x} \leq 3{,}4$	Enough
$1{,}8 < \bar{x} \leq 2{,}6$	Minus
$\bar{x} \leq 1{,}8$	Very Minus

Although, the analysis of practicallity based on observation result as these following.

1) The tabulation data of result from observation score by giving score 1 for "yes" and 0 for "no".
2) Calculating the percentage of learning reached by this formula

$$k = \frac{Score\ for\ each\ aspect}{Max\ score\ for\ each\ aspects} \times 100$$

3) Converting the percentage result of learning reached (k) being qualitative value based on criteria of assessment by scale 5 adapted from Sudjana (2005, p. 118) on table 6.

Table 6. Qualification of Learning Process

Percentage of Reached	Category
$k \geq 90$	Very Good
$80 \leq k < 90$	Good
$70 \leq k < 80$	Enough
$60 \leq k < 70$	Minus
$k < 60$	Very Minus

c. The Analysis of Effectivity

The analysis of students test result data used to know the effectivity of developed products like these following below.

1) Calculating the value was obtained from scoring to determine students learning achievement.
2) Calculating mean from all students, by this formula:

$$\bar{x} = \frac{\Sigma x}{n}$$

Notes:
$\bar{x}$ = Mean
Σx = The sum of all students score
n = the amount of students

3) Convert mean being qualitative value, then classified by table 7.

Table 7. Criteria of Learning Result Test and Classical Learning

Students Score	Percentage of Classical Learning	Criteria
$X \geq 85$	$P > 85$	Very Good
$75 < X \leq 85$	$75 < P \leq 85$	Good
$65 < X \leq 75$	$65 < P \leq 75$	Enough
$45 < X \leq 65$	$55 < P \leq 65$	Minus
$X \leq 45$	$P \leq 65$	Very Minus

Notes:
X = Students score
P = Percentage of classical learning

4) Calculating the percentage of classical learning

$$\frac{The\ amount\ of\ students\ achieved}{The\ amount\ of\ students\ did\ the\ test}\ x\ 100\%$$

5) Next, criteria of classical learning came from table 7.

In this reserach, developed products was categorized as effective if minimum percentage of students learning result test of achievement was on criteria good.

THE RESULTS AND DESCRIPTION

In this research, took a developing mathematics learning kits in statistics competency by PBL approach in terms of mathematics learning achievement for junior high school students grade VII. This was developed by five steps consist of analysis, design, development, implementation, and evaluation. The result of developing such as final product had tried for its validity, practicality, and effectivity. According to analysis of learning kits validity got a conclusion that it needed to develop lesson plan and student worksheet by certain

approach, so students could be active for finding a concept. Because of it, the researcher would choosed PBL approach. It would showed the students actively by discussion activity to find a certain concept. By trying to solve the problems individually, students were expected to capable took a meaningful learning. This refered to Al-Tabany (2009, p. 91) said that a logical consequence by solving the problems individually used their experiences, students would used it to pass relevant situation, this caused by the experience gave an especially meaning for students. According to analysis of learning kits practicality such as lesson plan and student worksheet resulted had been in criteria practical according to response from teacher and students, and observation of learning process also. Based on analysis result of learning kits effectivity got criteria effective. Generally, percentage of students score of test were done in last meeting was 100% with criteria very good. Students should learnt by understanding, constructed new knowledge by experiences and prior knowledges actively (NCTM, 2000, p. 19). Students found a learning concept by doing some activities and actively constructed their knowledges and more understanding about it also capable to develop their capabilities. It was relevant to Al-Tabany (2014, p. 19) said that effective learning was according to curricula learning or knowledge wanted to, and provided more spaces for students to create their experiences and apply their knowldeges. From three aspects of lesson plan and student worksheet, that were validity, practicality, and effectivity, they were in upper of minimum assessment. According to that result, this research concluded that learning kits by PBL approach were valid for using. This refered to Al-Tabany theory (2014, p. 202), a learning model was called good if got criteria like the: first, valid. Valid in two cases, (1) developed something according to rational of clear theoritical; (2) there were consistency internal. Secondly, about practical. Something was called practical if: (1) supervisors and practician said about what was developed and implemented; (2) the fact showed that what developed was could be applied. Thirdly, about effective. Parameter of effectivity were: (1) supervisors and practicians said effective to what developed was; (2) Operationnally, gave the products as like as what expected. The description of developing result by ADDIE model explained more here.

1. Analysis

a. The Analysis of Characters and Students Necessary

This step started from analyzed students characters of class VII.5 of SMPN 5 Yogyakarta, and students necessary when learning process occured. It aimed to know relevancy of learning kits to this analysis. The result showed that students had been usual with mathematics learning kits which showed many calculations than text of math about instruction or steps for finding a math concept; students dislike to learning kits which showed many text about instructions or steps of math in finding a math concept; and students had been usual with formula provided to solve the problems.

b. The Analysis of Curricula

This step was done by determined learning objectives, competency standard, and basic competency wanted to reach. In 2013, Indonesia began to give a changing about education curricula in eachf of school that was implementation of Curricula 2013. It was applied only in some schools in 2013 but every school had it in 2014. Unfortunatelt, in 2015-2016, many schools got difficulty used Curricula 2013, so that it should be postponed and came back to Curricula 2006 for some schools. However, there were some schools still used Curricula 2013, especially one of them was SMPN 5 Yogyakarta.

c. The Analyisis of Technology and Situation (Environmment)

The activity done by this step was class observation process and answer the questions with the teacher of related subject. It aimed for the researcher to know the description of facilities which was needed by the students when learning process in class, like the facility that supported students to get references of informations more beside at class. The result of analysis showed that mathematics subject would be more interesting and helpful for students by internet. It used to get informations more when learning process occured. Students were more attractive with learning media like student worksheet, but not much in text of math about instructions or steps for finding a math concept, it should showed many numbers and calculations, because students had been usual to know about its math.

a. The Analysis of Task

This task analysis gave the description totally about statistics competency that would be told by students. This aimed for the researcher to know students understanding about statistics competency learnt, then avoided the misconception of students about it. The activity was done by students was students given homework about statistics competency learnt, included essay questions individually. The result of task analysis showed that students capable to solve statistics problems individually also in a group.

b. The Analysis of Concept

This concept analysis was according to material had specified in task analysis. And then, it was related to main competency, which apllied in Curricula 2013, then created in map concept.

c. Learning Objectives Description

This step was a learning objectives description based on main competency from task and concept analysis resuts. The product of this step were students capable to find concept of data, collected data, managed data, and created data.

2. Design

The activities in this step were collected references and pictures relevant to statistics competency used to design lesson plan and student worksheet; designed lesson plan and student worksheet based on PBL approach; and designed the research instruments. In process of designed lesson plan in this research was the one based on PBL approach according to Curricula 2013. The steps of PBL were Identifying problem; Setting goal and making plan; Identifying learning issues; Learning knowledge; Applying knowledge; Assessing and reflecting. The lesson plan designed was according to standard of process. The lesson plann based on PBL approach consist of two that were first lesson plan with material and steps for students in finding concept of data, collecting data, and managing data; second lesson plan with materials and steps for students in creating data.

Next was about designed student worksheet. It was one of learning kits as media for students finding concepts in statistics competency had. It was designed according to PBL approach. This student worksheet showed the students to attractive in reading and understanding information or instruction given in statistics. They oriented to creativity exploration and main idea of students based on the pattern designed for students finding the statistics concept. These student worksheet designed according to quality of content, design was suitable to learning approach, design was suitable to didactic, constructive, and technical requirements. Here was consist of four student worksheets developed. For designed student worksheet, there were basic things should be done, such as designed the necessary map of student worksheet, determined the title of student worksheet, and designed the student worksheet based on template requirements of writing. Then, the next step was designed research instruments such as the assessment of lesson plan and student worksheet, the questionnaire of teacher and students response, observation sheet of learning process, and learning result test.

3. Development

The product of development step was the research of developing instrument such as assessment of lesson plan and student worksheet instrument, questionnaire of teacher and students response to practicality, observation sheet to learning process, and learning result test; the result of learning kits developing such ac lesson plan and student worksheet; validation; and revision. Those instruments created first, then would be consulted to lecturers. It aimed to get valid instruments then could be used for research. The validation result showed that those instruments were valid to use with revision as like as suggestions.

The creating of data analysis result was obtained from try out process such as lesson plan and student worksheet. It was on table 8.

Table 8. The Analysis of Lesson Plan Result

No	Aspects were Assessed	Mean of Assessment from Validator		Mean for Each of Aspect	Classification
		1	2		
1.	Identity of Lesson Plan	5	4	4,5	Very Good
2.	Discipline of Time Allocation	3	4	3,5	Good
3.	Learning Objectives Description	4,7	3,667	4,184	Good
4.	Learning Material	4	4	4	Good
5.	Model using	4	4,333	4,167	Good
6.	Learning activity by PBL	3,9	4,167	4,034	Good
7.	Learning sources choosing	4	4	4	Good
8.	Learning result	4	5	4,5	Very Good
Total of Mean				**4,11**	**Good**

According to lessson plan assessment got score 4.11 from maximum score 5 with qualification good. This showed that developed lesson plan had been suitable to principal of lesson plan developing like include to Ministry of Education and Culture Rule Number 65 in 2013.

Although, The Analysis of Student Worksheet Result showed on table 9.

Table 9. The Analysis of Student Worksheet Result

No	Aspects were Assessed	Mean of Assessment from Validator		Mean for Each of Aspect	Classification
		1	2		
1.	Suitable to Constructive Requirements	4	4	4	Good
2.	Suitable to PBL Model	3,8	4	3,9	Good
3.	Suitable to Quality of Content	3,8	4	3,9	Good
4.	Suitable to Didactic Requirements	4,17	4	4,085	Good
5.	Suitable to Technique Requirements	4,33	4	4,165	Good
Total of Mean				**4,01**	**Good**

According to table 9, the analysis of student worksheet result showed score 4.01 from maximum score 5 with qualification good ($3{,}4 < \bar{x} \leq 4{,}2$). It meant that developed student worksheet got criteria of validity.

4. Implementation

The implementation step in this research was a try out process of learning kits in mathematics learning activity by statistics competency. It was done by using developed research objects also the instruments to support this research, like the lesson plan, student worksheet, and learning reslut test. This implementation was done by try out process for students in class VII.5 of SMPN 5 Yogyakarta with thirty two students total.

The preparation was done by the researcher before consulting to lecturer, did the revision of learning kits, discussed with mathematics teacher at school, and did observation by coming to the class for knowing the condition and description of research subjetcs.

Trying process was done by grouping (four persons) and individually by lesson plan and student worksheet designed. It would be held on

3th-24th of May 2016 for three times of meeting. The schedule could be seen on table 10.

Table 10. Schedule of Try Out The Learning Kits

Time	Sub Material Learnt	Activity
Tuesday, on 3rd May 2016	Concept of Data; Collecting Data; Managing Data.	Group discussion and Individual homework
Tuesday, on 17th May 2016	Creating Data	Grouping and Individually exercise
Tuesday, on 24th May 2016	Doing the test	Solve the essay test individually

The function of teacher in mathematics learning using mathematics learning kits was as facilitator and partner. For the last time in learning meeting, students with teacher concluded statistics concept learnt. It aimed to check students understanding about its material and avoided the students from misconception about it. Beside that, students was given individual homework and short quiz to make teacher sure that the students understood the materials clear. It could be shown by the table 11.

Table 11. The Analysis of Observation Data Result in Learning Process

Date	Material	Percentage	Criteria
3rd May 2016	Concept of Data; Collecting Data; Managing Data;	100%	Very Good
17th May 2016	Creating Data.	100%	Very Good
Mean		**100%**	**Very Good**

The observation result explained that so far the learning process used developed mathematics learning kits got percentage of 100%. So, it was on criteria very good and suitable to practicality requirements.

5. Evaluation

Evaluation was obtained from data included assessment of teacher and students questionnaire response. These two table described it shown from aspect of content quality and objectives, instructional aspect, and techniques by teacher. It showed on table 12 and table 13.

Table 12. The Analysis of Teacher Questionnaire Response Result

No	Aspects of Assessment	Assessment Mean	Classification
1	Easiness	3,2	Practical
2	Useful	3	Practical
Total of Mean		**3,1**	**Practical**

Teacher response to learning kits was in score 3.1. Based on classification mark of developed learning kits, teacher response to learning process using developed mathematics learning kits got criteria good.

Table 13. The Analysis of Students Questionnaire Response Result

No	Aspek Penilaian	Rata-rata Penilaian	Klasifikasi
1	Easiness	3	Practical
2	Useful	3	Practical
Total of Mean		**3**	**Practical**

Students response to developed learning kits was in score 3. It meant that students response to developed learning kits got criteria good.

The evaluation of learning kits was obtained from students learning result test after using mathematics learning kits by solved the question in test and the questionaire of students response. Final score of students was obtained from 100% of learning result test. The minimum criteria score for mathematics in SMPN 5 Yogyakarta was 80. So, it could be said "Tuntas" if students got score ≥ 80. Students Achievement from the

test showed that all students got "Tuntas". It consist of twenty nine students got criteria very good and three students got criteria good from this test.

Based on data of learning result from the test, students class VII.5 got learning achievement scor in 93.5 (on interval $X \geq 85$) with classification very good and percentage of it was 100% with minimum score 0 and maximum score 100. This showed that developed learning kits was effective.

CONCLUSION AND SUGGESTION

Conclusion

Developing of mathematics learning kits included lesson plan and student worksheet in statistics competency by PBL approach in terms of mathematics learning achievement for junior high school students used ADDIE model. Its step of developing consist of analysis, design, development, implementation, and evaluation. The steps of learning based on PBL sintax consist of identifying problem, identifying learning issues, Setting goal and making plan, learning knowledge, applying knowledge, assessing and reflecting. Lesson plan got criteria valid by mean 4.11 from the maximum score 5 with qualification good ($3{,}4 < \bar{x} \leq 4.2$). The assessment of student worksheet got mean 4,01 from maximum score 5 with qualification good ($3.4 < \bar{x} \leq 4.2$). Lesson plan was assessed by teacher questionnaire response got criteria practical by mean 3,1 from maximum score 4 ($2.8 < \bar{x} \leq 3.4$). Student worksheet was assessed by students quotioenary response got criteria practical by mean 3 from maximum score 4 with qualification good ($2{,}8 < \bar{x} \leq 3{,}4$). The learning was assessed by observation result done by observer with percentage of 95% in classification very good. Lesson plan and student worksheet got criteria effective shown by mean of learning achievement from test result was 93.5 (on interval $X \geq 85$) and classification very good, also percentage of 100% from minimum score 0 and maximum score 100.

Suggestions

Some suggestions had been get from the research result to develop learning kits were learning kits such as developed lesson plan and student worksheet had reached criteria of assessment based on validity, practicality, and effectivity aspects so that it could be one of alternative as learning sources that used by the teacher in supporting learning. These could be used by teachers in others school that have same characteristics of students and curricula with this school. For the next research, expected to develop lesson plan and student worksheet in statistics competency by different learning approach. For the next research also, expected to be capable in organizing time better than this one, so that it could be increase students attractiveness in reading mathematics steps, concepts, and references, because in mathematics wasnot only needed calculating skill, but also reading attractiveness.

REFERENCES

Al-Tabany, T. I. B. (2014). *Mendesain Model Pembelajaran Inovatif, Progresif, dan Kontekstual.* Prenamedia Group: Jakarta.

Amri, S. (2013). *Pengembangan dan Model Pembelajaran Dalam Kurikulum 2013*. Pt Prestasi Pustakaraya : Jakarta.

Barret, T. (2005). *Understanding Problem Based Learning*. [online]

Dahar, R. W. (2011). *Teori-teori Belajar dan Pembelajaran*. Erlangga.
Environment. GMD : Darmstad. [online]. 232.

Hamalik, O. (2013). *Kurikulum dan Pembelajaran*. PT Bumi Aksara : Jakarta.

Laili, H. (2016). Keefektifan Pembelajaran dengan Pendekatan CTL dan PBL Ditinjau dari Motivasi dan Prestasi Belajar Matematika Siswa. *Pythagoras Jurnal Pendidikan Matematika* [online]. 11 (1), 25-34.

Liu, M. (2005). *Motivating Students Through Problem Based Learning*.University Of Texas : Austin. [online].

Menteri Pendidikan dan Kebudayaan. (2007). *Peraturan Menteri Pendidikan Nasional No. 20 tentang Standar Penilaian Pendidikan.*

Menteri Pendidikan dan Kebudayaan. (2013). *Peraturan Menteri Pendidikan Nasional No. 66 tentang Standar Penilaian Pendidikan dalam Kurikulum 2013*.

Menteri Pendidikan dan Kebudayaan. (2014). *Peraturan Menteri Pendidikan dan Kebudayaan No. 103 tentang*

Penggunaan Kurikulum 2013 dalam Pembelajaran Pendidikan Dasar dan Menengah.

Menteri Pendidikan Nasional. (2008). *Peraturan Menteri Pendidikan Nasional No.65 tentangLangkah-Langkah Penyusunan RPP*.

Miao, Y., Holst, S. J., Haake, J. M. & Steinmetz, R. (2000). PBL-*protocols: Guiding and Controlling Problem Based Learning Process in Virtual Learning*

Mulyasa, E. (2014). *Pengembangan dan Implementasi Kurikulum 2013*. PT Remaja Rosdakarya. Bandung.

Mulyatiningsih, E. (2014). *Metode Penelitian Terapan Bidang Pendidikan*. Alfabeta : Bandung.

NCTM (National Council of Teachers of Mathematics). (2000). *School Mathematics.*

Nieveen. (1999). Prototyping to reach product quality. Dalam J.V.D Akker et. al (Eds), *Design approaches and tools in Education and Trainning.* Netherlands, Dordsrecht: ICO Cluwer Academic Publisher.

Nugroho, N. B. (2014).Pengembangan RPP dan LKS Berbasis Problem Based Learning pada Materi Himpunan untuk Siswa SMP Kelas VII. *Skripsi Pendidikan Matematika.*

Prastowo, A. (2011). *Panduan Kreatif Membuat Bahan Ajar Inovatif*. DivaPress : Yogyakarta.

Retnawati, H. & Farhan, M. (2014). Keefektifan PBL dan IBL Ditinjau dari Prestasi Belajar, Kemampuan Representasi Matematis, dan Motivasi Belajar. *Jurnal Riset Pendidikan Matematika* [online]. 1 (2), 227-239.

Retnawati, H. & Sulistiyani, N. (2015). Pengembangan Perangkat Pembelajaran Bangun Ruang di SMP dengan Pendekatan PBL. *Jurnal Riset Pendidikan Matematika* [online]. 1 (1), 12-20.

Ruhimat, T. (2013). *Kurikulum dan Pembelajaran*. Rajawali Press : Jakarta.

Rusman. (2014). *Model-Model Pembelajaran: Mengembangkan Profesionalisme Guru*. Rajawali Press : Jakarta.

Sanjaya, W. (2013). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Kencana : Jakarta.

Sudjana, N. (2005). *Penilaian Hasil Proses Belajar Mengajar*. PT Remaja Rosdakarya : Bandung.

Widoyoko, S. E. P. (2014). *Penilaian Hasil Pembelajaran di Sekolah*. Pustaka pelajar : Yogyakarta.