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Developingrealia Media Based Matemathics Work Sheet To Improve The Outcomes of Learning Algebra of Students Grade Vii

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Abstract: *Abstract algebra material is difficult to be understood by students in grade VII who just graduated from Elementary School. Mathematics book used by the teacher in teaching algebra at grade VII not represent the material concretely. The current research aimed to:(1)Producethe realia media based mathematics'work sheet that may help the students in understanding algebra concretely;(2)analyze the effectiveness of work sheet use; (3) analyzethe students appeal onmathematicswork sheet. This research used Borg and Gall research approach and development. It was conducted inJunior High school (SMP)IT Fitrah InsaniandSMPIT DaarulIlmiBandarLampung.The data was collected by distributing questionnaires and tests, then the data was analyzed quantitatively and qualitatively. The result of the effectiveness test of work sheeton learning was 0.64which meant normalizedGainwasin middle classification, then the effectiveness was effective, the appeal testwas in success level of 3.17which meant the work sheet was in the category of interesting to be learned.Thiswork sheet may increase the average of post-test score to the pre-test score with the increase average of 59.92%. The realia media based mathematicsworksheetwas proven be able to increase the learning outcomes of algebra material the students grade VII of Junior High School inBandarLampung City.*

KeyTerms:*Algebra, learning outcomes, students' work sheet, realia media,*

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I. Preliminary

Mathematic is universal science that useful for human life and fundament the modern technology development. Mathematic has important role in various sciences and may upgrade the human thought. Mathematic subject is necessary to be taught to the students since in Elementary School to retread their thinking ability in logic, analytic, systematic, critic, innovative, and creative, as well as able to work together. Those competencies are required in order the students may have ability in obtaining, processing, and utilizing the information for better life in the situation that always unstable, uncertain, and very competitive. Therefore, it may not be denied that in the case of science and technology utilization in development, the role of mathematics is very important.

Meanwhile, mathematic is still considered as one of difficult subject. Among the mathematics material, mostly students consider that algebra is difficult. Algebra considers to be difficult because it is abstract material. The interviews result with Mathematics teachers of grade VII who incorporated in Mathematic teachers Forum of Bandar Lampung City showed a data that algebra become the subject that difficult to be understood by students, because the subject is abstract and never be learned in Elementary School. Students are still unfamiliar with several terms contained in algebra.

Mathematic teachers hold important role in processing the mathematics learning at class particularly when teaching the algebra in grade VII. The teachers may help the students in introducing abstract algebra to be more concrete and easy to understand. Since 2016/2017algebra material is taught in grade VII at 1st Semester, while in the previous year the algebra was taught in grade VIII. The students of grade VII who come from Elementary School never know and learn algebra material with such symbols as mentioned in Package book of mathematic for grade VII in school at present. The teachers teach in the class by only using Mathematics package book provided at school. The books used in teaching algebra at grade VII not represent the material concretely for the students. It is because the book that previously be tought in grade VII and IX not be adjusted to be tought in grade VII while the students who just graduated from Elementary School have been familiar to learn mathematic with concrete things. In addition that book also contains several terms that sounds strange for them for instance variable, constanta, and coefficient which the meaning or definition are not explained in details. The symbols used inside also make the students difficult to understand because oftenuse letter *x*and *y*. After knowing the symbols in algebra material, the further competency should be

comprehended is performing algebraic operation. The result of observation conducted by the writer in SMP IT Fitrah Insaniand SMP IT DaarulIlmiofBandar Lampung, encountered on several studentsmisconceptions in understanding the symbols in algebra material in which it will affect the process of completion of operation on algebraic.

The result of writer's interview with Mathematic teachers in SMP IT Fitrah Insani, SMP IT DaarulIlmiand some public/private teachers in mathematicsteacher forum of Bandar Lampung city indicates that there is no material teaching yet made the teachers in teaching algebra material. The teaching material used during this time is only package book provided by the publisher. This statement is based on the result of questionnaire distributed to the teachers then obtained data is 100% teachers not made the teaching material yet in the form of Students Work Sheet with algebra as the additional learning sources to improve the students learning outcomes. According to the observation and various initial information obtained by the writer from 2 (two) schools that will be the research object, all mathematic teachersrequire teaching material in the form of students work sheet as the learning sources to help them understanding the algebra material easily and gaining the proper understanding on algebra concepts.

Basic Competency (KD) will be observed in this research is KD 3.7 Explaining and performing operation on algebraic form (addition, subtraction, multiplication, and division), the reasons are: (1) No work sheet that is made special for that KD, (2) The learning outcomes of operation on algebraic form in both schools are very low and far below the Minimum Mastery Criteria (KKM).

Table 1.1 Students Achievement of KKM on KD 3.7

Basic Competency	School's Name	Achievement of KKM
3.7 Explaining and performing operation on algebraic form (addition, substraction, multiplication, and dividion)	SMP IT Fitrah Insani Bandar Lampung	54%
	SMP IT DaarulIlmi Bandar Lampung	55%

Source: Mathematic score of Grade VII of SMP IT Fitrah InsaniandDaarulIlmi

According to the data on table 1.1 most of the students not achieve the Minimum Mastery Criteria yet (KKM) on KD 3.7.The researcher chose SMP IT Fitrah Insaniand SMP IT DaarulIlmiBandar Lampung as the place for research because both schools have used Curriculum 2013 and in the same sub rayon as well as the schools have been accredited.

This research use realia media as the basic of work sheet that will be developed, because realia media is the aids that may give direct experience for the students. The role of realia media on learning may give the real meaning for the things that initially only explained abstractly, that is through the words or visually. As the learning media, realia have a potential to be used in many topics of subjects. Realia may give direct experience(*HandsonExperience*) for the students.

Basically, students learn from the concrete things so that to know the abstract concepts they need real things as the media or its visualization (Amin, 2010).Introducing mathematic to the students should not be handed an exercise book. Meanwhile, many type of media that available in our environment we can directly use for learning purposes, what required is our ability, carefulness, and creativity in choosing and empowering the potentials of various learning source and media around us (Rahadi,2004: 2).

This research is necessary to be conducted with several reasons such as: (1) Realia media basedwork sheet of operation on algebraic form is not developed yet. (2) Learning source is onlylimited on package or printed book. (3) Students are difficult to understand the symbols on abstract algebra material. (4) Students are not satisfied yet toward their learning outcomes because not achieve the Minimum Mastery Criteria (KKM = 75) (5) Mathematic teachers not create work sheet yet as the learning source that may attract the students.

This research aims to produce work sheet product with realia media of operation material of algebraic form, analyze the effectiveness of work sheet use and analyze the students appeal on that work sheet.

II. Material And Method

The present study is kind of *Research and Development* (R&D) ordevelopment research. According to*Borg& Gall* (2003:772), development research is a way/method/approach/strategy of research used to develop, that is to plan, formulate, validate, and revise an educational product that is conducted in integrated and comprehensive as well as based on the real educational problem in the field. The stage series should be conducted according to BorgandGall (2003) are initial observation and information collection, planning, initial product development, initial product trial, main product revision, main product trial, operational product revision, operational product trial, final product revision, and dissemination and implementation.

The current study is limited on the 7th (seventh) stage because the eighth, ninth, and tenth stage require expensive cost and wide scope forlong time. Each stage is explained as follows: (1) Conducting initial

observation (presurvey) and collecting the initial data including the literature, class observation, problem identification, and problem summarizing (2) Making planning, the important thing here is purpose statement that need to be achieved by the product will be developed (3) Developing the type/form of initial product including: preparing the learning material, preparing the handbook, and evaluations tool. (4) Conducting initial trial that is the evaluation of the expert in learning design, information technology, and multimedia. (5) Conducting revision to the main product, based on the feedbacks and suggestions from the initial field test result (6) Conducting field trial, used for obtaining the evaluation of product. The questionnaire is made to get feedback from the students who become the trial object of study. (7) Conducting revision to the operational product, based on the feedbacks and suggestions of field test result and educational practitioners.

The trial subject on this research is the students of grade VII of SMP IT Fitrah Insaniand SMP IT DaarulIlmiof BandarLampung. The research is conducted on even Semester in Educational Year of 2017/2018 on January to March 2018. The types of data collected in this research stage are quantitative and qualitative data. While the data collection technique of the development research are: (1) The result of *pretest*and*posttest*to obtain the improvement of learning outcomes and the effectiveness of work sheet use of realia media based algebra material. (2) Distribution of questionnaire conducted to obtain the students appeal data based on the attractive aspect of work sheet of realia media based algebra material.

The technique used in this research is descriptive analysis. It is conducted by using descriptive statistic. The descriptive statistic is statistic used to analyze data through description or depiction of data collected as it is without meant to make general conclusion or generalization (Sugiyono,2013:207).The category of this work sheet feasibility use measurement scale of Likert scale. Likert scale is used to measure the attitude, opinion, and perception of individual or group of people about the social phenomenon. The data obtained from the scale measurement of likert is in numbers. Those numbers are interpreted in quantitative meaning (Sugiyono, 2013: 134). Quantitative data is obtained from the measurement scale of likert

In the first stage of product trial there are two (2) main activities conducted, those are product evaluation by the expert, and students limited trial. The trial is conducted to analyze the obstacle occurred, and the result is used as the basic for reducing that obstacles on the next work sheet implementation. Beside the evaluation stage, the other stage that involving the students is also conducted to measure the product of development result. The expert test is conducted by several experts with academicalsqualification minimum S2,those are:1) learning design expert to measure the learning criteria(*instructionalcriteria*),2)material expert to measure the material(*materialreview*),and3) media expert to measure the appearance criteria(*presentationcriteria*).While the limited test is conducted in 2 (two) stages those are one on one trial and small group trial. The subject used is the students of grade VII SMP IT Fitrah InsaniandSMP IT DaarulIlmi ofBandarLampungas many 6 people to test one on one and 12 people to test the small group, the chosen students represent group of high, middle, and low score. This trial uses questionnaire instrument which contain the product measurement of work sheet development. In addition it also use*s one group of pretest and posttest*. After that the product revision is conducted by analyzing the lack found, then soon make improvement toward the product. Operational product revision is conducted after the data of trial analysis result stage I have been obtained, from that data the temporary result of work sheet product use is gained. Beside from the trial data stage I, it is also conducting discussion with classmate and asking for the feedback and suggestion for the media developed. The discussion result may be used to complete the work sheet product developed.

In the product trial stage II, the researcher retrial the product with wider target, conducted in two schools ofSMP ITFitrah InsaniandSMP IT DaarulIlmi ofBandarLampung.The purpose of this stage is determining whether the developed product have showed performance as the criteria defined or not. The trial conducted is the effectiveness and appeal trial. The product obtained is the final result that has been passed the test stage II, which state the product is ready to use.

Quantitative data will be obtained from the result of *pretest*and*posttest*. The test result then will be analyzed quantitatively to find the presence or absence of difference in learning outcomes on the students before and after using the work sheet, and to find the effectiveness of work sheet use. Before conducting analysis on the level of effectiveness, normality test and paired sample t-test areconducted.The normality test is conducted to see that the class condition is in the normalcurve and feasible to be the trial object, while the paired sample t-test is used to find the difference between the result of *pretest*and*posttest*before and after the work sheet use. The effectiveness testing may be conducted by viewing the normalized gain. According to Hake2007the normalized gain average is obtained from the average of *posttest*subtracted to *pretest*dividedwith the maximum score subtracted to the average of *pretest*. If we made it in equation is as the following equation.

$$(g) = \frac{(Sf) - (Si)}{}$$

$$\frac{Sm - Si}{}$$

Notes:
(g) = average of normalized gain
(Sf) = average of posttest score
(Si) = average of pretest score
Sm= Score of maximum

The calculation reseult is interpreted using gain (g) index, according to Hake is shown by table 3.2 below.

Table 3.2 Index Score of Normalized Gain and the Classification

Index Score of Normalized Gain	Classification	Effectiveness Level
$g \geq 0{,}70$	High	Very effective
$0{,}30 < g < 0{,}70$	Middle	Effective
$g \leq 0{,}30$	Low	Less Effective

Source:Elice(2012:66)

III. Algebra

The etymology of algebra is from Arabic, the basic word is *Jabr* if translated into Indonesia means meeting, relation or settlement. Algebra is the general form extensionordiversionofarhitmathics. In the stage of further understanding algebra may be complex and correlated to the settlement of other branch of mathematics science. In its original context comprehending algebra in mathematics lectures will meet Basic Algebra, and Algebra Structure. In its expansionand relation with other science will be discussed in algebra and trigonometry, more complex algebra structure concerning the abstract algebra untilpertainan algebra on such field.

This algebra science is the result of adopted science from Greek but the Arabian is more capable in creating the structured algebra and they more capable in giving general form which is emphasized the realistic proven than the Greek Algebra's problems. Therefore in the end, with the innovations stated by Arabic mathematician then the scientist memorize them with algebra. Recalling that memory is based on a famous figure in algebra field he is AL Gebra or also known as Al Jabr. However, not only Al Gebra who has role in algebra, there are alot of Arabian figures who also contribute in algebra.

Learning Outcomess

According toNasution (2006:36) learning outcomes is the result of an interactionof teaching –learning action and usually shown by the test score given by the teacher. Meanwhile, according to Hamalik (2006:30) learning outcome is when someone have learned then a changing on his attitude occurs for instance initially not know become know and initially not understand become understand on such thing. Moreover, according to Surya (2003:25) learning outcome is the individual attitude change completely including the cognitive, affective, and motoric aspect.

Based on those definitions then may be concluded that the learning outcome is individual attitude changes completely including cognitive, affective, and psychomotor aspects. The learning outcome can be seen from the evaluation activity which aims to obtain the evidence data that will show the ability level of students in achieving the learning purpose. The learning outcome observed in this research is the cognitive and Mathematics skill which cover three levels those are knowledge (C1), comprehension (C2), and implementation (C3). The instrument used to measure the learning outcome of students on cognitive aspect and skill is test.

Students Worksheet (SW)

Students worksheet is part of Learning Implementation Design (RPP) that support the indicators achievement through acting (Hands on Activity) and thinking(Minds on Activity) so that the students achieve cognitive, affective, and psycomotoric skill. The functions of worksheet are: (1) worksheet is part of learning Implementation Design (RPP) that support the indicators achievement (2) worksheet is to assist the students in written in conducting the learning activities (3) implementation of worksheet is through acting and thinking (4) used to obtain knowledge, skills and the presence of attitude changes.

The purpose of worksheet arrangement is: strengthen and support the the learning purpose achievement, indicator and basic competency as well as the standard of competency have been formulated and help the students in conducting directed learning activities

Realia Media

The word media is originally from Latin language "medius" which literally means "middle/mediumoragent. According to (BoveeinEna: 2001) media is a tool functioned to deliver a message. In addition several experts says that media in learning process tend to be interpreted as graphics, photographic, or electronic tools to capture, process, and rearrange the verbal or visual information.

Media realia (*real thing*)is the easiest aids to be used because we do not need to make preparation except directly use it.What is meant by real thing as the media is information delivery tool in the form of real or original things or objects and not having any significant changes. As the real object, realiais the aids which may give direct experience to the users. Therefore, realia is many used in learning process as the aids to introduce new subject. The form of realia is same with the real things which not have changes at all and can be used for learning purpose. Basically, children learn from concrete things, so that to understand the abstract concepts will require the realthings as the media or visualization (Amin, 2010). Introducing mathematics to children should not be handed the exercise book while there are many other types of media available in around us which directly we can use for learning purpose, what we need is our ability, carefulness, and creativity in choosing and empowering the potential of various learning source and media available in around us(Rahadi,2004: 2). Givereal meaning toward the things which are initially depicted abstractly with words or visual only.

In education world, realia is often considered as the easiest media of information to be accessed and attracted. As the information media, realia mayexplain the abstract things with less or without verbal explanation. By directly interacting with realia, expected that less clear thing if explained verbally will be clearer. Realia have ability to stimulate the users' imagination by carrying their life in the real word into the class. As the learning media, relia has potential to be used in various topics of subjects. Realia is able to give direct experience (*HandsonExperience*) for the students. By using real media the students may use their various senses to learn such object. Students may watch, touch, smell, even feel the object learning.

IV. Finding And Discussion

The Result of Effectiveness Test of Worksheet Use

Researcher has coordinated with the classroom teacher before conducting field test concerning the implementation technique and what things should be performed by the teacher during the learning process.
Learning activity was started with *pretest*. After*pretest*have been conducted, students performed learning activity using worksheet of material of realia media based algebraic operation, then in the end of the class students have*posttest*. It was meant to know the presence or absence of the change/improvement of students learning outcomes before and after using worksheet product.

Students learning outcome before (*pretest*) and after (*posttest*) using Worksheet can be seen on thetable 4.1.

Table 4.1 Students Learning Outcome on the Field test

School's Name	Average Score		Improvement	Improvement (%)
	Pretest	*Posttest*		
Grade VII SMP IT Fitrah Insani	51.35	82.12	30.77	59.92
Grade VII SMP IT DaarulIlmi	58.33	85.00	26.67	45.72

Source: Calculation Result of*pretest*and*posttest*score

Table 4.1 generally showed that there was an increase on students learning outcomes after learning using worksheet of realia media based algebraic operation material. In grade VII SMP IT Fitrah Insanithe average of students learning outcomes before given learning using realia media based worksheet was 51.35 increased become 82.12 after given learning using realia media based worksheet or the average increase was 30.77 with percentageof 59.92%. Meanwhile, the average of students learning outcome of *pretest*and*posttest*in grade VII SMP IT DaarulIlmiwas 58.33 increased become85.00 and the average increase was 26.67 with percentage of 45.72%.

Furthermore, the students score of*pretest*and*posttest*in grade VII of SMP IT Fitrah Insaniandgrade VII of SMP IT DaarulIlmican be seen on figure 4.14 and 4.15.

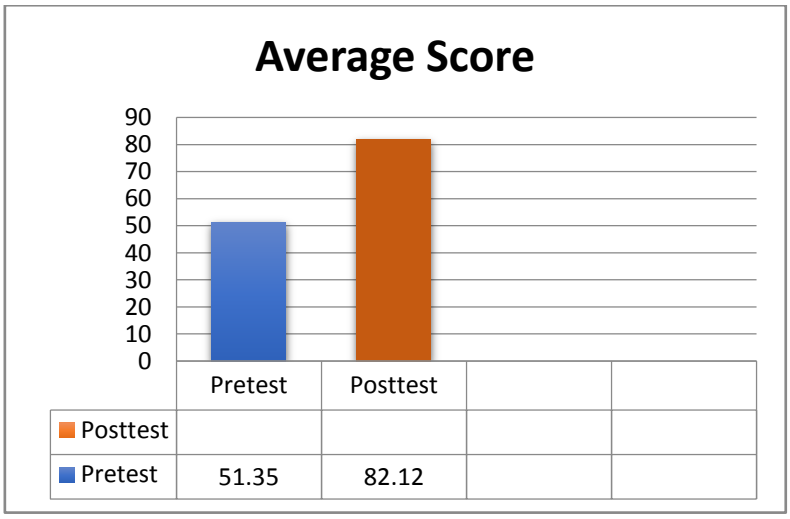

Figure 4.14 Diagram of Students Outcome of *Pretest*and*Posttest*Score

In grade VII SMP IT Fitrah Insani

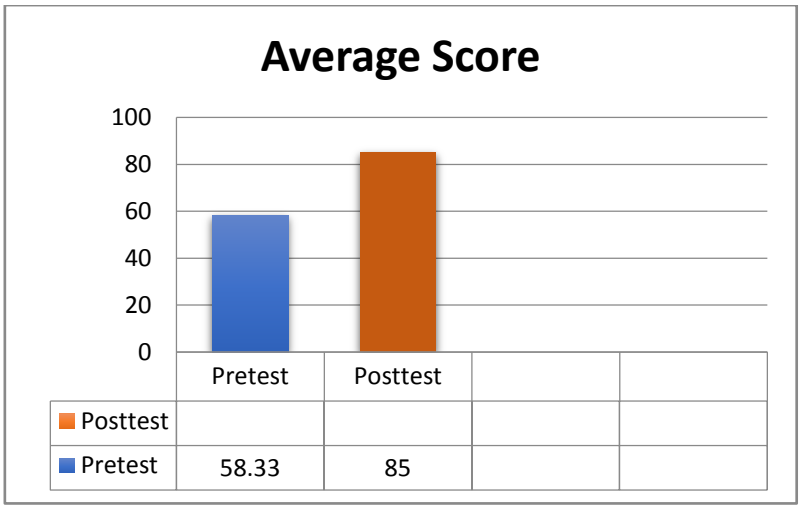

Figure 4.15 Diagram of Students Learning Outcome of *Pretest*and*Posttest*Score in Grade VII SMP IT DaarulIlmi

Effectiveness Test Using N-Gain

N-*Gain* was used to analyze the increase of learning outcome before and after learning using Worksheet.

The following was the result of N-*Gain Pretest-Posttest*after calculated and presented on table 4.2.

Table 4.2Result of*N-GainPretest-Posttest*after calculated

No	Students	Gain
1.	Grade VII of SMP IT Fitrah Insani	0.63
2.	Grade VII of SMP IT DaarulIlmi	0.64
Average		0.64

Source: Result of*N-Gain* after calculated

From the table 4.2 the average result of normalized*Gain*showed the result of 0.64 which meant the normalized*Gain*was in middle classification/category, then the level of effectiveness was effective.

Appeal Test of Worksheet

The result of worksheet appeal test obtained the appeal data of 3.17. According to the recapitulation result of questionnaires have received then known that the worksheet was in category of interesting to be learned by students.

The following was the appeal test result of Worksheet based on the questionnaires given to the students in the field test.

Table 4.3 Recapitulation of Questionnaires Results of Worksheet Appeal

School	Average Score	Classification
Junior High School of IT Fitrah Insani	3.18	Interesting
Junior High School of IT DaarulIlmi	3.16	Interesting
Average	3.17	Interesting

V. Conclusions And Suggestions

CONCLUSIONS

The conclusion of the present research and development are: (1) Potential and condition of school is very supportive and possible for conducting Students Mathematics Worksheet development of realia media based algebraic operation material. (2) Realia media based Mathematic worksheet is effective to be used in learning activities. It is supported by the data analysis which shows the increase of significant learning outcome toward students who use realia media based worksheet. (3) This mathematics worksheet is very interesting to be learned by the students. It is known from the recapitulation result of questionnaires which show the amount of 3.17 meant the Worksheet classification is interesting.

SUGGESTIONS

It is necessary to conduct furtherresearch to measure the efficiency of students' worksheet development product. Teacher may use realia media based Mathematics worksheet on algebraic operation material as the learning source to help students more understand about algebra material concretely.

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