

Need Analysis for Development of a Cube and Beam Volume Assessment Instrument in Macromedia Flash Based Elementary Mathematics Learning

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Abstract

The background of this study was that teacher has difficulty in overseeing the evaluation net, so that the potential for collaboration among students in evaluating was discovered, and the instruments used by teachers were still using classical assessment instruments. The purpose of this study was to determine the form of assessment instruments used by teachers in conducting evaluations, and to find out whether teachers need a Macromedia Flash-based research instrument handbook in evaluating learning. The sample used in the study was saturated or non-probability sampling where the sample was taken from SDN Bangetayu Wetan 02 class 5, the method used was quantitative and qualitative techniques, quantitative was used to calculate needs analysis and qualitative was used to collect data from samples, Data collection techniques used were using tests and non-tests where tests used cognitive assessment sheets and non-tests using data triangulation through collecting data, observations, interviews and documentation studies, the tools used were observation sheets, interview sheets, and documentation studies. The results obtained from the analysis of the needs of the cube and beam volume assessment instruments in learning Macromedia Flash based elementary school mathematics through the calculation of validity obtained Mean Square 0.956 and declared valid, as well as through the reliability test ebel obtained 0.414 so that it was declared reliable, so the needs analysis was declared valid and reliable the development of cube and beam volume instruments in Macromedia Flash-based elementary mathematics learning is urgently needed. Manfat for the community is the community will better understand how important the use of Macromedia Flash application technology in the world of education, while for science to help overcome problems in the field of assessment.

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INTRODUCTION

The test instrument is a tool used in the framework of measurement and assessment, usually in the form of several questions given to be answered by the subject under study (Lestari, 2015: 164). The test used by the fifth grade teacher at SDN Bangetayu Wetan 02 is a multiple choice and essay test. The process of implementing the correction of students' answers to the teacher found the similarity of answers from students with no workflow or systematic finding towards the results of the answers, said the homeroom teacher V Bu Sara SDN Bangetayu Wetan 02 when interviewed at the elementary school office, the scope of the evaluation work was also one of the factors the occurrence of answers between students where students are able to see the answers of friends without being known by the teacher, based on observations made in class 5 SDN Bangetayu Wetan 02 the distance between students is only 30 cm, so it does not rule out the possibility of students being able to see the answers of peers when working question.

Education as an inseparable part of the process of human maturity certainly on the one hand has a big contribution to the development of science and technology (Mushon, 2010: 2) Macromedia Flash is an animation application that has a versatile usability, Macromedia Flash can be used to create questions and answers and grades spontaneously and real, its application in evaluation is by providing a laptop device that has been installed Macromedia Flash application and students are invited to fill out some questions then after a while students immediately know their grades, the teacher does not need to proofread and supervise the evaluation nets because all have been done with just one application.

Conducting evaluation in the old-fashioned way is clearly the reason that there is a need to develop evaluation instruments in the classroom in order to add specifications in conducting assessments for students to be more ideal. In carrying out program evaluation activities there needs to be an instrument to measure the effectiveness of the program (Lestari, 2013: 8) therefore there needs to be a good instrument to measure students' cognitive levels. The purpose of

education is to get the results of the material delivered through evaluations conducted by the teacher so that it can be used as a provision of life according to Miftahudin, education is a learning process carried out by someone consciously in life in order to increase knowledge, understanding, or certain skills (Miftahudin, 2014) so clearly the assessment made by the teacher will affect the results obtained by students. Teachers in various educational institutions have started implementing education based on their experiences (Cheung, Socie, Me, & Dias, 2009) experience is valuable capital in order to understand a teaching material that is in the class, so that the delivery will be more natural.

Learning conducted in elementary schools has different characteristics at each grade level such as in grades 1 and 2 which emphasize attitudes and character to build personal learners who are able to behave and have good morals so that it becomes a good foundation, also different when in classes 3 and 4, at the learning stage in the elementary school classes, the basic materials of each subject have started to dominate, while in grades 5 and 6 they have begun to emphasize the advanced materials that learners will learn at the next level, then from that grade 5 in elementary students have begun to be taught how to think concretely operational thinking that students are confronted with the reality that students see so that later it will be used as an ideal learning material or media because it is in accordance with the mindset of students.

The development of assessment instruments is a follow-up to renewing existing assessment instruments either by innovation, modification or overhauling in various ways to produce products that are more effective, efficient and of practical value, The development of instruments is carried out in systematic ways and takes into account the weaknesses of existing instruments and corrects them as well as possible so as not to cause weaknesses again, The systematic step in question is the scientific way, the development of assessment instruments refers to the existing curriculum which is the 2013 curriculum which contains a lot of HOTS content, Apart from HOTS considerations, the development of assessment instruments also considers the use of

technology as an aid in conducting assessments. Factors that influence the success of a learning is the ability of teachers to make and use assessment, evaluation processes (Budiman, 2014: 141).

The elements that must be considered in developing assessment instruments are the grids, indicators, question items, and the use of media (Azwar, 2016: 20) some elements are related and cannot be released one and the other, the development of assessment instruments will be carried out in class 5 SDN Bangetayu Wtan with several considerations that have been formulated in the needs analysis, for that analysis of the need to develop a cube and beam volume assessment instrument in Macromedia Flash-based elementary school mathematics learning is important, needs analysis is the first step of the researcher to determine the condition of grur, schools and students before designing product development.

For that analysis of the need to develop a cube and beam volume assessment instrument in Macromedia Flash-based elementary school mathematics learning is important, needs analysis is the first step of the researcher to determine the condition of grur, schools and students before designing product development. (Astuti, 2012: 40) a lot of trials conducted by the government so that the assessment can be improved properly, from the selection of the difficulty level of the questions or in terms of the method of presenting instruments, assessment of learning outcomes as one of the learning components is an important part that needs to get the attention of the teacher (Utomo, 2013: 2) in SD N Bangetayu Wetan 02 there are still many teachers who have not applied the assessment recommended by the government, when an interview with Mr. Sunardi as homeroom V in SD N Bangetayu 02, will close the possibility of anomalies and discrepancies between the curriculum used and the assessment techniques used. The teacher uses because it has a strong correlation.

The 2013 curriculum focuses on IT (Information Technology), HOTS (Higher Order Thinking Skill), literacy, and PPK (Strengthening Character Education). Technology will make a substantial and unique contribution to children's education (Bharti, 2017: 791) so that in reality the

assessment used by the teacher is still the same as the previous assessment then the correlation between the learning that the teacher does and the assessor will be different, it can be a further consideration for the teaching teacher because if the assessment is not in harmony, then maybe what will happen is that the questions made will be too easy or even there is no 2013 curriculum integration in them. Even though all program evaluation needs an instrument to measure the effectiveness of a program (Ahmadi, 2013).

Mathematics is one of the subjects in elementary school, Mathematics is a science of calculating axioms between axioms and uses deductive and inductive thinking patterns, Mathematics is a compulsory subject to be studied in elementary school, in class 5 Mathematics is a separate subject from other subjects, Mathematics is one of the subjects in elementary school, Mathematics is a science of calculating axioms between axioms and uses deductive and inductive thinking patterns, Mathematics is a compulsory subject to be studied in elementary school, in class 5 Mathematics is a separate subject from other subjects, Mathematics is a science that explains the need to demonstrate through concrete objects, in grade 5 itself there is material that has a connection with the lives of students in the surrounding environment, such as building space including cubes and beams, cubes and beams entered in one of the Elementary School Mathematics KD grade 5 , cube and beam become an important foundation as a foundation for the application of the use of Macromedia Flash electronic media that is able to interpret mathematical material in a concrete operational way through the advantages of making animation, the relationship of both makes the material of the cube and the beam used as the initial reference in analyzing the needs of research instruments in the volume of cubes and beams in Macromedia Flash based elementary mathematics learning.

Media in the learning process is defined as graphic, photographic, or electronic tools to capture, process, and rearrange visual and verbal information (Sutjipto, 2011: 7), then there are many ways for teachers to create innovative media that can be used as an instrument. The media also

functions to change the message conveyed by the teacher so as not to be too verbal (Sundayana, 2013: 7). The results of observations in class V SDN Bangetayu Wetan 02 were assessed using the old-fashioned method using the LKS sheet (Student Worksheet) or using blackboard media to open the gap for students to cooperate in working on evaluation questions, the information was obtained after an interview with the fifth class SDN Bangetayu Wetan 02. Teachers have limitations in carrying out supervision when evaluating learning where in essence there are 35 students not comparable to 1 teacher who must oversee all of them, even though reprimands have been done but do not provide a deterrent effect because in fact wide opportunities are the main factor for students to commit fraud.

Research conducted by Lalu Heri with the title Development of Gymnastics Psychomotor Assessment Instrument in Learning Physical Education of Elementary School Students is a development research in the field of developing assessment instruments with practicality test results showing the front roll instrument at number 33 in the "practical" category, back roll 34, straddle jump 35 and squat jump 35 in the "very practical" category. Whereas the research conducted by Ana Solihatin with the title Development of Instrument-based Tests for Class IV Elementary Schools in Margorejo Pati District with a score of 497 with an average of 82.83 and included in the effective category so that the instrument was declared Valid and Reliable and suitable for use in elementary school.

Two studies conducted by Lalu Heri and Ana Solihatin are the same research using the development model, but both Lalu and Ana's research still do not use an IT base, even though based on Permendikbud standard processes in every learning process in schools have been demanded to use innovative technology to attract participants' learning interest students and avoid monotonous learning, the research to be conducted by researchers is now a development analysis based on Macromedia Flash, in which the role of Macromedia Flash as an evaluation tool is able to assist teachers in conducting assessment and correction processes.

The solution to the problem is to analyze the need for developing cube and beam volume instruments in Macromedia Flash based mathematics learning, the use of the Macromedia Flash application was chosen because this application is very flexible and can be used easily by the teacher. teachers who do learning in regions outside Indonesia.

The purpose of the analysis of the need for developing cube and beam volume assessment instruments in Macromedia Flash-based elementary mathematics learning is to know the form of assessment instruments used by teachers in conducting evaluations, and to find out whether teachers need a Macromedia Flash-based research instrument handbook in evaluating learning. The manual will contain a guide to using the Macromedia Flash application, which contains volumes and blocks, there will be guidelines and how to use them in the classroom, especially when evaluating.

Research benefits: (1) for learners students can measure the cognitive abilities of cube and beam volume material using the Macromedia Flash application which contains assessment instruments, (2) for teachers who have a Macromedia Flash application handbook that contains a material assessment instrument for cube and beam volumes, (3) for schools having a guide book to use the Macromedia Flash application which contains cube and beam volume assessment instruments that can be implemented in other subjects. The benefit of research for ilmu is that it will be found that elementary school teachers need innovation in new assessment instruments to replace old research instruments, while the benefits for science help to overcome problems in the field of assessment.

METHOD

The research uses the Research and Devolution design where the Research here uses quantitative and devolution uses development, according to Sugiyono (2015: 109) there are 4 types of experimental research including: Pre-Experimental design, True Experimental Design, Factorial Design, and Quasy Experimental design.

Pre-Experimental design is a research design that cannot be called truly experimental research, because in Pre-Experimental design there are still many that can influence the dependent variable, so the results obtained are not only entirely from the independent variables, because there are no control variables and non-random sampling, as for several types of Pre-Experimental Design designs, namely: One-Shoot Case Study, One-Group Pretest - Posttest Design, and Intac - Group Comparison (Sugiyono, 2015: 109).

The study uses the Intac - Group Comparison design as shown in Figure 3.1 because in the study there are relevant steps that will facilitate researchers in obtaining data where the sample used is not random because on a small scale researchers took samples of a population of SD N Bangetayu 02 where taken 1 class 5 with 2 groups namely a and b, it is expected that the use of the Intac - Group Comparison model will facilitate researchers in obtaining data and inferring conclusions from research, the model of the research is to divide the group into 2 with the same treatment where both groups are mentioned have the same mathematical prerequisite capabilities, then one group was given treatment and another group was not given treatment, the treatment was carried out aiming to find out how effective Macromedia Flash assessment instruments were in class.

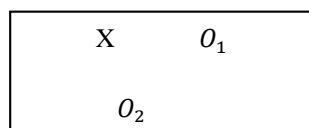


Figure 1. Intact Design - Group Comparison Information:

- O_1 : The results of the measurement of half the group treated
- O_2 : The measurement results of half the group that was not given Sugiyono treatment (2016: 111)

The research will produce a product in the form of the development of a Macromedia Flash based beam and cube material assessment instrument in elementary school, in addition to producing a new assessment instrument later the results of the research will also be in the form of a teacher's manual, the teacher's manual will assist

teachers in implementing the development of Macromedia Flash-based assessment instruments in Elementary school.

The process of collecting preliminary data using data collecting is by collecting sources in the form of the latest grades in Mathematics, collecting previous research that has links with problems, conducting interviews with class teachers and students, conducting initial observations by looking at the way teachers teach, overall from the process of collecting data uses data triangulation techniques, meaning researchers gather information using different methods to produce the same results.

The sample in this study used a saturated sample, which only used students in grade 5 at SDN Bangetayu Wetan 02, while the data collection technique was used using tests and non-tests, tests were conducted to find out how the results of students' cognitive scores after the treatments were done using new research instruments, while non-test is used to find out how important it is for new instruments to be applied in class, the form of the instrument is Macromedia Flash-based assessment instruments, questionnaires, observation sheets, and documentation sheets.

The research will begin with the process of collecting preliminary data by making observations in class V SDN Bangetayu Wetan 02, preliminary observations are conducted to find out the condition of the class and also the implementation of learning conducted by the teacher, observations carried out by researchers for 2 periods namely the first day and second day, it aims to find out the comparison between the first and second observations, with both observations conducted, the researcher will get two different information that will be used as a benchmark between the two observations, in addition to the observation the researcher also conducted an initial interview to the fifth grade teacher at SD N Bangetayu Wetan 02 interviews were conducted with Ms. Sara and Ms. Murtati, the researcher asked about the condition of the class and the evaluation process, the interview at an early stage aimed to explore what problems they often encountered when doing learning. It is in the form of an analysis of the needs of the fifth grade teacher at SDN Bangetayu Wetan 02, the analysis is made through indicators taken from several sources such

as the Grade V syllabus, standard assessment process and material taught in class V, the needs analysis in the form of a questionnaire consists of two answer choices namely Yes and No, the answer was chosen through the Guttman scale theory, the questionnaire was filled out by the fifth grade teacher at SDN Bangetayu Wetan 02, then after obtaining the results from the questionnaire the researchers immediately processed it with the Validity and Reliability test to measure the validity and constancy of the answers from both sumber or commonly called rater, with the use of two rater it will make the results obtained more accurate. The calculated questionnaire will allow two results, namely valid and invalid, if valid then the questionnaire will be continued with a reliability test while if the questionnaire is not distributed valid it will be monetized making new items based on the background of existing problems. Data processing in this research uses quantitative and qualitative techniques, quantitative techniques are used to calculate the findings in the form of frequency analysis needs which are decorated using a validity test, while qualitative is used to describe the findings after interviews, observations and documentation studies. (Sugiyono, 2015: 109).

RESULTS AND DISCUSSION

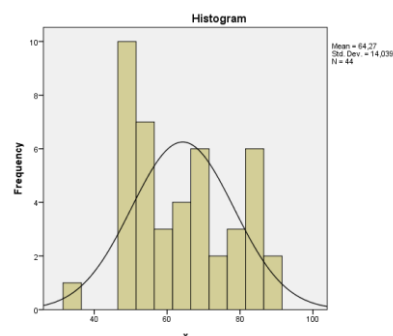
The results obtained after interviews, observations and documentation studies are the number of students in class V SD Bangetayu Wetan 02, namely the number of students as much as 44 students, also obtained the most recent value of Mathematics lessons from class V SDN Bangetayu 02, and the results obtained from the questionnaire teacher needs analysis class V SDN Bangetayu 02, table 1.1 will explain the number of students in class V SDN Bangetayu Wetan 02

Table 1. Number of Students Grade V SDN Bangetayu 02.

Number of students	Girls	Boys
44	23	21

The table shows that there are too many students, because in the ideal class the maximum is only 23 students in the class (Permendikbud no 22 2016) in the teacher class having difficulty in assessing students in Mathematics subjects the data obtained after the interview with two fifth grade teachers at SDN Bangetayu Wetan 02 namely Mrs. Sara and Mrs. Murtati, the difficulty is evident from the difficulties encountered by the teacher when supervising learning in class, the number of students that is not proportional to the number of evaluation supervisors makes one class teacher will be inconvenienced and there is noise in class, the incident was seen when the researcher made observations in class when learning was done, in making a teacher assessment instrument has difficulties that are related to the material or media used, the difficulty is reflected from the media used by the teacher is still monotonous and does not arouse enthusiasm to do an evaluation with enthusiasm. The documentation of the study shows that the grade 5 of the Final Exam scores in Mathematics will be shown through a curve or histogram.

Table 2. Curve Results of The Fifth Grade UAS SDN Bangetayu Wetan 02



The table shows that there are imperfect curves forming mountains / triangles, marked by a straight up curve at the beginning of the value, which means that a lot of low scores are obtained and causing the curve to rise directly upwards shows that children who get low scores have more numbers than children who get medium value, whereas in the middle of the curve the direct value decreases dramatically with the criteria 80-100 meaning that a moderate value is obtained between

60-70, then at the end of the curve the value decreases again meaning that only a few children get good grades, if the curve is carefully considered the value less good more students obtained than the medium and good grades, the curve shows that the frequency grade grades are not balanced, also obtained an average value of 64.27 while in SDN Bangetayu Wetan 02 the value of Mathematics lessons that are tolerated to enter KKM is 65 , the results of the calculation of the UAS grade V grade curve SDN Bangetayu Wetan 02 through SPSS is clearly a problem that must be resolved because there are not ideal grades in class V and there are too many students.

The difference in media used will affect the speed of the teacher in processing the questions to be made through the grid. That's the answer from Mrs. Sara as the V class of SDN Bangetayu Wetan 02 when interviewed about the media used to evaluate learning, even though in essence they themselves really need the media practical, most teachers have the perception that it will be easier to make assessment instruments classically but in reality they themselves feel inconvenient and difficult to make and oversee the evaluation nets and in different perspectives learners feel bored because they must always face the questions without any stimulation in a way concrete with related material, whereas in fact every knowledge gained by students contained a learning experience obtained by students in a concrete operational manner, meaning that the experience gained while learning through real picture and evaluated with a concrete operational process that has a connection with the delivery of learning it will be a harmonious line, students who have the initial stock will get perfection in analyzing the questions presented interactively.

Results of Interviews conducted with 2 class V teachers namely Sara and Mrs. Murtati There are 2 factors that make teachers need practical instruments, including difficulties in supervising students that are not proportional to the number of teacher teachers also preoccupied with class administration which makes them have two the busy side outside teaching hours, so that if assisted with practical assessment instruments and can be used at any time then the teacher's burden will be

reduced and provide a little respite, in addition to being useful for the teacher, students will also get an ideal score based on the cognitive abilities of each individual , because basically every student's right is to get ideal and pure results from the abilities possessed by students.

Next, the researcher took the data from the teacher through a data analysis questionnaire, the questionnaire was given to the teacher to find out if further action was needed regarding the evaluation of assessment instruments to help the teacher evaluation process, the needs analysis would answer how the difficulties encountered by the teacher during the learning process, especially at the evaluation stage where teachers need to make assessment instruments, assessment instruments made by researchers will help teachers make practical assessments, in addition to knowing the needs of teachers needs analysis will be the foundation of researchers in conducting studies and providing continued solutions for teachers who are sustainable

The following is a table of results from the needs analysis.

Table 3. Validity Test Results with SPSS.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12,433 ^a	13	,956	1,913	,518
Intercept	140,167	1	140,167	280,333	,038
R	,000	0	.	.	.
B	12,433	13	,956	1,913	,518
R * B	,000	0	.	.	.
Error	,500	1	,500		
Total	154,000	15			
Corrected Total	12,933	14			

Based on the data above, it is found that the Mean Square in the item column is 0.956 so that the numbers can be categorized as valid distribution, the researcher uses a reference of 0.05, while the validity requirement of an instrument is

that the Mean Square is greater than T arithmetic that is 0.632, after being tested valid then the Mean results Square is entered into the Ebel reliability test, namely:

$$R = \frac{MK_b - MK_i}{MK_B} = \frac{0,956 - 0,518}{0,956} = 0,414$$

Figure 2. Reliability

Figure 2 Reliability shows the results of 0.414 so that the instrument is declared reliable with the results obtained valid and reliability, the questions raised by researchers to teachers found that teachers really need to get new instruments that are innovative and practical in conducting the evaluation process in the classroom.

The benefits of this research for science are that this research is able to be a solution to the problems of the assessment process in elementary school and be able to provide renewable innovations for the world of education, for the community and this research school will make the public more aware of the importance of using Macromedia Flash application technology in the world of education, while for science it helps overcome problems in the field of assessment.

CONCLUSION

Based on the results of the analysis and discussion, it was concluded that the teacher had difficulty in evaluating classically, the teacher also needed an innovative new assessment instrument from the researcher in order to be a solution of the problems obtained by the teacher, besides the Macromedia Flash application handbook containing the material assessment instrument cube and beam volumes are really needed by the teacher as a guide to using the Macromedia Flash application that contains cube and beam volume assessment instruments.

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