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RESEARCH ARTICLE

THE ANALYSIS ON STUDENTS' CRITICAL THINKING IN SOLVING THE PROBLEM ON ONE-VARIABLE LINEAR EQUATION BASED ON REALISTIC MATHEMATICS EDUCATION WITH LOCAL WISDOM.

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Abstract

Realistic Mathematics Education is one particular approach in which learning process involves the real world and surrounding, especially local wisdom, which is prevalent in every region. The present study was devoted to analysing students' critical thinking in solving problem on one-variable equation. Through Realistic Mathematics Education with Local Wisdom, students in the study, totalling 36 subjects, had to solve problem on one-variable linear equation. Through qualitative approach, their performance was analysed to probe their critical thinking. The findings generated the following data on their critical thinking. The students, totalling 36 subjects, consisted of 17 male students and 19 female students. There were 7 students with exceptional critical thinking, 26 students with satisfactory critical thinking, and 3 students with moderate critical thinking. Based on the findings, the study concluded that the students' level of critical thinking in solving problem on one-variable equation based on realistic Mathematics education with local wisdom is very satisfactory.

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Introduction:-

Realistic Mathematics Education with local wisdom is one instructional approach coupled with local wisdoms. This approach involves Mathematics instruction through real world or surrounding, while local wisdom denotes local wisdom prevalent in every region. As such, realistic Mathematics education with local wisdom is one of Mathematics instructional approach, which is based on local wisdom existing in certain region. Instructional activity, which involves local wisdom or proceeds through real world, will result in better outcome. This is in line with Soejadi (in Asra, 2004:17), who contends that Mathematics instruction with realistic approach is involving reality and environment familiar to students in order to accelerate Mathematics instruction better than before. What is meant by *reality* in this regard is anything real or concrete which is easily observable or comprehensible to students through their imagination, while the term *surrounding* is the environment wherein the students live, be it school, family, or society comprehensible to students. These environments are also known as daily-life environment.

The ability to think critically is a crucial competence to be taught to students as they can analyse problems they deal with, find and choose solution to it precisely. Given the varied levels of critical thinking, teachers need to understand and analyse whether their students belong to the category of satisfactory critical thinker or developing one. In reality, students' participation is found low, as they tend to be passive when involved in learning, particularly,

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Mathematics instruction. As a corollary, the students are not accustomed to critical thinking. The students' scores in English at class 7 H of Public Junior High School 1 of Sempu have yet to reach their utmost. This evinces low Mathematics scores due to weak critical thinking.

The present study aimed at analysing the students' critical thinking. Ennis (in Nafis, 2016) defines the ability of critical thinking as the process of reflective thinking which focuses on making decision on what is believed to be done. Glaser (in Alec, 2009) points out that critical thinking is the attitude involving deep thinking concerned with issues and matters within one's experience. Solving a problem is the general objective of Mathematics instruction, in which emphasis lies on the process and strategy students deploy to solve a question or problem. Obviously, it has to go in tandem with the ability to think critically. In this study, the researcher adopted the levels of critical thinking (Paul and Elder, 2008) comprising of 6 levels.

During the research, the researcher created five-phase process to solve problems on one-variable linear equation based on realistic Mathematics education with local wisdom, aiming at probing the students' level of critical thinking. Those five phases covered understanding, explaining, solving, comparing, and concluding. The novel analysis on one-variable linear equation is the analysis based on realistic Mathematics education with local wisdom.

Research Method:-

The study applied qualitative descriptive approach, inasmuch as it delved into describing and analyzing the students' ability to think critically in solving problem on one-variable linear equation based on realistic Mathematics education with local wisdom. The study was carried out at Public Junior High School 1 of Sempu, with class 7 H chosen as the research subject for their varied Mathematics competences, covering high, moderate, and low.

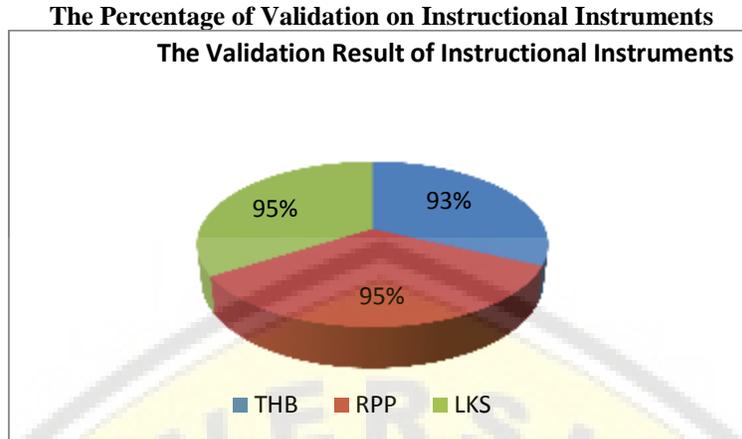
The population in the study was the entire class 7H, totalling of 36 students (19 female students and 17 male students). Data analysis done by the researcher adopted Miles and Huberman's test (in Gunawan, 2013), which comprises of three phases of qualitative data analysis: data reduction, data presentation, and drawing conclusion.

The steps in the study were divided into three phases, including preparation, implementation, and final phase. The first phase, preparation, dealt with designing the instructional instruments covering lesson plan, students' work sheets, and learning achievement reports. The second phase was implementation, in which instruction and assessment on learning achievement were operative. In the last phase, processing data, data analysis, and drawing conclusion were done.

In the research, data under assessment were the test result on students' critical thinking in solving problem on one-variable linear equation based on realistic Mathematics education with local wisdom. Subsequently, the result of data analysis cushioned the investigation on the students' critical thinking based on the indicators of critical thinking.

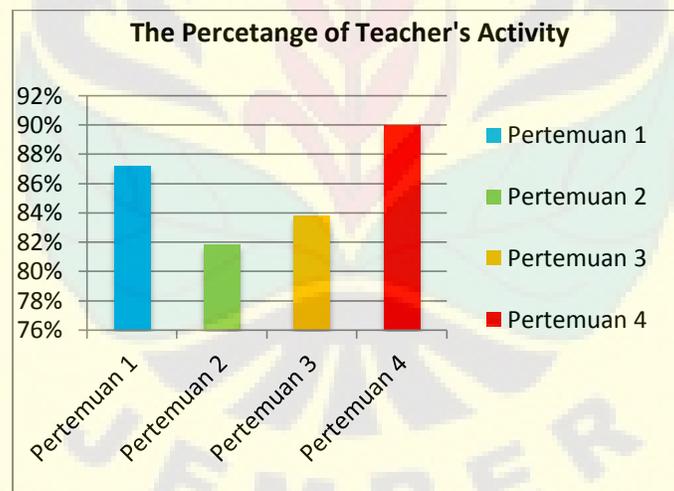
Findings And Discussion:-

The outset of the study dealt with designing research plan, during which the researcher designed required instructional instruments, designed lesson plan as well as required indicator to analyse the students' critical thinking as indicated by the test result. Having designed the plan, the researcher developed required instructional instruments to be validated by expert. The result of validation consisted of lesson plan, students' worksheet, and learning achievement test.



Referring to the validation result of instructional instruments, it was indicated that the instruments were eligible for the research purpose, marked by average validation scores over 90%. After the validation on instructional instruments, evincing their eligibility for the research, research was carried out in four meetings.

During instructional process, teacher’s activity in managing his class and students’ involvement was assessed by observer, which was meant to probe how well the instructional process was done. Hereunder is the percentage of teacher and students’ activity during the instructional process.

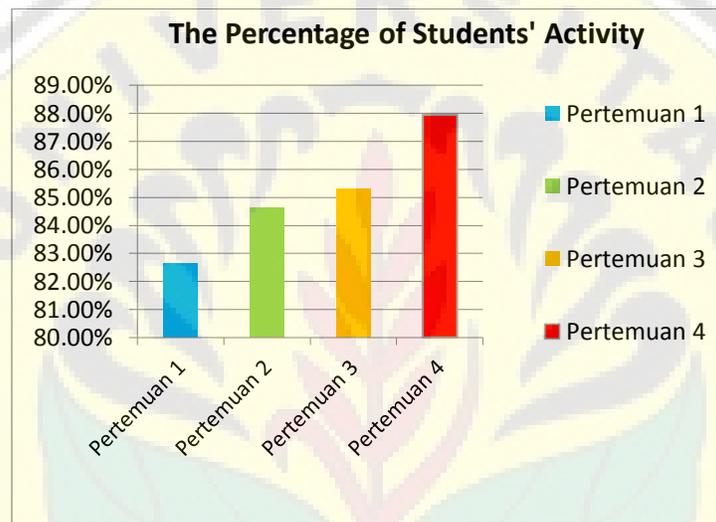


The diagram above evinces that the percentage of teacher’s activity in the first meeting indicates very good score, which is 87%. In the first meeting, the teacher informed the learning objectives, motivated the students, asked them to pay attention to the learning objectives, motivated them to raise questions on the problems presented in their worksheet, asked them to understand the problems, asked them to explain the problems, asked them to solve the problems, asked them to compare the problems, and further drew conclusion from the problems in the entire material. In the first meeting, the percentage of teacher’s activity reaches 87% criteria of fine instruction.

In the second meeting, the percentage of teacher’s activity declined to 82%, which was still at fine category. This was because he did not manage his time very well, as planned in the lesson plan, and there were some students, who were not attentive to his instruction. In this meeting, the teacher informed the learning objectives, motivated the students, asked them to pay attention to the learning objectives, motivated them to raise questions on the problems presented in their worksheet, asked them to understand the problems, asked them to explain the problems, asked them to solve the problems, asked them to compare the problems, and further drew conclusion from the problems in the entire material.

The percentage of teacher's activity in the third meeting was higher than that in the second meeting, reaching 85% within the range of fine category. In this meeting, the teacher informed the learning objectives, motivated the students, asked them to pay attention to the learning objectives, motivated them to raise questions on the problems presented in their worksheet, asked them to understand the problems, asked them to explain the problems, asked them to solve the problems, asked them to compare the problems, and further drew conclusion from the problems in the entire material.

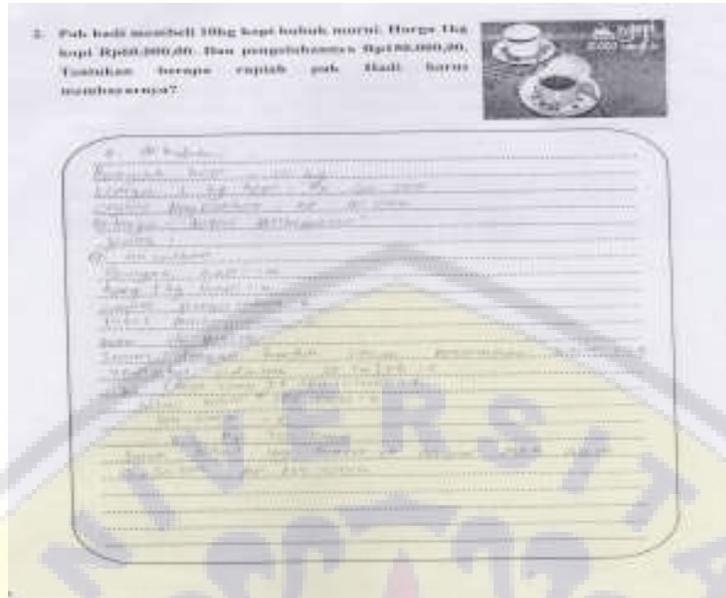
The percentage of teacher's activity in the third meeting was found higher than was that in the second meeting, indicated by a figure of 90% within the range of *very good* category. In this meeting, the teacher informed the learning objectives, motivated the students, asked them to pay attention to the learning objectives, motivated them to raise questions on the problems presented in their worksheet, asked them to understand the problem in the worksheet, asked them to explain the problem, asked them to solve the problem, asked them to compare the problem, and asked them to draw conclusion from the entire material.



The diagram above shows that from the first to the fourth meeting the percentage of students' activity reaches 82.65%, 84.65%, 85.3%, and 87.95% respectively. From the first to the fourth meeting, the students paid attention to and listened to the teacher's explanation, understood the problem in the worksheet, pointed out the problem, solved the problem, compared the problem, and drew conclusion from the material very well.

At the outset of study, particularly the planning part, the researcher prepared the research instruments, *inter alia*: observation checklist, interview guide, and test. These instruments went through expert validation. Subsequent to the validation, observation on students' activity during the class was carried out, which was done twice, both before and during the test and interview. The results of observation are presented in the following pie chart.

The instructional process through realistic Mathematics education with local wisdom aims at introducing the concept of one-variable linear equation as the instructional focus. After the concept had been introduced and explained through realistic Mathematics education with local wisdom, the students had to sit a test on solving problems on the same concept, which was one-variable linear equation. Their performance was then analysed to probe their critical thinking.

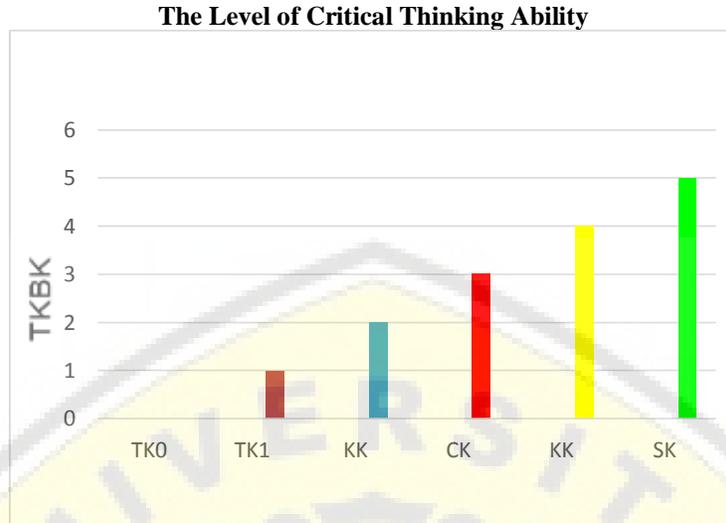


The test dealt with assessing the students' critical thinking upon solving problems dealing with one-variable linear equation, based on realistic Mathematics education with local wisdom. What follows is one of the students' responses in solving the problem on local wisdom-based one-variable linear equation. The local wisdom discussed was *ngopi sepuluh ewu* (drinking ten thousand cups of coffee).

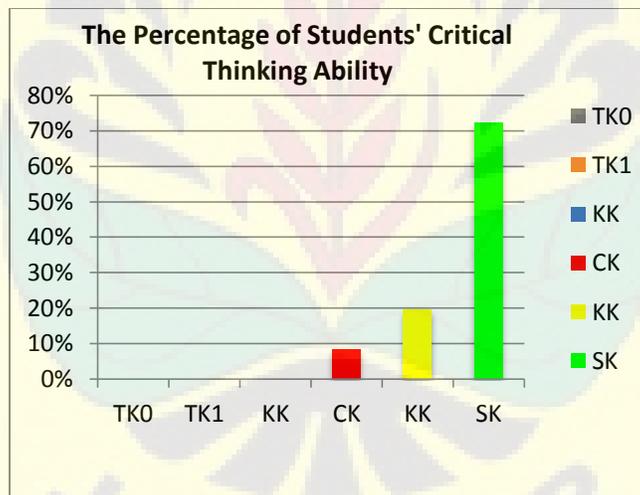
The response is one of the students' responses in solving the problem on one-variable linear equation based on realistic Mathematics education with local wisdom, focusing on *ngopi sepuluh ewu*. The response above belongs to the category of very critical thinker, as the student can provide answer based on the concept and principle of one-variable linear equation very well and provide clear and logical conclusion. In the case of students with critical thinking, they can analyse information of problem and provide answer well, and they can apply the concept and principle of one-variable linear equation. By contrast, the students with moderate critical thinking have yet to be able to analyse the information of problem and provide answer using the concept and principle of one-variable linear equation.

As evinced by the students' responses of various levels of critical thinking, the study has concluded that the students' responses at very critical thinking category can provide answer with clear, precise, and accurate assumption, provide answer based on information based on relevant data and fact, and use precise concept as well as procedure in drawing conclusion. In the case of those at critical thinking level, the students can provide answer in the form clear, precise, and accurate assumption and base their answer on relevant data and fact. Nonetheless, they have not been able to use proper concept and procedure or draw clear conclusion. In the case of students' responses at moderate critical thinking level, they have not been able to provide clear, precise, and accurate assumption in their answers, provide answers supported with relevant data and facts, apply proper concept and procedure, or draw clear conclusion.

Based on the research at Public Junior High School 1 of Sempu, involving 17 male students and 19 female students, it has been found out that 7 students are capable of very critical thinking, 26 students are capable of critical thinking, and 3 students are capable of moderate critical thinking.



As shown in the diagram above, the students' critical thinking ability is divided into 6 levels, comprising of TK 0 (very uncritical thinking, TK 1 (uncritical thinking, KK (low critical thinking), CK (moderate critical thinking), KK (low critical thinking), and SK (very critical thinking).



Based the analysis on the students' critical thinking level, the study found that 19,44% of the students were at very critical thinking category, 72,22% of the students were at critical thinking category, and 8,333% of the students at moderate critical thinking category. In addition to observation result, the researcher also presented the students' test result.

Conclusion And Suggestion:-

Corroborated by the research findings, the present study concluded that the students' critical thinking abilities in solving problems on one-variable linear equation based on realistic Mathematics education with local wisdom were variant. The students, totalling of 36 subjects, belonged to different levels of critical thinking: very critical (7 students), critical (26 students), and moderately critical (3 students).

The researcher proposed several suggestions to herself for better work. These include providing more fine-grained explanation on the research process, improving the study's novelty, and obtaining more maximal bases from the previous studies.

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