**Developing the Ability of Understanding and Self-confidence the Mathematical Students with VBA for Excel**

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ABSTRACT

Visual Basic Application for Excel is a simple program language and has the power to process data quickly, let alone the utilization of math functions in Microsoft Excel can help work on Excel display more interactive so that teachers can create props inside Excel. The advantages of Microsoft Excel compared to mathematical software are the many math functions and images available in the form of shapes or pictures.

With the availability of VBA, math and image functions in Microsoft Excel, teachers can design the creation of media related to mathematics learning especially helping to develop the ability of junior high school students who have difficulty connecting mathematics lessons with basic mathematics knowledge requirements. In general, that most students in Indonesia have not solved mathematical problems, therefore, by using VBA for Excel the ability of junior high school students to improve in the usual way significantly with a t-test with 0.006 <0.05 and there is an association between Trust self-comfidence student with students' mathematical comprehension skills with a contingency value with a significant amount of 0.016 <0.05 with a contingency coefficient of 0.525 including a moderate association.

**Keywords:** VBA for Excel, Excel Microsoft, Ability to Understand, Self- Confidence

**Introduction**

Mathematics is one of the most essential foundations so that the subjects are taught from an early age to college, it can not be denied that all circles much need mathematics without being limited by age, because with mathematics, human beings can develop logical, analytical, systematic, critical, and creative thinking skills, as well as cooperative abilities applied in daily inhalation (Bernard, 2015: 198).

But many obstacles faced by students facing math problems, because of the lack of skills prerequisite students that they should be able to master. And their tendency depends on the way the work process should be followed without understanding the actual storyline. The math subjects in the school cause this factor are monotonous and less varied in the use of instructional media, thus fewer interest students (Bernard, 2014: 425).

One that must be mastered by students as the key is to learn the concept of counting operations such as sum, subtraction, multiplication, and division. Or associate the mathematical functions that the student thinks are new material but which have actually been studied previously. So the difficulties of students not yet understand the mathematics to the next stage because it has not been able to associate the basic mathematics or the so-called prerequisites, this is in accordance with Astusi (2018: 69) that students in Indonesia are not accustomed to solving problems.

Another student's difficulty is conveying mathematical symbols and identifying to distinguish symbols such as understanding about variable differences and constants, in fact, the linkage of this concept has been studied as to the set or may be analogous to other forms. Of course, this is needed by the media visually so that students understand from some examples. Benefits of mathematics learning media are petrified students who are concrete operational phase in understanding the material that is abstract or less able to be explained by using verbal language (Coal, 2017: 15). Media to be created must be in accordance with the achievement of mathematics subjects are being studied in the classroom.

To create mathematical media, it should be designed according to learning strategy about the effectiveness of time, space, and materials. Because it is not easy media can be made with a short, but not necessarily be useful for students, but the purpose of media provides convenience to students to understand the material so that during the process of mathematics, students are not dependent on the source text (Wijayanti & Khikmiyah, 2016)

Based on the utilization and the purpose of the media, that ICT is one technology that can be used as an alternative media. Because by using ICT, already provides images of various shapes and sizes so easily designed well. ICT-based media one of them is Microsoft Excel, and the software is rich in mathematical functions for data processing. Microsoft Excel also provides images such as Shapes, Picture, Graphics, and Diagrams, but at this time most people still connect the data processing cells with graphics. In fact, running Shapes, Picture, Graphs, and Diagrams into a dynamic form by using Visual Basic Application for Microsoft Excel.

According to Chotimah, Bernard, & Wulandari (2018: 4) that Visual Basic Application can create drawings that are designed into a more interactive mathematical tool, and also do not have to cost, and do not need much consideration to choose the material. And even the Visual Basic Application language has a language structure that is not so difficult because the word is a lot of high school students or as a science prerequisite for teachers.

The ease of Microsoft Excel software by using VBA, delivering students can compile or process the understanding to make the steps structured, it is agreed with Senjayawati & Bernard, (2018: 66) that the mathematical software can also solve the problem of the theorem or the definition of mathematics by composing until the destination results.

**Research Methods The**

Research was conducted in one of the junior high schools in cimahi city, and the selection of samples in two classes were 30 students of class VII A as an experimental class which was a classroom with VBA-based mathematics learning game for Microsoft Excel while class VII B consisted of 33 students as control class or classes that are learning in the normal way. Methods of research design with Quasi-Experiments, as follows:

O X O (Sulaeman, 2018: 47)

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O O

O: Pretest / Posttest Ability Understanding

X: Using VBA-Based Games for Microsoft Excel

-----------: Sample is not random

**Result of Research**

At the time of pretest, the experimental class and control class are given about the ability to understand about the equation of one variable, and the results obtained from both groups in table 1.

**Table 1. Average Value and Standard deviation When Pretest**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Class** | **Average** | **Standard Deviation** |
| 1 | Experiments | 7.08 | 1.73 |
| 2 | Controls | 7.48 | 1.84 |

Table 1 shows that in the experimental class has an average value the 7.08 and the 7.48 control classes which mean the control class is higher than the experimental category. And seen the standard deviation, Experiment class 1.73 and control class 1.84, where for standard deviation of experiment class is smaller than control class, it means the value of spreading of experiment class data more evenly than control class, and for whether there is difference of mean of between experimental class and control class, the first step is whether the two grades of students of the course are normally distributed or not.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2. Normal Test of Pretest** | | | | | | | |
| **Class** | | **Kolmogorov-Smirnova** | | | **Shapiro-Wilk** | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| Value | Control Class | .139 | 29 | .157 | .922 | 29 | .034 |
| Class Experiment | .147 | 32 | .078 | .955 | 32 | .196 |
| 1. Lilliefors Significance Correction | | | | | | | |

In Table 2, for a normal test using the Kolmogorov-Smirnov, where the results of statistical values for a class of 0,139 controls, degrees freedom 29 and significant amount 0,157 and for an experimental class result of statistic value 0.147, a degree of freedom 32 and considerable value 0,78. since the significance level of the table is 0.05 then the two significant amounts for the control and experimental classes are greater than 0.05 meaning that the two data are normally distributed, then the homogeneous test will be continued to see whether the dispersion of values a gainst the mean is the same or not.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3. Test of Mean Differences of Experiment Class and Control when Pretest** | | | | | | | | | | |
|  | | **Levene's Test for Equality of Variances** | | **t-test for Equality of Means** | | | | | | |
| F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| Lower | Upper |
| Value | Equal variances assumed | .416 | .521 | .850 | 60 | .399 | .389 | .458 | -.527 | 1305 |
| Equal variances not assumed |  |  | .847 | 57.45 | .400 | .389 | .847 | -.530 | 1,308 |

From data table 3, shows that the value of the second F test of the data is 0.461 and the significant amount of 0.521 is greater than 0.05, meaning that the two data are homogeneous. To see the average difference between the two groups, taken from the t-test on the data having the same variance of 0.85 with the degrees of freedom 60 and the significant 2-tailed value of 0.399. This means that the two average values are no different.

**Table 4. Average Value and Standard Deviation At Postest**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Class** | **Average** | **Standard Deviation** |
| 1 | Experiments | 17.19 | 1.91 |
| 2 | Controls | 16.03 | 1.56 |

Table 4 shows the average grade of students at postest or at the time after given the average score for the experimental class 17.19 and the average for the control class 16.03 means that the average value of the experimental level is greater than the average value of the control class, while for the standard deviation value for the experimental class 1.91 and control class 1.56 and since the control class has a standard value smaller than the experimental level, then the scores of the students' grade of control on the average value are more evenly than the experimental class. And to see the average difference between the two classes, both data must normally be tested.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 5. Normality Test at Postest** | | | | | | | |
| **Class** | | **Kolmogorov-Smirnova** | | | **Shapiro-Wilk** | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| Value | ClassControl | .158 | 29 | .054 | .956 | 30 | .249 |
| Experiment Class | .148 | 32 | .071 | .970 | 32 | .512 |
| a. Lilliefors Significance Correction | | | | | | | |

In Table 5, the statistical value used Kolmogorov-Smirnov for Control class 0.1458, degrees of freedom 32 and significant amount 0.071. For control class statistic value 0.158, degrees of freedom 29 and considerable value 0.054. Since both data have the considerable value greater than 0.05, then both data are the normal distribution and continued with the homogeneous test.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 6. Test of Mean Differences of Both Classes When Postets** | | | | | | | | | | |
|  | | **Levene's Test for Equality of Variances** | | **t-test for Equality of Means** | | | | | | |
| **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** | **Mean Difference** | **Std. Error Difference** | **95% Confidence Interval of the Difference** | |
| Lower | Upper |
| Value | Equal variances assumed | 1.124 | .293 | -2.595 | 60 | .012 | -1.154 | .445 | -2.044 | -.264 |
| Equal variances not assumed |  |  | -2.611 | 58.978 | .011 | -1.154 | .442 | -2,039 | -.270 |

Table 6 shows that F test for both data is 1,124 with significant value 0,293 bigger than 0,05 meaning that both information is homogeneous, then continued with analysis of difference of average that is t test and got value -2,59, degree of freedom 60 and amount significant 0.012 for 2-tailed while 1-tailed to see that which grade is better, then the considerable value is divided into 2 into 0.006 (Uyanto, 2009: 153) less than 0.05, and according to table 4 that the average value of the experiment larger than the control class then the experimental level is better than the control class.

To see if there is an increase in pretest or early learning with post-learning then the N-Gain seen on each student based on table 1 and table 4 shows that both classes show an increase in mean value, then compare which is better N- gain between two levels.

**Table 7. Average Value and Standard Deviation N-Gain**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Class** | **Average** | **Standard Deviation** |
| 1 | Experiments | 0.77 | 0.24 |
| 2 | Controls | 0.68 | 0.16 |

In Table 7, that the average value of N-gain in the class the experiments were larger than the average N-gain values in the control class, and the standard deviation value of N-gain of the control class was smaller than that of the experimental N-gain class, meaning that the control group's N-gain values were more evenly distributed than the experimental level. To see the difference in the average of the two classes especially for the normality test of the two data.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 8. N-Gain Normality Test** | | | | | | | |
| **Class** | | **Kolmogorov-Smirnova** | | | **Shapiro-Wilk** | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| Value | ClassControl | .107 | 29 | .200\* | .980 | 30 | .837 |
| Experiment Class | .112 | 31 | .200\* | .955 | 32 | .200 |
| \*. This is a lower bound of the true significance. | | | | | | | |
| a. Lilliefors Significance Correction | | | | | | | |

In Table 8, it shows that the statistical value using Kolmogorov-Smirnov for the experimental class is 0.112 and the control class is 0.107 with each degree of freedom 29 and 32 and has a significant amount of 0.200 greater than 0.05, meaning that the two data are typically distributed. And continued with a homogeneous test.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 9. Mean Differences Test N- Gain** | | | | | | | | | | |
|  | | **Levene's Test for Equality of Variances** | | **t-test for Equality of Means** | | | | | | |
| **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** | **Mean Difference** | **Std. Error Difference** | **95% Confidence Interval of the Difference** | |
| Lower | Upper |
| Value | Equal variances assumed | .419 | .520 | -2557 | 60 | .013 | -.09597 | .03754 | -.17106 | -.02088 |
| Equal variances not assumed |  |  | -2 566 | 59 842 | .013 | -.09597 | .03740 | - .17078 | -.02117 |

Table 9, shows the F test value of both data is 0.419 and a significant amount of 0.52 greater 0.05 means that the two average values of N-gain are homogeneous, followed by the test of average difference with using t-test, with t -2,557 value, degree of freedom 60 and significant amount of 2-tailed 0.013, to see t-tailed test result hence substantial result of t 2-tailed t-test divided by equal to 0,0065 smaller than 0, 05 means that the average value of N-gain experiment better than the control class.

Viewed from the ability of students based on high ability, medium and low to the students' assessment of the knowledge of understanding mathematics by using VBA-assisted math games for Microsoft Excel.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 10. Association of Student Math Ability to Student Understanding** | | | | | |
|  | | **Ability of Mathematics** | | | **Total** |
| **Low** | **Medium** | **High** |
| Understanding Ability | Low | 1 | 3 | 2 | 6 |
| Medium | 6 | 11 | 5 | 22 |
| High | 0 | 4 | 0 | 4 |
| Total | | 7 | 18 | 7 | 32 |

In table 10, it explains that there is 1 student who has low mathematics ability is also low on the strength of understanding, there are 3 students of moderate math skills but low comprehension ability, there are 2 students high ability in mathematics but low comprehension ability, there are 6 students low ability of math but ability of understanding of being, there are 11 students that ability of math and the mathematical knowledge of the agreement is also being, there are 5 students with high math ability but medium understanding ability, there are 4 students of medium math ability but high understanding ability. Means there is an increase of 85% of students have low capacity to have a moderate value, there is a decrease of 16.67% average ability of math has low comprehension ability, but an increase of 22.22% math ability has a high understanding ability. While high math ability 71.43% decline in the ability to moderate and 28.57% comprehension ability to lower the 20 highest value and lowest value 13.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 11. Value of Chi Square forAssociation.** | | | |
|  | Value | df | Asymp Sig. (2-sided) |
| Pearson Chi-Square | 4.040a | 4 | .401 |
| Likelihood Ratio | 5,475 | 4 | .242 |
| Linear-by-Linear Association | .224 | 1 | .636 |
| N of Valid Cases | 32 |  |  |
| a. 8 cells (88.9%) have expected count less than 5. The minimum expected count is .88. | | | |

Table 11 explains the value of Chi Squares 4.04, 4 freedom counts with a significant amount of 0.401 greater than 0.05 meaning that there is no association between mathematical ability and students' comprehension abilities.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 12. Association of Student Self Confidence Questionnaire with Understanding Skill Student** | | | | | |
|  | | **Questionnaire** | | | **Total** |
| **Low** | **Medium** | **High** |
| Value | Low | 1 | 3 | 1 | 5 |
| Medium | 5 | 16 | 1 | 22 |
| High | 0 | 1 | 4 | 5 |
| Total | | 6 | 20 | 6 | 32 |

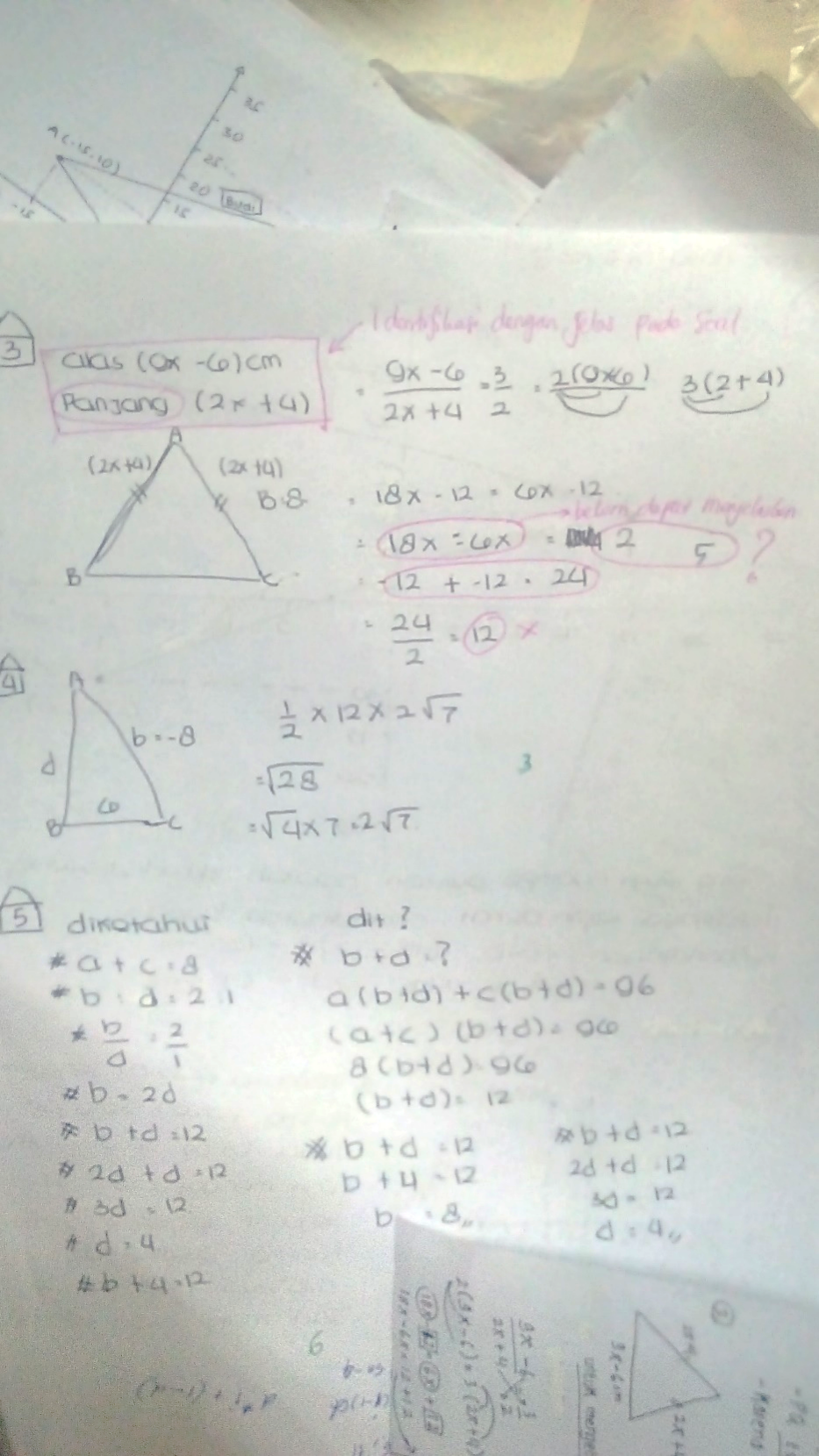
Table 12 explains that there is 1 student with low and ability low understanding, there are 3 students with moderate questionnaire but have low score, there are 2 students with high questionnaire but low comprehension ability, there are 5 students with low questionnaire but have medium understanding ability, there are 16 students have medium questionnaire and have medium ability, there is 1 students, with high questionnaire but medium understanding ability, there are 1 students with a medium questionnaire, there are 4 students with high questionnaire and high comprehension ability. Consistently 16.67% of students with low questionnaires and low comprehension skills, 80% of students with medium questionnaires and medium comprehension skills and 50% of students with high questionnaires and high comprehension skills.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 13. Contingency Questionnaire and Student Understanding Understanding** | | | | | |
|  | | **Value** | **Asymp. Std. Errora** | **Approx. Tb** | **Approx. Sig.** |
| Nominal by Nominal | Contingency Coefficient | .016 |  |  | .525 |
| Ordinalby Ordinal | Gamma | .255 | .335 | .729 | .466 |
| Spearman Correlation | .169 | .229 | .940 | .355c |
| interval by interval | Pearson's R | .184 | .214 | 1.024 | .314c |
| N of Valid Cases | | 32 |  |  |  |
| a. Not assuming the null hypothesis. | | | | | |
| b. Using the asymptotic standard error assuming the null hypothesis. | | | | | |
| c. Based on normal approximation. | | | | | |

In table 13, explaining the contingency value of the association between students 'self-confidence questionnaires with students' comprehension ability is obtained with a value of 0.525 is a moderate category and for a significant value of 0.016 less than 0.05 means that there is an association between students 'self-confidence and students' understanding ability.

**Discussion**

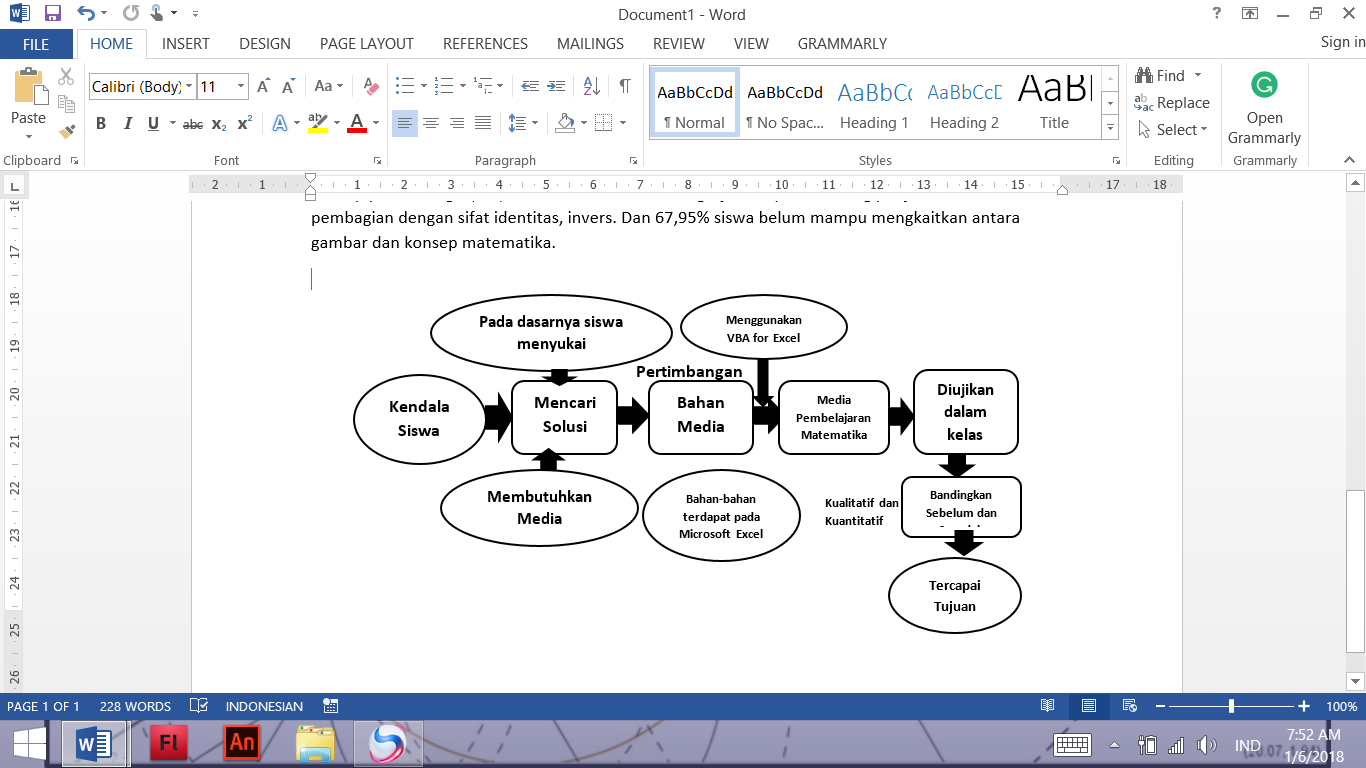
Students have difficulty at the beginning of learning to determine the value of x from the equation on two segments. The cause of the students' barriers from the seventh grade students has not mastered the basic prerequisites of mathematics ie students have not been able to share concepts, the properties of addition and multiplication operations such as commutative, distribution, identity, inverse and distribution.



**Figure 1.** Student Difficulties in the Counting Process

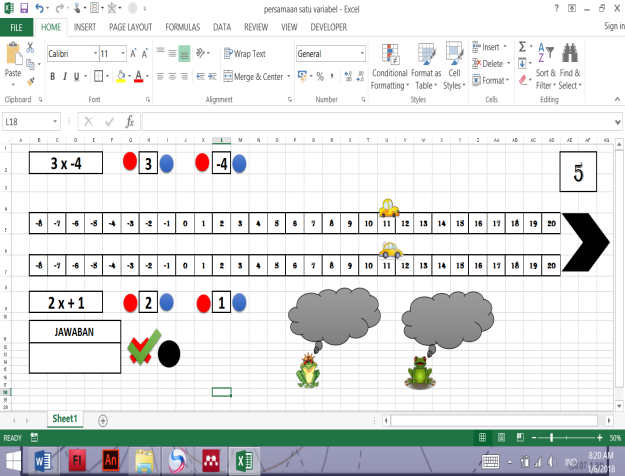
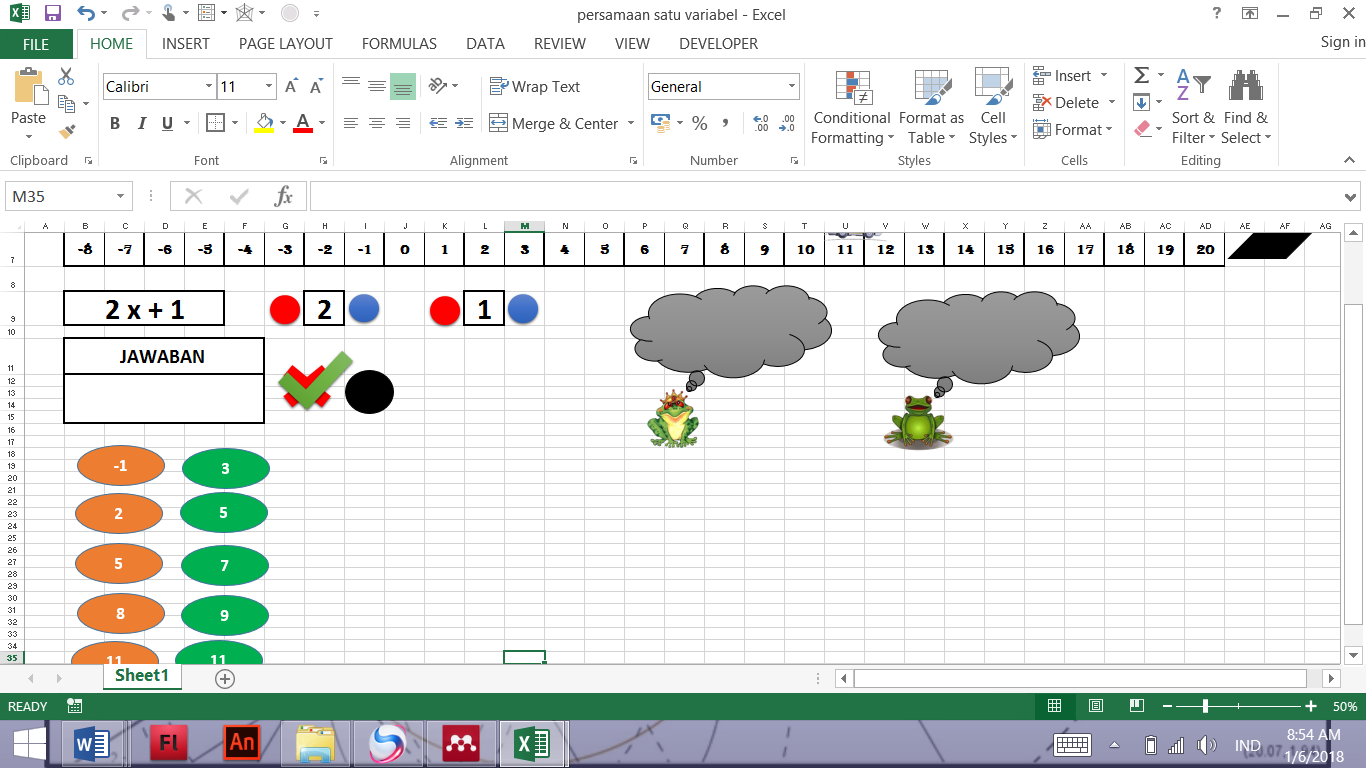
In Figure 1, the first grade of junior high school students is mistaken, the beginning, it is not appropriate to adjust the problem between the problem and the picture. Secondly, the multiplier counting process is correct but when the method determines the value of x, the student begins to get confused, seen when the student moves the 6x amount from the right and the left, as well as the number of the -12 from left to right, and the end result is less precise .

From the results of observation workmanship of 32 students, according to the way the process of calculating the mathematics of 10.64% student miscalculation process with the nature of the distribution, 54, 37% error students in the concept of comparison, 68.53% error students do sum and counting operations with properties identity, inverse. And 67.95% of students have not been able to relate between drawing and mathematical concepts.



**Figure 2.** Mathematics Game Design Game

In the first step, the researchers collected the results of workmanship data from 32 students, as a material consideration. The second step the researchers create a solution that can link between mathematical concepts with instructional media in accordance with the cost and time of manufacture. Judging from its utilization, the media of learning mathematics by using Microsoft Excel-based VBA more practical and efficient, because in the software already provides images with different shapes and sizes taken from Shapes in the Insert menu, in addition, the images can be taken from the Picture in Insert menu.



**Figure 3.** Designing a Picture of Math Game in Microsoft Excel The

Drawings designed according to the relation of the mathematical concept are the equations of one variable. By making a story of the difference of the two-car journey that has the difference of speed and distance difference, and the time specified describes as answer x. And to move the car depends on the equation of each, while the two frogs as observers to see the difference in the distance of the initial car and the difference in the distance of the car as it begins to move as the reason for moving the variables and numbers from one segment to the other, then the students answer the result of x whether same on the result of the answer when the car is moved, of all the commands will be connected using the Visual Basic language, then the code is written in Visual Basic Application for Microsoft Excel.

'Create a time function

Sub time ()

' create sheet definition as worksheet in Microsoft Excel

Dim sheet As Worksheet

'Make definitions for a, b and c as integers

Dim a As Integer

Dim b As Integer

Dim c As Integer

' enable sheet on sheet1 in Microsoft Excel

Set sheet = Worksheets (1)

'ordered on cell AE2 to increment 1 when button is pressed

Range ("AE2") = Range ("AE2") + 1

' a is equal to cell in AE2

a = Range ("AE2" )

'b is equal to the multiplication of the value of a with the value in cell H2

b = a \* Range ("H2")

' c equals the multiplication of the value of a with the value in cell H9

c = a \* Range ("H9")

' Running car1 on position of cell horizontally

sheet.Shapes ("mobil1"). Left = Cells (4, 10 + b + Range ("L2")). Left

'Runs mobil1 on cell position vertically

sheet.Shapes ("mobil1" ) .Top = Cells (4, 10 + b + Range ("L2")). Top

'Running mobil2 on cell position horizontally

sheet.Shapes ("mobil2"). Left = Cells (6, 10 + c + Range ( "L9")). Left

'Running mobil2 on cells position vertical

lembar.Shapes( "mobil2"). Top = Cells (6, 10 + c + Range ( "L9")). Top

'Closing time function

End Sub

One programming language code to make a game of mathematics is a command to run the car, according to the equation of one variable. This Visual Basic code will be associated with cells in Sheet1 in Microsoft Excel and inserted into one of the images as the driving button of the two cars.

'Create function to create value added on variable x

Sub increment1 ()

' Make value on cell H2 increase 1 when button pressed

Range ("H2") = Range ("H2") + 1

'Create condition based on value on cell H2

Select Case Range ("H2")

'If the value of the cell is equal to 1

Case 1

' And if the cell of L2 is greater than 0 then

If Range ("L2")> 0 Then

'Will be written on cell B2 by joining x + cell L2

Range ("B2") = "x +" & Range ("L2")

'If not then

Else

' and on cell L2 equals 0 then

If Range ("L2") = 0 Then

'Will be written on cell B2 is x

Range ("B2") = "x"

'If not then

Else

' And if cell L2 is smaller 0 then

If Range ("L2") <0 Then

'Cell B2 will be written X and cell on L2

Range ("B2 ") =" x "& Range (" L2 ")

'Closing function if the third section

End

If'Close the function if the second part

End If

'Close the function if the first section

End

If'If the conditions in the cells H2 equal to -1

Case -1

'And if cell H2 is less than 0 then

If Range ( "L2")> 0 Then

'Will be written on cell B2 by merging -x + with the inscription on cell L2

Range ("B2") = "-x +" & Range ("L2")

' if not then

Else

'If cell in L2 equals 0 then

If Range ("L2") = 0 Then

'Cell B2 will be written -x

Range ("B2") = "-x"

' If not then

Else

'If cell L2 is less than 0 then

If Range ( "L2") <0 Then

'Cell B2 will be written merging -x with cell L2

Range ("B2") = "-x" & Range ("L2")

' Closes if at third part stage

End If

'Closes if at stage the second part

End If

'Closes if in the first part stage

End If

' The cell condition H2 is equal to 0

Case 0

'And the cell in L2 is not equal to 0

If Range ("L2") <> 0 Then

' B2 cell will be written equal to the cell on L2

Range ("B2") = Range ("L2")

'If not then

Else

' and cell L2 equals 0 then

If Range ("L2") = 0 Then

'Cells on L2 will not be written anything

Range (" B2 ") =" "

'Closes the if function in the second part stage

End If

' Closes the if function in the first part stage

End If

' ng from -1

Case Is <-1

'And cell H2 is greater than 0 then

If Range ("L2")> 0 Then

' Cells on B2 will be written merging between posts on cell H2 and with x + and cell L2

Range (" B2 ") = Range (" H2 ") &" x + "& Range (" L2 ")

'if tidk then

Else

' And cell L2 equals 0 then

If Range (" L2 ") = 0 Then

'Cell B2 will be written same as the merging of L2 and x

Range ("B2") = Range ("H2") & "x"

'If not then

Else

' If cell L2 is less than 0 then

If Range ("L2") <0 Then

' Cell B2 will be written merge written on H2, x and written on L2

Range ("B2") = Range ("H2") & "x" & Range ("L2")

'Closes the if program in the third stage

End If

' Closes program if the second phase

End If

'Close the program if the first phase

End If

'If condition in H2 greater than 1

Case is> 1

'And if the cell is larger L2 0 then

If Range ( "L2")> 0

then'cells B2 will be written merging

Range ("B2") = Range ("H2") & "x +" & Range ("L2")

'If not then

Else

' And if cell L2 is same with 0 then

If Range ("L2") = 0 Then

'Cells on B2 will be written merging H2 cells with x

Range ("B2") = Range ("H2") & "x"

' If not then

Else

' L2 is less than 0 then

If Range ("L2") <0 Then

'Cell B2 will be written merging cells H2, x and cell L2

Range ("B2") = Range ("H2") & "x" & Range ("L2 ")

'Close the function if at this stage of the third section

End

If'Close the function if at this stage of the second section

End If

'Close the function if at this stage of the first section

End

If'Close the function Select Case

End Select

'Writing on the cell AE2 equals 0

Range (" AE2 ") = 0

'Closes the added function1

End Sub

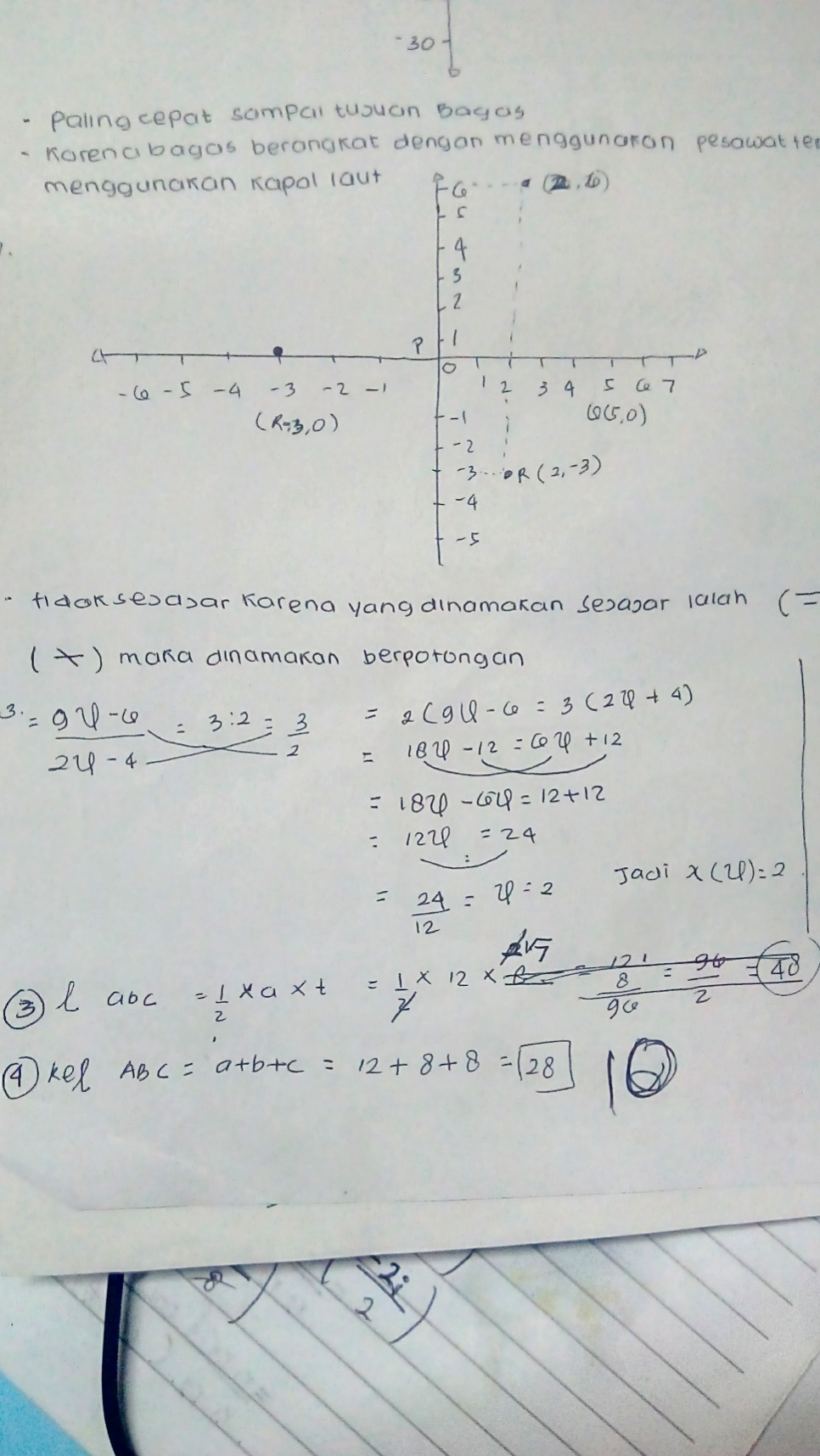
The above function can also be applied to a reduced value in the variable part of the variable, and the difference lies in Range (" H2 ") = Range (" H2 ") + 1 changes on positive symbol to negative form will be the Range ("H2") = Range ("H2") - 1. Demikain for the constant value, in the same way as in the variable part that distinguishes the H2 cell on the variable element while the cell L2 at the continuous region.

After you finish creating a VBA-based math game for Microsoft Excel and then tested to students in the classroom, so students can deduce from some examples of questions related to the equation of one variable.



**Figure 4.** Students Practicing Gaming Media in Microsoft Excel

Students try from several examples of the equations of a mathematical variable then practiced from the properties of counting operations so that students can deduce from the process through the math game.



**Figure 5**. Students Understood About Equations One Variable

When given the question of equalization one variable, students have understood the concept of the properties of addition and multiplication operations, thus displaying the right results. By providing a mathematical game, students tend to be more active in discussing with peers and actively giving opinions if there is a wrong, accurate calculation process.

**Conclusion**

Based on the results of research that VBA-based Math Games for Microsoft Excel can improve the ability of students to understand the junior high school and foster a sense of confidence students to work on the equation of one variable. By using mathematics learning media using VBA for Microsoft Excel, teachers can make props more practical and efficient. As well as helping teachers to deliver interactive images relating to math materials at school.

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