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Abstract

A lot of students have difficulty in Math. Every semester there are always students who get D or E for Math. It makes low average score and the students who get E or IP<2,00 are dropped out. The lecturer must have many methods to help them. The Derive Program of Window software can help the students to increase their motivation. The functions of Derive Program are like a calculator. The subjects depend on the needs of the Department. For Civil Engineering needs the subject of Matrix, Determinant, Equation, Graphs, Derivative, and Integral. The result of average Math score of Derive Program is better than the Theory. The motivation of students has increased and students have enjoyed, have fun and spirit, and are more interested to solve problems in Math.

Keywords: *learning; motivation; derive program*

Abstrak

Turunkan Implementasi Program di Matematika (Pembelajaran Matematika Politeknik Negeri Malang). Banyak siswa mengalami kesulitan dalam Matematika Setiap semester selalu ada siswa yang mendapatkan D atau E untuk Matematika, sehingga menghasilkan nilai rata-rata yang rendah dan siswa yang mendapatkan E atau IP <2,00 dikeluarkan, dosen harus memiliki banyak metode untuk membantu mereka. Program Derivatif perangkat lunak Window dapat membantu siswa meningkatkan motivasi mereka. Fungsi Program Turunan seperti kalkulator. Subyek bergantung pada kebutuhan Jurusan Teknik Sipil membutuhkan subjek Matriks, Determinan, Persamaan, Grafik, Derivatif, dan Integral. Hasil rata-rata nilai Matematika Derif lebih baik dari pada Teori. Motivasi siswa meningkat dan siswa telah menikmati, memiliki menyenangkan dan semangat, dan lebih tertarik untuk memecahkan masalah di Matematika.

Kata Kunci: pembelajaran; motivasi; mendapatkan program

INTRODUCTION

The mathematics learning at State Polytechnic of Malang had not just a theory in the classroom, but also practiced at the Computer Laboratory. The department of Electrical Engineering uses Math Lab, while in Civil Engineering and Mechanical Engineering use Derive Program. Almost all Mathematics problems can be solved by the Derive Program.

The students of Civil Engineering enjoyed and were active when they learned Mathematics in the computer laboratory. All students had finished Mathematics problems easily. The students clapped when the lecturer gave the problems that were quickly and correctly answered. . The atmosphere was fun and happy. The students only operated the computer by using the notation of Derive Program. Santos (2011) said, the Derive Program was like a calculator, only by operating notation, numbers, equations, and whatever was needed to solve the problems of mathematics.

Furthermore, Hakim (2001) said, the students' achievement in mathematics had increased than just by learning theory in the classroom. This was obvious from the fact that the average test scores were high. Almost all mathematics problems can be solved by the Derive Program, such as Equations, Graphs, Matrix, Determinant, Limit, Derivative and Integral.

MATERIALS AND METHOD

The students must pay attention to the notation of Derive Program. Because the notation will determine the answers are right or wrong. Usually, the answers are wrong if the students.

RESULT AND DISCUSSION

Hakim (2001) said, the benefits of the Derive Program are described as follows. Precision, accuracy of the calculation to 15 decimal digits, test

measurement units and dimensions, solving simultaneous equations and inequalities, identifying complex numbers and variables, recognize octal, decimal, and hexadecimal, being able to analyze the trigonometric functions, hyperbolic and exponential, can be used for analysis statistics, perform fast Fourier transform, matrix operations and vector element reaches 8000, size charts reaching 127 rows and 127 columns

There are procedures to solve problems with Derive Program, as stated as follows in the guidebook.

Integral

1. $\int_2^4 2x^3 - 4x^2 + 2\ dx$

The solution step is as follows.

Typed : 2x^3 – 4x^2 + 2
Enter
Select : $\int$
Variable : x
Select : ° Definite
Lower limit : 2
Upper limit : 4
Select : OK
Select : =
Answer : $\frac{148}{3}$
Answer decimal, select ≈
Answer : 49,33

2. $\int (2t - 1)\ dt$

The solution step is as follows.

Typed : (2t – 1)
Enter
Select : $\int$
Variable : t
Select : indefinite
Constant : c
Select : OK
Select : =
Answer : $t^2 - t + c$

3. $\int_0^{\frac{\pi}{2}} 3 \sin 2t + 4\ cost\ dt$

The solution step is as follows.

Typed : 3 sin (2t) + 4 cos (t)
Enter
Select : $\int$
Variable : t
Pilh : definite
Lower limit : 0
Upper Limit : $\frac{\pi}{2}$
Select : OK
Select : =
Answer 7

Limit

4. $\lim_{x \to -2} \frac{x^2-4}{x+2}$

The solution step is as follows.

Typed : (x^ 2 – 4) / (x + 2)
Enter
Select : lim
Variabel : x
Limit point : -2
Approach from : ° $both$
Select : OK
Select : =
Answer : - 4

5. $\lim_{x \to 0} \frac{\sqrt{4+x}-\sqrt{4-x}}{x}$

The solution step is as follows.

Typed : $(\sqrt{(4+x)} - \sqrt{(4-x)})$ / x
Enter
Select : lim
Variable : x
Limit point : 0
Approach from : both
Select : OK
Select : =
Answer : $\frac{1}{2}$

Derivatif

6. Determine f " of f(x) = $\sqrt{x^2 - 4}$

The solution step is as follows.

Typed : √(x^2-4)
Enter
Select :∂
Variable : x
Order : 2
Select : OK
Select : =
Answer : $-\frac{4}{(x^2-4)^{\frac{3}{2}}}$

7. find h' ($\frac{\pi}{2}$) if h = 2 sin $3\gamma + 4 \cos 2\gamma$

The solution step is as follows.

Typed : 2 sin $(3\gamma) + 4 \cos(2\gamma)$
Enter
Select : ∂
Variable : γ
Order : 1
Select : OK
Select : =
Select : SUB
Variable : γ
New Value : $\frac{\pi}{2}$
Select : OK
Select : =
Answer : 0

8. Determine y' at t = $\frac{\pi}{4}$ if y = $\tan^2 t$

The solution step is as follows.

Typed	: tan^ 2 (t)
Select	: ∂
Variable	: t
Order	: 1
Select	: OK
Select	: =
Select	: SUB
Variable	: t
New Value	: $\frac{\pi}{4}$
Select	: OK
Select	: =
Answer	: 4

Matrix and Determinant

9. If $A = \begin{pmatrix} -2 & 3 & -1 \\ 4 & -3 & 6 \end{pmatrix}$ and B = $\begin{pmatrix} 2 & -4 & 3 \\ 3 & 4 & 4 \\ -1 & -3 & 2 \end{pmatrix}$,

determine

a. 3AB

b. $|B|$

c. $-4AB^T$

d. B^{-1}

These are steps to solve above problem.

Select : $\begin{bmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{bmatrix}$

Put the data matriks A and B with row and column.

Typed	: 3(#?)(#?) ? depend on the monitor
Klik	: Enter
Select	: =
Answer	: $\begin{pmatrix} 18 & 69 & 12 \\ -21 & -138 & 36 \end{pmatrix}$

To find determinan like this:

Typed	: det(#?)
Klik	: Enter
Select	: =
Answer	: 65

To calculate of $-4AB^T$

Typed	: - 4(#?)(#?)`
Klik	: Enter
Select	: =
Answer	: $\begin{pmatrix} 76 & -8 & 36 \\ -152 & -96 & -68 \end{pmatrix}$

To find invers B

Typed	: (#31)^-1
select	: Enter
Select	: =
Answer	: $\begin{pmatrix} \frac{4}{13} & \frac{-1}{65} & \frac{-28}{65} \\ \frac{-2}{13} & \frac{7}{65} & \frac{1}{65} \\ \frac{-1}{13} & \frac{2}{13} & \frac{4}{13} \end{pmatrix}$

Equation

10. Determine x of the equation $2x^3 + 5x^2 - 3x = 0$

The solution step is as follows:

Typed	: 2x^3+5x^2-3x=0
Enter	
Select	: SOLVE
Klik	:Expression
Variable	: x
Solution	: algebracally
Domain	: complex
Klik	: OK
Select	: =
Answer	: x = 0,5 V x = - 3 V x = 0

11. Calculate a, b, c fromthis equationt.

a + b + c = 4

2a – 3b + 2c = - 22

-3a – 2b – 4c = - 8

The solution step is as follows.

Select	: SOLVE
Select	: System
Equation number	: 3
Typed the problem	
Sulotion variables	: select
Select	: OK
Klik	: =
Answer	a = -4 b = 6 c =2

Graph

12. Describe this function.

a) $y = x^2 - 4$

b) g = sin 3t

c) h = $\frac{1}{x-2}$

The solution step is as follows:

Typed	: x^2 – 4
Enter	
Typed	: sin(3t)
Select	: Enter
Typed	: 1/(x – 2)
Select	: Enter

Block one by one the equation

The figure 1 and 2 showed the step of Derive Program that can be seen on the monitor as follows.

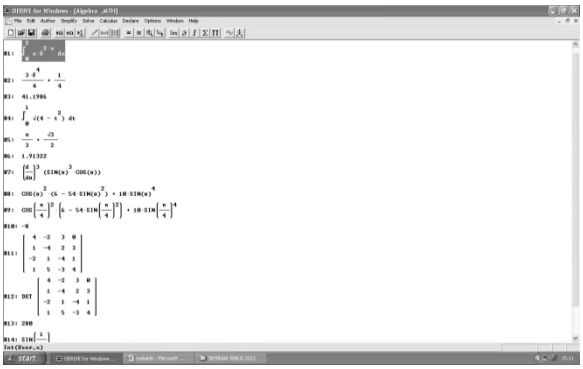

Figure 1. The step of math problems

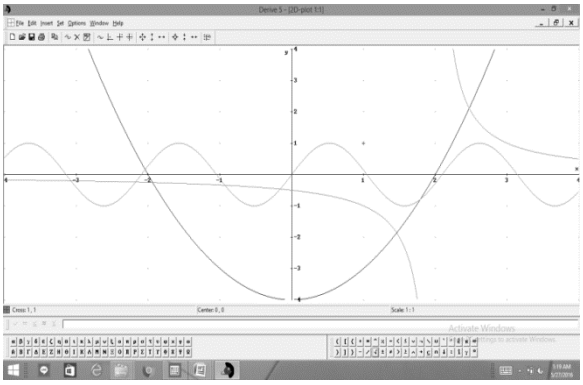

Figure 2. The graphs of derive program

The results of research, Hakim (2001) had written that the student achievement had improved than just by learning theory in mathematics classes and the time needed was shorter. Furthermore Dewi (2015) had conducted research at the Department of Civil Engineering; The motivation of students had increased, the students enjoyed and were happy in class.

About the results of the community service Dewi (2015) said that all participants were very interested and active to follow the workshop for Math teachers of Senior High Schools and Vocational High Schools. The comments of participants were as follows. We are very grateful for this additional knowledge, which will add our knowledge and skills in using computer technology. The implementation of workshops was much fun and improved teacher insight. The Derive Program was very useful for math teachers in the writing and math problem solving. We are very grateful as participants. In the future, it is hoped more teachers are invited to participate the workshop. The workshop is very important for teachers, mainly to write up an answer key. Derive Program is very useful for us as Mathematics teachers and students, especially in problem solving. Thank you for the opportunity given to participants in this workshop, it is very useful for teachers. The teachers can increase the variety of problems. It is hoped the application of Derive Program can be transferred to the Android Version

CONCLUSION

Based on the above statement, it can be concluded as follows.Math with Derive Program became more interesting, all students were active, could easily solve the problems and asked questions, and motivation increased. The test results showed that the average score of Derive Program was higher than the average score of class theory. The participants of workshop actively, asked questions and were enthusiastic to solve problems. Derive program was very useful and helpful to solve Mathematics problems. It is hoped, there will be other similar workshop based on Android.

REFERENCE

Dewi, ML. Derive Program for Civil Engineering. The State of Polytechnics Malang. 2015

Elena Santos. Derive. http://derive.en.softonic.com/ downloaded June 1st on 2011

Hakim, AR. The program Derive for Windows. Malang: P5D State Polytechnic Malang. 2001

Hakim, AR. Effectiveness of Mathematics Learning assisted Derive Program at the Polytechnic. Malang: P5D. 1999