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## **MATHEMATICAL CONCEPTS ABILITY IN SPLDV MATERIAL BASED ON APOS THEORY STAGES VIEWED FROM LEARNING STYLES**

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### **Abstract**

*This study aims to determine the ability of mathematical concepts in the material system of two-variable linear equations (SPLDV) based on the stages of APOS theory in terms of the learning styles. The type of research used in this research is qualitative research. The subjects in this study were 32 students of class X SMA Negeri 10 Tanimbar Islands Regency. The instrument used in this research is a) observation. Observation aims to observe student activity in understanding mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles, b) interviews. Interview sheets were used to obtain information related to understanding mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles c) Tests The test sheets in this study were given to students after being given mathematics learning with an understanding of mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles. The results of this study indicate that the APOS theory as an elaboration of mental construction from actions (actions), processes (processes), objects (objects), schemes (schema) improves students with visual learning styles, auditory learning styles and kinesthetic learning styles can improve students' abilities. mathematical concepts in the material system of two-variable linear equations (SPLDV).*

**Keywords:** APOS Theory, Learning Styles and SPLDV Concepts.

*Penelitian ini bertujuan untuk mengetahui kemampuan konsep matematika pada materi sistem persamaan linear dua variabel (SPLDV) berdasarkan tahapan teori APOS ditinjau dari gaya belajar. Jenis penelitian yang digunakan dalam penelitian ini adalah penelitian kualitatif. Subjek dalam penelitian ini adalah siswa kelas X SMA Negeri 10 Kabupaten Kepulauan Tanimbar yang berjumlah 32 siswa. Instrumen yang digunakan dalam penelitian ini adalah a) observasi. Observasi bertujuan untuk mengamati aktifitas siswa dalam pemahaman konsep matematika pada materi SPLDV dalam menerapkan teori APOS ditinjau dari gaya belajar siswa, b) wawancara. Lembar wawancara digunakan untuk mendapatkan informasi yang berkaitan dengan pemahaman konsep matematika pada materi SPLDV dalam menerapkan teori APOS ditinjau dari gaya belajar siswa c) Tes Lembar tes dalam penelitian ini diberikan kepada siswa sesudah diberikan pembelajaran matematika dengan pemahaman konsep matematika pada materi SPLDV dalam menerapkan teori APOS ditinjau dari gaya belajar siswa. Hasil penelitian ini menunjukkan bahwa teori APOS sebagai suatu elaborasi tentang konstruksi mental dari aksi (actions), proses (processes), objek (objects), skema (schema) meningkatkan siswa dengan gaya belajar visual, gaya belajar auditorial dan gaya belajar kinestetik dapat meningkatkan kemampuan konsep matematika pada materi sistem persamaan linear dua variabel (SPLDV).*

**Kata Kunci:** Teori APOS, Gaya Belajar dan Konsep SPLDV.



## INTODUCTION

APOS theory can be used directly in comparing the success or failure of individuals related to mental constructions that have been formed for a mathematical concept. Suppose there are two individuals who seem to both have mastered a mathematical concept. With APOS theory it can be further detected who has a better mastery of the mathematical concept, that is, if someone can further explain the concept then he is at a better level than the other. Besides that, if the mental construction of APOS, namely action, process, object, and schema for a mathematical concept has been well constructed by an individual, then it can be used to make solid predictions that the individual will be successful in using the mathematical concept in solving a problem ( Khairani, N. 2016). According to Mulyono (Safitri, A. 2017) the APOS theory consists of four stages, namely: 1) Action (action) is a transformation of objects that are felt by individuals with step-by-step instructions on how to carry out operations. 2) Process (process) is defined as performing the same type of action, but no longer with the need for an external stimulus. 3) Object (object) is built from a process that can be transformed into an action. 4) Scheme (scheme) for a particular mathematical concept is a collection of individual actions, processes, objects, and other schemes that are connected by some general principles to form a framework in the minds of individuals who might be brought to deal with problem situations involving the concept.

APOS theory has an important role for one's individual abilities, mathematical ideas that develop from students are outward concepts of broad and structured planting of mathematical abilities. Logical thinking is a concept of understanding that originates from the reflection of ideas that are developed based on a continuous scheme of individual abilities. The four stages of APOS theory, namely Action, Process, Object, and Scheme, are a study of students' understanding of how to understand mathematical topics. According to Deporter and Hinercki (2013), learning styles are generally divided into three types, namely, visual learning styles, auditory learning styles and kinesthetic learning styles. The application of the APOS theory is studied based on student learning styles which originate from students' abilities towards SPLDV material. The learning styles used by students in understanding the SPLDV concept include seeing, hearing, moving, working and touching.

Based on the results of an interview with one of the students of SMA Negeri 10 South Tanimbar in the 2022/2123 Academic Year, the researchers obtained information that the student had difficulty understanding mathematics in the SPLDV material. The cause of the learning difficulties experienced by these students is that learning tends to focus on teacher-centered concepts and learning styles. Students understand mathematical concepts with limited abilities, without realizing individual abilities based on



the APOS theory stages associated with student learning styles. Thus students have difficulty understanding the mathematical concepts applied by the teacher. After the researchers conducted interviews and discussions with Mrs. Martafina Kelbulan, S.Pd who is a mathematics teacher at SMA Negeri 10 Tanimbar Selatan District, Tanimbar Islands Regency, on Monday 15 December 2022. Information was obtained that learning with the APOS theory approach can improve students' learning styles towards the SPLDV concept not yet used by subject teachers. The teacher only uses the teacher's concept in implementing the learning process in class. So that the concept of understanding the APOS theory of student learning styles is a new thing for students of SMA Negeri 10 South Tanimbar, Tanimbar Islands Regency. While most students have not been able to manage mathematical concepts individually based on their learning style. Mathematics teachers at SMA Negeri 10 Tanimbar Islands Regency find it difficult to apply the SPLDV concept, because students' understanding of the concept is limited to the learning system that takes place at school.

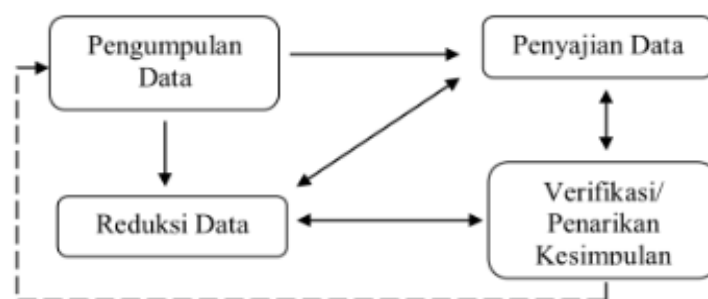
Learning approach with APOS theory on students' learning styles. With this approach, students are required to utilize individual concepts with a scheme of understanding the SPLDV concept. This is reinforced by the opinion (Jumrianti 2017) that APOS theory can be used as an analytical tool to describe the development of one's schema on a mathematical topic which is the totality of knowledge related (consciously or unconsciously) to that topic. With this approach students feel ready to discover mathematical concepts based on the SPLDV scheme. In this way, they will be ready to carry out learning in the classroom. Because students have mastered the concept in a structured manner based on the scheme formed. A person's learning style is a combination of absorbing information easily and then organizing and processing that information DePorter et al (Rijal, S., & Bachtiar, S. 2015). The combination of students' understanding to absorb SPLDV material is a connection to the application of APOS theory so that active and innovative learning can be optimized, such as discussions, problem solving, presentations, or project-based learning. Thus the understanding of the concept of student learning styles can be improved based on the APOS theory to form a schema for students' understanding of SPLDV material at SMA Negeri 10, Tanimbar Islands Regency.

Mathematics learning has a big influence on development. The purpose of learning mathematics at school is given to students so that they can prepare themselves to face world developments globally (Nanlohy, N. L, et al 2021) this trains students to think critically and rationally according to the mathematical scheme formed by utilizing students' learning styles on SPLDV material. So the researcher was interested in conducting research with the title: "Mathematical Concept Ability in SPLDV Material Based on APOS Theory Stages in View of Learning Styles in SMA Negeri 10 Tanimbar Islands Regency.

## RESEARCH METHODS

This type of research uses a qualitative descriptive method which produces data in the form of someone's expressions that refer to a certain situation. Qualitative research is research conducted to find out phenomena in the field by research subjects in a descriptive way in the form of words and language based on the observations of Walidin et al (Fadli, M. R. 2021). Qualitative research is a research process to understand human or social phenomena by creating a comprehensive and complex picture that can be presented in words, reporting detailed views obtained from informant sources, and carried out in a natural setting and reinforced by Mardalis' opinion. , (Hadi, A., et al. 2021). Qualitative research intends to understand phenomena about what is experienced by research subjects, for example perceptions, motivations, actions, etc. by means of descriptions in the form of words and language, in a special natural context and by utilizing various natural methods.

One of the characteristics of qualitative research is that the researcher acts as an instrument as well as collecting data. Instruments other than humans (such as: questionnaires, interview guides, observation guides and so on) can also be used, but their function is limited as a support so that the task of the researcher is the key instrument. This research was conducted at the Tanimbar Archipelago 10 State Senior High School. The instrument used in this research is a) observation. Observation aims to observe student activity in understanding mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles, b) interviews. Interview sheets were used to obtain information related to understanding mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles c) Tests The test sheets in this study were given to students after being given mathematics learning with an understanding of mathematical concepts in SPLDV material in applying APOS theory in terms of student learning styles. This test sheet is a tool to find out how the scheme of students' mathematical problem solving abilities based on learning styles in solving SPLDV problems. Before being given to students, the test will be tested and validated first. Qualitative data analysis, namely analysis of student work results, student response questionnaires and implementation of learning activities used qualitative analysis. According to (Ratuanik & Feninlambir, 2022), The following can be presented in the form of a research flowchart:



Gambar 1. Alur Penelitian

## RESULTS AND DISCUSSION

The results of the study were reviewed based on the answers of 32 students who took the test which were grouped based on the total score achieved by the students in taking the test. A description of the test results is presented in this section, that is, students with high and low abilities were taken who were able to answer the problems in this study. Among them, 3 students with high abilities and 2 students with low abilities according to student test results. Furthermore, the 4 students were used as subjects in this study consisting of subject 1, subject 2, subject 3, subject and subject 4, each subject was described. The following are the 4 research subjects presented based on the ability category of mathematical concepts in SPLDV material based on the stages of APOS theory in terms of learning styles between lan as follows:

### a. Subject 1 FR

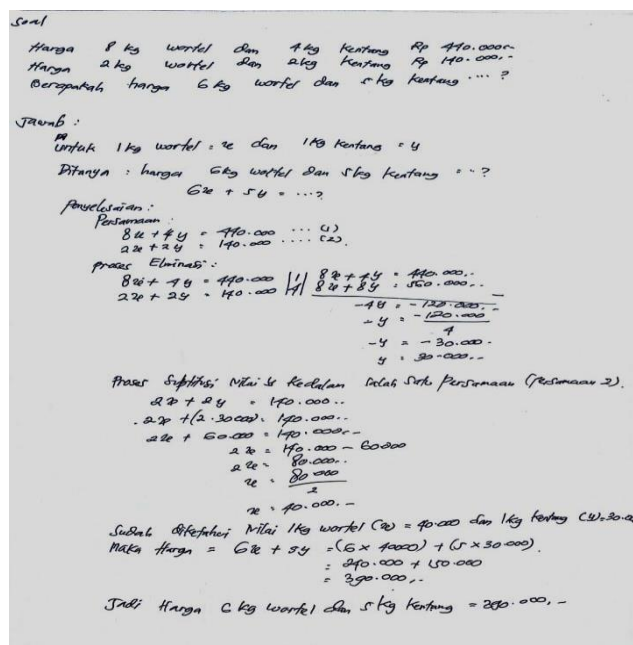


Figure 2. Subject Answers 1

Based on Figure 2. The results of subject 1's answers obtained that in solving SPLDV word problems, students were able to understand the story problems given, by writing examples of the variables  $x$  and  $y$ , which are the equations of two variables namely,  $x$  = one kg of carrots and  $y$  = one kg

of potatoes. Students write down 6 kg of carrots and 5 kg of potatoes that are known from the problem and students write down the equation  $6x+5y$  according to the questions about the unknown values of the equations of the two variables. then students are able to write equation one and equation two, that is, equation one is  $8x + 4y = 440,000$  and equation two is  $2x + 2y = 140,000$ . Furthermore, students used a mixed method, namely, elimination and substitution to solve equations one and two. Students are able to write down their answers according to the elimination method, namely,  $8x + 4y = 440,000$  and  $2x + 2y = 140,000$ . Based on the two equations that the students want to eliminate, namely the elimination of the variable  $x$  in equations one and two, so that students perform multiplication operations on equations one and two, namely,  $8x + 4y = 440,000 \times 1 = 8x + 4y = 440,000$  and  $2x + 2y = 140,000 \times 4 = 8x + 8y = 560,000$ . then students eliminate both equations by performing a subtraction operation, namely,  $(8x + 4y = 440,000 - 8x + 8y = 560,000) = (-4y = -120,000)$ . students find answers from variable  $y$  namely,  $y = \frac{-120.000}{-4} = 30.000$ , so students write down the answer is,  $y=30,000$ . After students complete the two equations using the elimination method, then students use the substitution method. Students substitute  $y = 30,000$  in the second equation, namely,  $(2x + 2y = 140,000) = (2x + 2(30,000) = 140,000) = (2x + 60,000 = 140,000)$ , students explain their answers to the variable  $x$ , namely perform a subtraction operation on the constants and  $y$  coefficients of the second equation, that is,  $(2x = (140,000 - 60,000)) = (2x = 80,000)$ , after that students perform the division operation, namely,  $x = \frac{80.000}{2} = 40.000$ , thus students write answers from the variable  $x = 40,000$  from the use of the substitution method. After students find answers to the variables  $y = 30,000$  and  $x = 40,000$ . Then students write down the answers to the questions, namely, how much does 6 kg of carrots and 5 kg of potatoes cost? Students write  $6x + 5y = 6(40,000) + 5(30,000)$ . After that students perform multiplication operations so students write  $(240,000 + 150,000) = 390,000$ . Thus the students conclude that the price of 6 kg of carrots and 5 kg of potatoes is 390,000.

## b. Subject 2 S Y

Soal :

Harga 8 kg wortel dan 4 kg kentang Rp 440.000,-  
 Harga 2 kg wortel dan 2 kg kentang Rp 140.000,-  
 Berapakah harga 6 kg wortel dan 5 kg kentang ...?

Jawab :

misal :

1 kg wortel =  $x$  dan 1 kg kentang =  $y$

Dit : harga 6 kg wortel dan 5 kg kentang  
 $6x + 5y = \dots ?$

Model matematika :

$$\begin{array}{r} 8x + 4y = 440.000,- \\ 2x + 2y = 140.000,- \end{array} \quad \left| \begin{array}{l} 1 \\ 4 \end{array} \right| \begin{array}{r} 8x + 4y = 440.000,- \\ 8x + 8y = 560.000,- \\ \hline -4y = -120.000,- \\ \hline -y = -30.000,- \\ \hline y = 30.000,- \end{array}$$

Substitusi Nilai  $y$  kedalam salah satu persamaan :

$$\begin{array}{r} 2x + 2y = 140.000,- \\ 2x + (2 \times 30.000) = 140.000,- \\ 2x + 60.000 = 140.000,- \\ 2x = 140.000,- - 60.000,- \\ 2x = 80.000,- \\ x = \frac{80.000}{2} \\ x = 40.000,- \end{array}$$

untuk harga 1 kg wortel ( $x$ ) = 40.000 dan 1 kg kentang ( $y$ ) = 30.000,-  
 maka harga  $6x + 5y = (6 \times 40.000) + (5 \times 30.000)$   
 $= 240.000 + 150.000$

### Figure 3. Subject Answers 2

Based on Figure 3. The results of subject 2's answers obtained that in solving SPLDV word problems, students were able to understand the story problems given, by writing examples of the variables  $x$  and  $y$ , which are the equations of two variables namely,  $x =$  one kg of carrots and  $y =$  one kg of potatoes. Students write down 6 kg of carrots and 5 kg of potatoes that are known from the problem and students write down the equation  $6x + 5y$  according to the questions about the unknown values of the equations of the two variables. Furthermore, students have not written down equation one and equation two, that is, equation one is  $8x + 4y = 440,000$  and equation two is  $2x + 2y = 140,000$ . Furthermore, students used a mixed method, namely, elimination and substitution to solve equations one and two. Students are able to write down their answers according to the elimination method, namely,  $8x + 4y = 440,000$  and  $2x + 2y = 140,000$ . Based on the two equations that the students want to eliminate, namely the elimination of the variable  $x$  in equations one and two, so that students perform multiplication operations on equations one and two, namely,  $8x + 4y = 440,000 \times 1 = 8x + 4y = 440,000$  and  $2x + 2y = 140,000 \times 4 = 8x + 8y = 560,000$ . then students eliminate both equations by performing a subtraction operation, namely,  $(8x + 4y = 440,000 - 8x + 8y = 560,000) = (-4y = -120,000)$ . students find answers from the variable  $y$  namely,  $y = \frac{-120.000}{-4} = 30.000$ , so students write down the answer is,  $y=30,000$ . After students complete the two equations using the elimination method, then students use the substitution method. Students substitute  $y = 30,000$  in the second equation, namely,  $(2x + 2y = 140,000) = (2x + 2(30,000) = 140,000) = (2x + 60,000 = 140,000)$ . students explain the answers to the variable  $x$ , namely performing subtraction operations on the constants and the  $y$  coefficient of the second equation, namely,  $(2x = (140,000 - 60,000)) = (2x = 80,000)$ , after that students carry out the division operation, namely,  $x = \frac{80.000}{2} = 40.000$ , thus students write answers from the variable  $x = 40,000$  from the use of the substitution method. After students find answers to the variables  $y = 30,000$  and  $x = 40,000$ . Then students write down the answers to the questions, namely, how much does 6 kg of carrots and 5 kg of potatoes cost? Students write  $6x + 5y = 6(40,000) + 5(30,000)$ . After that students perform multiplication

operations so students write  $(240,000 + 150,000) = 390,000$ . Thus the students conclude that the price of 6 kg of carrots and 5 kg of potatoes is 390,000.

### c. Subject 3 S M

Harga 3kg wortel dan 4kg kentang Rp. 440.000,-  
 Harga 2kg wortel dan 2kg kentang Rp. 140.000,-  
 Berapakah harga 6 kg wortel dan 5 kg kentang ?

Jawab :

$$\begin{aligned} \text{Bik : } & 8x + 4y = 440.000 \\ & 2x + 2y = 140.000 \end{aligned}$$

Dit : harga  $6x + 5y = \dots ?$

Penyelesaian :

\* Sistem eliminasi nilai  $x$  :

$$\begin{array}{r} 8x + 4y = 440.000 \quad | \quad 1 \quad 8x + 4y = 440.000 \\ 2x + 2y = 140.000 \quad | \quad 2 \quad 4x + 4y = 280.000 \\ \hline 4x \qquad \qquad \qquad = 160.000 \\ \hline x = \frac{160.000}{4} \\ x = 40.000 \end{array}$$

\* Sistem substitusi nilai  $y$  :

$$\begin{aligned} 2x + 2y &= 140.000 \\ (2 \times 40.000) + 2y &= 140.000 \\ 80.000 + 2y &= 140.000 \\ 2y &= 140.000 - 80.000 \\ 2y &= 60.000 \\ y &= \frac{60.000}{2} \\ y &= 30.000 \end{aligned}$$

$$\begin{aligned} 6x + 5y &= 6 \times 40.000 + 5 \times 30.000 \\ &= 240.000 + 150.000 \\ &= 390.000,- \end{aligned}$$

Figure 4. Subject Answers 3

Based on Figure 4. The results of subject 3's answers obtained that in solving SPLDV word problems, students were able to understand the story problems given, by writing examples of the variables  $x$  and  $y$ , which are the equations of two variables namely,  $x$  = one kg of carrots and  $y$  = one kg of potatoes. Students write down 6 kg of carrots and 5 kg of potatoes that are known from the





problem and students write down the equation  $6x + 5y$  according to the questions about the unknown values of the equations of the two variables. Furthermore, students have not written down equation one and equation two, that is, equation one is  $8x + 4y = 440,000$  and equation two is  $2x + 2y = 140,000$ . Furthermore, students used a mixed method, namely, elimination and substitution to solve equations one and two. Students are able to write down their answers according to the elimination method, namely,  $8x + 4y = 440,000$  and  $2x + 2y = 140,000$ . Based on the two equations that the students want to eliminate, namely the elimination of variables in equations one and two, so students perform multiplication operations on equations one and two, namely,  $8x + 4y = 440,000 \times 1 = 8x + 4y = 440,000$  and  $2x + 2y = 140,000 \times 2 = 4x + 4y = 280,000$ . then students eliminate both equations by performing a subtraction operation, namely,  $(8x + 4y = 440,000 - 4x + 4y = 280,000) = (4x = 160,000)$ . students find answers from variable  $x$  namely,  $x = \frac{160.000}{4} = 40.000$ , so students write down the answer is,  $x=40,000$ . After students complete the two equations using the elimination method, then students use the substitution method. Students substitute  $x = 40,000$  in the second equation, namely,  $(2x + 2y = 140,000) = (2(40,000) + 2y = 140,000) = (80,000 + 2y = 140,000)$ . then the students explain the answers to the variable  $y$ , which is to carry out the subtraction operation on the constant and the  $x$  coefficient of the second equation, namely,  $(2y = (140,000 - 80,000)) = (2y = 60,000)$ , after that the students carry out the division operation, namely,  $y = \frac{60.000}{2} = 30.000$ , thus students write answers from the variable  $y = 30,000$  from using the substitution method. After students find answers to the variables  $x=40,000$  and  $y=30,000$ . Then students write down the answers to the questions, namely, how much does 6 kg of carrots and 5 kg of potatoes cost? Students write  $6x + 5y = 6(40,000) + 5(30,000)$ . After that students perform multiplication operations so students write  $(240,000 + 150,000) = 390,000$ . then students have not been able to draw conclusions from the problem, students should conclude that the price of 6 kg of carrots and 5 kg of potatoes is 390,000.

**d. Subject 4 P F**

Harga 8 kg wortel dan 4 kg kentang Rp 440.000,-  
 Harga 2 kg wortel dan 2 kg kentang Rp 140.000,-  
 Berapakah harga 6 kg wortel dan 5 kg kentang ...?

Jawab : Dik :  $8x + 4y = 440.000,-$   
 $2x + 2y = 140.000,-$   
 Dit Harga  $6x + 5y = \dots?$

Penyelesaian :

Cara eliminasi:

$$\begin{array}{r} 8x + 4y = 440.000,- \\ 2x + 2y = 140.000,- \quad | \times 4 | \\ \hline 8x + 4y = 440.000 \\ 8x + 8y = 560.000 \\ \hline -4y = 300.000,- \\ y = \frac{300.000,-}{-4} \\ y = 75.000,- \end{array}$$

Cara substitusi:

$$\begin{array}{r} 2x + 2y = 140.000 \\ 2x + 2(75.000) = 140.000,- \\ 2x + 150.000 = 140.000,- \\ 2x = 150.000 - 140.000,- \\ 2x = 10.000,- \\ x = \frac{10.000,-}{2} \\ x = 5.000,- \end{array}$$

$$\begin{array}{r} 6x + 5y = 6(75.000) + 5(5.000) \\ = 450.000 + 25.000,- \\ = 475.000,- \end{array}$$

**Figure 5. Subject Answers 4**

Based on Figure 5. The results of subject 4's answers obtained that in solving SPLDV word problems, students were able to understand the story problems given, by writing examples of the variables  $x$  and  $y$ , which are the equations of two variables namely,  $x$  = one kg of carrots and  $y$  = one kg of potatoes. Students write down 6 kg of carrots and 5 kg of potatoes that are known from the problem and students write down the equation  $6x + 5y$  according to the questions about the unknown values of the equations of the two variables. Furthermore, students have not written down equation one and equation two, that is, equation one is  $8x + 4y = 440,000$  and equation two is  $2x + 2y = 140,000$ . Furthermore, students used a mixed method, namely, elimination and substitution to solve equations one and two. Students are able to write down their answers according to the elimination method, namely,  $8x + 4y = 440,000$  and  $2x + 2y = 140,000$ . Based on the two equations that the students want to eliminate, namely the elimination of the variable  $x$  in equations one and two, so that students perform multiplication operations on equations one and two, namely,  $8x + 4y = 440,000 \times 1 = 8x + 4y = 440,000$  and  $2x + 2y = 140,000 \times 4 = 8x + 8y = 560,000$ . then the student is still wrong in eliminating the two equations by carrying out the subtraction operation, namely,  $(8x + 4y = 440,000 - 8x + 8y = 560,000) = (4y = 300,000)$ , the student's answer should be  $(8x + 4y = 440,000 - 8x + 8y = 560,000) = (-4y = -120,000)$ . Furthermore, students are still wrong in completing answers from variable  $y$  namely,  $y = \frac{300.000}{4} = 75.000$ , the student's answer should be from

the variable  $y$ , namely,  $y = (-120,000)/(-4) = 30,000$ , and writing the correct answer is  $y=30,000$ . For this reason, students are still mistaken in substituting errors from the initial answers, namely,  $y = 75,000$ . So students write  $(2x + 2y = 140,000) = (2x + 2(75,000) = 140,000) = (2x + 150,000 = 140,000)$ . then the student continues by writing  $(2x = (150,000 - 140,000)) = (2x = 10,000)$ , after that the student performs the division operation, namely,  $x = \frac{10.000}{2} = 5.000$  the answers given by students were still wrong in using the mixed method, namely, the elimination method and the substitution method. Students should substitute  $y = 30,000$  in the second equation, namely,  $(2x + 2y = 140,000) = (2x + 2(30,000) = 140,000) = (2x + 60,000 = 140,000)$ . and explaining the answers to the variable  $x$ , namely carrying out subtraction operations on the constants and the  $y$  coefficients of the second equation, namely,  $(2x = (140,000 - 60,000)) = (2x = 80,000)$ , after that students must carry out the division operation, namely,  $x = \frac{80.000}{2} = 40.000$ , thus students should write down the answers from the variable  $x = 40,000$  from using the substitution method. After students find answers to the variables  $y = 30,000$  and  $x = 40,000$ . then students have to write down the answers to the questions, namely, what is the price of 6 kg of carrots and 5 kg of potatoes? For that students need to write  $6x + 5y = 6(40,000) + 5(30,000)$ . and students perform multiplication operations so students can write  $(240,000 + 150,000) = 390,000$ . Thus students can conclude that the price of 6 kg of carrots and 5 kg of potatoes is 390,000.

The process of learning mathematics based on APOS theory which is studied from the level of understanding of concepts, namely, actions, processes, objects, and schemes, concepts viewed from student learning styles in SPLDV material have a very large impact on the level of students' abilities in managing cognitive abilities that originate from abilities individual. Based on understanding the concept of APOS theory 1) Action (action) is the transformation of objects that are felt by individuals with step-by-step instructions on how to carry out operations. 2) Process (process) is defined as performing the same type of action, but no longer with the need for an external stimulus. 3) Object (object) is built from a process that can be transformed into an action. 4) Scheme (scheme) for a particular mathematical concept is a collection of individual actions, processes, objects, and other schemes that are connected by some general principles to form a framework in the minds of individuals who might be brought to deal with problem situations involving the concept. The apos theory that is reviewed from student learning styles is a learning process that is different from other learning processes (Mansah & Safitri, 2022; Raka Siwa et al., 2018; Rezekiah et al., 2022; Romaito et al., 2021; Romansyah et al., 2019; Safitri et al., 2022; Safitri & Hasibuan, 2018; Wati et al., 2022). The learning style studied in SPLDV material is a structured planting of mathematical concepts in its application to student learning activities directly.



## CONCLUSION

Based on the results of the research and the results of the test analysis of class 10 students at SMA Negeri 10 Tanimbar Islands Regency, it was concluded that by applying the APOS theory in terms of student learning styles, they can instill mathematical concept abilities in SPLDV material. This is seen from the results of the final test of students who follow the learning process. Students can develop individual concepts with their own learning styles to solve SPLDV problems.

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