



Critical thinking skills in phlegmatic students using learning videos

Fitria Sulistyowati¹, Septi Hartanti², Sri Adi Widodo^{3*}, Flora Grace Putrianti⁴

^{1,2,3} Department of Mathematics Education, Universitas Sarjanawiyata Tamansiswa. Batikan Street, No UH III/1043, Yogyakarta, Indonesia.

⁴ Department of Psychology, Universitas Sarjanawiyata Tamansiswa. Kusumanegara Street, No 121, Yogyakarta, Indonesia.

E-mail: ¹sriadi@ustjogja.ac.id*

Article received : 26 October 2022,

article revised : 11 November 2022,

article Accepted: 14 November 2022.

* Corresponding author.

Abstract: This study is single-subject research with A-B-A design that aims to find out how to increase the critical thinking skills of a phlegmatic student in learning a two variable linear equation through learning videos that have been uploaded on youtube. The subject was a class VIII junior high school student with a phlegmatic personality who was selected based on observations and interviews with counseling teachers and school principals. Data collection techniques used observation, tests, and documentation. Data were analyzed using analysis under conditions and between conditions. The result is mean level of critical thinking skills increased from 48.6 at first baseline to 74 at intervention and 91 at second baseline. These results are supported by the overlap percentage of 0%. This indicates that the learning videos affect increasing the critical thinking skills of the phlegmatic student in learning a two variable linear equation. The results of this study are expected to be a reference in further research related to critical thinking skills in students with phlegmatic personalities.

Keywords: Critical Thinking; Plegmatic; Video of Learning; Singgle Subject Research

Keterampilan Berpikir Kritis pada Siswa Phlegmatis Menggunakan Video Pembelajaran

Abstract: Penelitian ini merupakan penelitian subjek tunggal dengan desain A-B-A' yang bertujuan untuk mengetahui bagaimana cara meningkatkan kemampuan berpikir kritis siswa phlegmatis dalam pembelajaran sistem persamaan linear dua variabel dengan video pembelajaran. Subjeknya adalah seorang siswa kelas VIII SMP berkepribadian plegmatis yang dipilih berdasarkan observasi dan wawancara dengan guru BK dan kepala sekolah. Teknik pengumpulan data yang digunakan adalah observasi, tes, dan dokumentasi. Data dianalisis menggunakan analisis kondisi dan antar kondisi. Hasilnya rata-rata tingkat kemampuan berpikir kritis meningkat dari 48,6 pada baseline pertama menjadi 74 pada intervensi dan 91 pada baseline kedua. Hasil ini didukung oleh persentase tumpang tindih sebesar 0%. Hal ini menunjukkan bahwa video pembelajaran berpengaruh terhadap peningkatan kemampuan berpikir kritis siswa apatis dalam pembelajaran sistem persamaan linear dua variabel. Hasil penelitian ini diharapkan dapat menjadi acuan dalam penelitian selanjutnya terkait keterampilan berpikir kritis pada siswa yang berkepribadian apatis.

Kata Kunci: Berpikir Kritis; Plegmatik; Video Pembelajaran; Penelitian Subyek Tunggal

INTRODUCTION

Critical thinking skill is a high-level thinking ability to analyze and consider solutions obtained in solving problems (Benyamin et al., 2021; Lestari, 2014; Martyanti & Suhartini, 2018). Critical thinking skills is the ability to think reflectively and reasoned in making decisions (Ibrahim et al., 2021). Critical thinking is thinking logically and systematically in making

decisions or solving an existing problem (Priatna et al., 2020). The Ministry of Education, Culture, Research and Technology revealed that 21st century abilities are known as 4Cs, namely: Critical thinking and problem solving, Communication, Collaboration, and Creativity and innovation (Anggraeni & Sole, 2018; Anwar, 2018; Septikasari & Frasandy, 2018). Therefore, critical thinking skills must be possessed by all students without exception, because a critical thinker will be able to evaluate and analyze any new information, he receives (Firdaus & Wilujeng, 2018; Lestari, 2014; Prasetyo & Ma'arif, 2021).

Critical thinking skills must be possessed by all students, this is because this ability is one of the soft skills needed to improve careers and leadership in an organization. Critical thinking become the main goal in education for prepare students for the demand's world of work (Bialik et al., 2015). This is also in line with the statement that critical thinking is a predictor in making decisions in life (Butler et al., 2017). A person who thinks critically often has benefits for his successful leadership. But the problems in the field are things that result in students' critical thinking skills are still low, such as the learning process carried out by the teacher is more mechanical, namely the teacher gives examples of questions first before giving tests to students so that they have difficulty when given questions in a different form (Ariani, 2020). In addition, students also have difficulty in doing the questions correctly, are not able to make mathematical models and have not been able to solve problems correctly (Benyamin et al., 2021). The results of research conducted on high school students of class X MIPA in Pelalawan Regency showed that critical thinking skills in physics subjects were still low. This is because students are only able to complete their physical calculations but are unable to relate the concepts of physics to the actual situation, so that it will have an impact on student learning outcomes (Priyadi et al., 2018). Likewise, students at Madrasah Aliyah Negeri in Magetan and students at State Junior High Schools in Delanggu District, Klaten showed that their critical thinking skills were still low (Nuryanti et al., 2018; Susilowati et al., 2017).

Whereas critical thinking skills are not innate skills, so these skills can be applied, trained and developed through learning processes and assessments. For this reason, it is necessary for students' critical thinking skills to be improved. One of the factors that can affect students' critical thinking skills is the teacher's ability to carry out learning that is tailored to the characteristics of students faced, such as phlegmatic personality. The phlegmatic personality has the characteristics that the student looks simply, likes to find peace by staying silent, and is not easy to get along with even though they actually like being around people (Chairilisyah, 2012). The main characteristic of phlegmatic students is that they are introverted or do not like to get along with other people/the environment, observers, and pessimists so that for other people, students with phlegmatic personality types look slower than other students (Anggreini et al., 2020). The results of previous studies showed that phlegmatic students were not able to understand the commands in the problem-solving ability test given by the researcher, so that students could not take the test in the correct way and step in problem solving (Kurniawati et al., 2020; Meylina & Jatmiko, 2019; Pamungkas & Siswanto, 2021). As a result, it can be ascertained that students' critical thinking skills are still low.

The covid pandemic has hit Indonesia since its first findings in March 2020. Since then, the learning process has been mostly done online by utilizing media learning management systems such as Moodle, Google Classroom or other LMS developed by educational institutions. In addition, the learning process during the pandemic also utilizes conference platforms such as Zoom, Google Meet or Microsoft Teams. In a pandemic situation, to be able to improve students' critical thinking skills, they can use appropriate and appropriate learning media. Learning media is a tool that is able to assist the teaching and learning process and serves to clarify the meaning of the message or information conveyed, so as to achieve the planned learning objectives (Anderson & Dron, 2014; Clark, 1994; Jonassen et al., 1994; Verawati et al., 2022; Widodo, 2018). Until now the covid-19 pandemic has not ended, this can be seen from the cases of the spread of covid-19 that are still happening, although the level of spread is still relatively small compared to the beginning of the spread of covid-19 in 2020. Even educational institutions are currently conducting learning face to face, because they think they have entered the endemic phase. Learning tools such as media and learning resources that have been developed by teachers to prepare for distance learning are still used for face-to-face learning in endemic times. This is a positive effect of the COVID-19 pandemic for teachers, namely increasing digital literacy skills for teachers.

The right alternative learning media for phlegmatic students is learning videos because phlegmatic students tend to be quiet and don't want to ask other people, so phlegmatic students have difficulty in learning to replay the learning videos. By playing it repeatedly, phlegmatic students are thought to be able to review the material until they really understand it. Learning video is a medium that uses audio and vision and contains learning materials that combine several concepts, principles, procedures, and theories that apply knowledge to help understand the learning material being taught. Learning videos can be made in a way as if the teacher is teaching with students. In addition, video footage can be made using a model that is quite interesting and unique depending on the presentation given by the teacher. Furthermore, the learning videos can be distributed through media such as YouTube, Instagram and TikTok. In the research, the video used is a learning video that has been uploaded on YouTube

In this regard, the purpose of this study is to determine the improvement of phlegmatic students' critical thinking skills with the help of learning videos on the material of a two variable linear equation system. This material was chosen because students still have difficulty, this is because students only memorize the formula without understanding the process of getting the formula, they are difficult to plan to complete the required data using known information (Suraji et al., 2018). In addition, if given a story problem with distracting data, most students are fooled and assume that all the data given to the problem must be used to find a solution.

METHOD

This type of research is an experiment with a single subject or single subject research. The experimental method with a single subject or single subject research is a research method that aims to obtain the necessary data by seeing whether there is an effect of the treatment given to the subject by comparing the conditions before being given treatment, when given treatment, and after being given treatment. The single subject research design used is A-B-A (see Figure 1), where this design aims to show a causal relationship between the dependent variable and the independent variable which is stronger than the A-B design (Byiers et al., 2012; Freeman & Eagle, 2011; James, 2016; Sunanto, 2005; Sunanto et al., 2006).

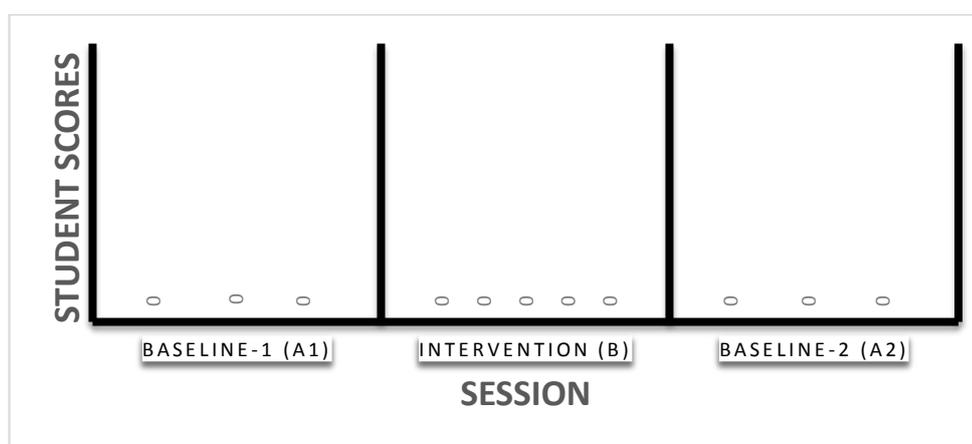


Figure 1. Desain of Research

The first baseline phase (A1), phlegmatic students were given critical thinking ability test questions on the material of a two variable linear equation system at the end of each session and phlegmatic students were not given learning videos. The first baseline phase was carried out for 3 meetings or until the condition of the subject was stable. After the data in the first baseline phase is stable, it can proceed to the intervention phase (B). in the intervention phase, phlegmatic students were given treatment in the form of learning videos which would be followed by a critical thinking ability test after being given treatment. This intervention phase was carried out for 4 meetings or until the condition of the subject was stable. Furthermore, the second baseline phase (A2) is a repetition of the first baseline- condition which aims as an evaluation of the intervention that has been given whether it has an effect on phlegmatic students or not. This second baseline phase was carried out for 3 meetings or until the subject's condition was stable.

The subjects used in this study were taken using a purposive technique in class VIII junior high school students. Purposive sampling is a sampling technique that has certain objectives and characteristics (Etikan et al., 2014). In this study, the aim of this research is to improve critical thinking skills in phlegmatic students, so that the main characteristic used as a guide for sampling is that the subject must have a phlegmatic personality according to Hippocrates and Galenus. In addition, consideration of fluency in communication is also one of the considerations in determining the subject. This is done so that researchers do not experience

difficulties in communicating to research subjects during the learning mentoring process. The sampling process with phlegmatic personality was carried out by means of observations and interviews conducted by school psychologists, in this case the counseling teacher. So that the researchers used the justification from the counseling teacher to classify students including phlegmatic personalities. Obtained one student with a phlegmatic personality, and he was made the subject of research. For this reason, this study uses a single subject research type. In connection with the research code of ethics, henceforth this subject is referred to as "P".

In accordance with the type of research and research focus, the learning media used in the intervention phase is learning videos, while critical thinking is the dependent variable or becomes the observation variable. The instrument used in the study was a critical thinking test, this instrument was given to subject P at the end of each session. The rubric for assessing critical thinking skills refers to 5 indicators, namely (1) basic clarification, (2) providing the basis for a decision, (3) providing conclusions, (4) further clarification, (5) making assumptions and integration. In indicators, basic clarification includes focusing questions, analyzing arguments, and asking and answering questions that require explanation or challenge. Indicators provide the basis for a decision including assessing the credibility of the source of information, and making observations and assessing reports on observations. Indicators provide conclusions include making deductions and assessing the results of deductions, making conclusions, making judgments. Indicators perform further clarification including defining and assessing definitions, and identifying assumptions. Indicators perform guesswork and integration include guessing and combining. Furthermore, the data obtained are presented in Table 1 before data analysis is carried out.

Table 1. The Sheet for Critical Thinking Skills Score

Phase:	A1 / B / A2	Session:
Indicator	Sub-Indicator	Skor (1-10)	
1	Subject analyzes the argument Subject asks and answers questions that require explanation		
2	Subjects can assess the credibility of the source of information Subjects make observations and assess reports of observations		
3	Subjects can make deductions and judge the results of deductions Subjects can draw conclusions		
4	Subjects can define and judge the definition Subjects can identify assumptions		
5	Subjects can provide tentative guesses on the problem Subjects can combine the information contained in the problem		
Total			

After the data is collected, the data is analyzed using analysis techniques under conditions and analysis between conditions. The components of the analysis under conditions include (1) condition length, (2) directional trend estimation, (3) stability trend, (4) data trail,

(5) stability level and range, and (6) level change (Gast & Ledford, 2014; Istiqomah et al., 2022; Stringfield et al., 2011). components of the analysis between conditions include (1) the number of variables that are changed, (2) changes in the direction of the trend and its effects, (3) changes in the stability trend, (4) changes in level, and (5) changes in overlap (Gast & Ledford, 2014; Widodo et al., 2021, 2022).

RESULT AND DISCUSSION

The results of the critical thinking ability test at the first baseline, intervention, and second baseline can be seen in Table 2.

Table 2. The Scores of Critical Thinking Ability Test

Phase	Baseline-1			Intervention				Baseline-2		
Session	1	2	3	1	2	3	4	1	2	3
Scores	43	50	53	65	75	75	81	88	91	94
Mean	48,6			74				91		

Based on Table 2 shows the mean score of baseline-1 is 48.6, intervention 74, and baseline-2 is 91. This shows that the average critical thinking ability of subject P shows an increase in each session in its phase (see Figure 2).

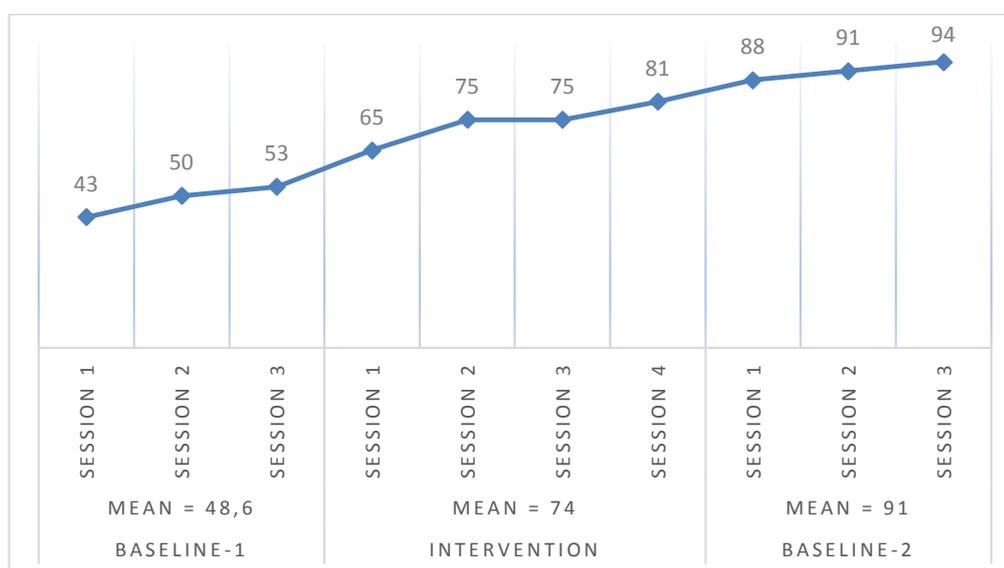


Figure 2. Score of Critical Thinking Skills

In addition to seeing the increase in scores, the data were also analyzed using conditional analysis to determine the initial condition of the subject. The components of the analysis include condition length, directional trend forecast, stability trend, data trail, stability level, range, and rate change. The overall analysis can be seen in Table 3.

In Table 2 it is shown that the length of the condition from first baseline is 3, intervention is 4, and second baseline is 3 which indicates a meeting session. The estimation results of the direction trend show that the progress of the subject's critical thinking ability from the initial session to the final session in each phase tends to increase. Based on this, it can be said that the direction trend of first baseline, intervention, and second baseline has increased. The trend of stability, for all three phases, is stable. First baseline, intervention, and second baseline are said to be stable because they have a stability level of 100%. This means that the range of data in each phase tends to be small or the level of variation is low. This condition is the same as determining the directional trend condition so that the data trail is the same as the data in the directional trend condition. It can be said that the data trail at first baseline, intervention, and second baseline is increasing.

Table 3. The result of conditional analysis

Condition	Baseline-1 (A1)	Intervention (B)	Baseline-2 (A2)
Condition length	3	4	3
Estimated directional trend			
Stability trend	Stable (100%)	Stable (100%)	Stable (100%)
Data trail			
Stability level and range	Stable (40.7 – 56.5)	Stable (61.8 – 86.2)	Stable (79.9 – 105.1)
Level change	(44 – 53) (+9)	(65 – 81) (+16)	(88 – 94) (+6)

The level of stability and range is determined by taking the smallest and largest scores in each phase. The level of stability and data range for first baseline is stable with a stabilities range of 40.7 – 56.5. At the intervention stable with a stabilities range of 61.8 – 86.2. At second baseline it is stable with a stabilities range of 79.9 – 105.1. Changes in level can be known by calculating the difference between the largest data and the smallest data from each phase. The sign (+) indicates improvement, (-) indicates worsening changes, and (=) indicates no change. Based on the results of the analysis, the level of change from first baseline is +9 which means an increase of 9, intervention is +16 indicates an improved condition of 16, while at second baseline is +6 indicates that the data increases by 6.

Furthermore, the data were analyzed using analysis between conditions to see the effect of the intervention given to the subject. The components of the analysis between condition include the number of variables that are changed, changes in the trend direction and their effects, changes in stability trends, changes in level, and changes in the overlap. The results of the analysis can be seen in Table 4.

Table 4. The result of between condition

Compared conditions	Baseline-1/Intervention	Intervention/Baseline-2
The variables that are changed	1	1
Changes in the trend direction and their effects		
Changes in stability trends	Stable to Stable	Stable to Stable
Changes in level	53 – 65 (+12)	81 – 88 (+7)
Changes in the overlap	0%	0%

Table 4 shows that the number of variables changed is one, namely the baseline condition to the intervention. Changes in the trend direction are determined by taking data from the analysis under conditions, this aims to see changes in behavior. The trend of the direction of change in the subject shows that the change in the trend at first baseline with the intervention is increasing and increasing. Furthermore, between the intervention with second baseline, namely increasing and increasing, which means the condition improved after the intervention was given and increased again than during first baseline.

The change in stability trend aims to see the stability of the subject's behavior in each condition. The trend of stability at first baseline with the intervention and the intervention with second baseline was stable to stable. Changes in level can be known by calculating the difference between the last data and the first data between phases, then we mark the difference (+) if it increases, (-) if it decreases, and (=) if there is no change. The subject's critical thinking ability increased by 12 in the first session of intervention from the last session of first baseline. This shows that the condition increases (+) after the intervention is given. Changes in the subject's level of critical thinking ability in the last intervention session to the second baseline session increased again by 7. This indicates that the condition increased (+) after the intervention was given.

The data overlap shows the similarity of conditions between first baseline, intervention, and second baseline. That is, the smaller the overlap percentage, the intervention on the target behavior will have a better effect. Data overlap from first baseline to intervention is 0%, meaning that there is no overlapping data. This shows that the intervention, namely the use of learning video media, has a good influence on the subject's critical thinking ability. Furthermore, the data between the intervention and second baseline overlap is 0%, meaning that there is no overlapping data. This shows that the second baseline data shows an increase in the percentage of the subject's critical thinking ability which is higher than first baseline.

After analyzing the data, it can be concluded that the use of instructional video media has a good effect on increasing the subject's critical thinking skills. This is because there is a change in the data for the better, namely the data at second baseline is higher than the data

at second baseline. In addition, there is no overlapping data, between the first baseline condition with the intervention and the intervention with the second baseline.

In the first baseline phase, the subject was given an ability test to think critically on the material for the two variable linear equation system with 2 questions in each session. This test is used to measure the initial ability before being given treatment in the form of learning videos. One of the results of the critical thinking ability test in the first baseline phase can be seen in Figure 3.

① a. Diketahui = harga 4 jeruk, dan 6 mangga
 = RP. 6.500
 = Harga 3 Jeruk, 2 mangga = RP 3.000
 Ditanya = model matematika
 Jawab = 4 Jeruk + 6 mangga = 6.500
 3 Jeruk + 2 mangga = RP = 3.000
 Jadi, model matematikanya
 $4j + 6m = 6500$
 $3j + 2m = 3000$

① b. Diketahui : harga 4 jeruk dan 6 mangga = 6.500
 harga 3 jeruk dan 2 mangga = 3.000
 ditanya = harga 2 Jeruk dan 6 mangga
 Jawab = 4 jeruk + 6 mangga = 6.500
 3 jeruk + 2 mangga = 3.000

 1 jeruk + 4 mangga = 3.500

Figure 3. The student's answer in the first baseline

Based on Figure 3, the subject's critical thinking ability is still low. This is because the subject has not been able to make mathematical models and explanations of the two questions correctly. This is in line with previous research which states that students have difficulty in learning linear equations and inequalities of one variable because of the limited context for students, especially in modeling mathematical sentences (Blanton et al., 2015; Jupri et al., 2014; Jupri & Drijvers, 2016; Rohimah, 2017). Furthermore, in question 1 (b) in the completion or answer section, the subject only wrote "4 oranges + 6 mangoes = 6500-3 oranges + 2 mangoes = 3,000" without making a mathematical model first and without further answers. This is in accordance with previous study that students' mistakes in working on questions are not understanding the questions, not being fully known and asked, not understanding the material, and forgetting the formula used, concluded that the subject had not been able to conclude interpretation, analysis, evaluation, and inference from it (Nurussafa'at et al., 2016). In addition, in the baseline-1 phase (A) the subject looked serious in doing the questions, but the subject did not want to ask the researcher. Therefore, in the intervention phase, the subject is guided with the help of learning video media. It is intended that critical thinking skills can increase after the treatment.

In the intervention phase (B), namely the use of learning video media, the subject was very enthusiastic and felt helped. At the beginning of the session, the researcher played a learning video containing an explanation of the material and examples of working on the questions. Furthermore, the researcher gave a little explanation about the example questions. After that the subject was given 2 critical thinking ability test questions and when working on the subject the subject was allowed to look back at the learning video when he felt difficult. The results of the critical thinking ability test in the intervention phase (B) can be seen in Figure 4.

Sesi 4 Intervensi
 Assesmen 2021

① Diketahui = harga 8 buku tulis dan 6 pensil = 14.400
 = harga 6 buku tulis dan 5 pensil = 11.200
 Ditanya = Buatlah model matematika
 Jawab = harga 1 buku tulis = x
 harga 1 pensil = y
 karena harga 1 buku tulis = x
 dan harga 1 pensil y
 model matematikanya adalah
 $8x + 6y = 14.400$
 $6x + 5y = 11.200$

② Diketahui = harga = 8 buku tulis dan 6 pensil = 14.400
 harga = 6 buku tulis dan 5 pensil = 11.200
 Ditanya = Tentukan selisih harga 5 buku tulis
 dan 2 pensil
 Jawab = misal = harga 1 buku tulis = x
 harga 1 pensil = y
 model = $2x + 6y = 14.400$
 $6x + 5y = 11.200$

$$\begin{array}{r} 8x + 6y = 14.400 \quad \times 5 \\ 6x + 5y = 11.200 \quad \times 6 \\ \hline 40x + 30y = 72.000 \\ 36x + 30y = 67.200 \\ \hline 4x = 4.800 \\ x = 1.200 \end{array}$$

$$\begin{array}{r} 6x + 5y = 11.200 \\ 6x \times 1200 + 5y = 11.200 \\ 7200 + 5y = 11.200 \\ 5y = 11.200 - 7200 \\ 5y = 4.000 \\ y = 800 \end{array}$$

Figure 4. The student's answer in the intervention

Based on the figure 4 subjects have been able to meet several indicators of critical thinking skills, including interpretation, analysis and evaluation. However, in question 1 (b) there is no inference or conclusion according to what was asked in the question. In this phase, the subject's critical thinking ability tends to increase. When working on test questions, the subject wants to ask things that are not yet known or not understood. Subjects also re-watched the learning video several times while working on the questions. Learning videos can attract students' interest and make learning fun, innovative, effective, and efficient (Nanda et al., 2017).

Next is the baseline-2 (A') phase. This phase aims to determine whether the intervention that has been given has an effect on the subject or not. The results of the critical thinking ability test in the baseline-2 (A') phase can be seen in Figure 5.

Soal 3 Baseline 2
17 Desember 2021

Diketahui = harga 4 gulung kain Jersey dan 3 gulung kain rayon = RP. 290.000
 harga 3 gulung kain Jersey dan 1 gulung kain rayon = RP. 155.000

Ditanya = model matematika =

Jawab = misal = harga 1 gulung kain Jersey = x
 harga 1 gulung kain rayon = y
 maka harga 1 gulung kain Jersey = x dan harga 1 gulung kain rayon = y
 model matematikanya = $4x + 3y = 290.000$
 dan $3x + y = 155.000$

Jadi model matematika adalah $4x + 3y = 290.000$
 dan $3x + y = 155.000$

Diketahui = harga 4 gulung kain Jersey dan 3 gulung kain rayon = 290.000
 harga 3 gulung kain Jersey dan 1 gulung kain rayon = 155.000

Ditanya = harga setiap gulung kain Jersey dan kain rayon

Jawab = model = $4x + 3y = 290.000$
 $3x + y = 155.000$

$$\begin{array}{r} 4x + 3y = 290.000 \quad \times 1 \quad | \quad 4x + 3y = 290.000 \\ 3x + y = 155.000 \quad \times 3 \quad | \quad 9x + 3y = 465.000 \\ \hline -5x = -175.000 \\ x = 35.000 \end{array}$$

$3x + y = 155.000$
 $3 \times 35.000 + y = 155.000$
 $105.000 + y = 155.000$
 $y = 155.000 - 105.000$
 $y = 50.000$

harga 1 gulung kain Jersey = $x = 35.000$
 harga 1 gulung kain rayon = $y = 50.000$
 jadi $(x, y) = (35.000, 50.000)$

Figure 5. The student's answer in the second baseline

Based on the picture above, it can be seen that the subject's critical thinking ability continues to increase. This can be seen from the results of higher test scores than the baseline-1 phase (A) and the intervention phase (B). In this phase the subject has been able to meet the four indicators of critical thinking skills, it's just that the subject's error is in the calculation of the answer.

Based on the results of the study, the critical thinking ability of phlegmatic students can be increased with the help of learning videos on the SPLDV material. This is indicated by an increase in the score obtained by the subject in the intervention phase, namely the use of learning videos. In the baseline-2 phase or after the intervention the score also continued to increase. This statement is supported by Yanti, Prahmana, & Fitriyah (2018) which states that the results of the evaluation before and after treatment show a significant increase in mathematics learning outcomes (Yanti et al., 2018).

CONCLUSION

Based on the results of research and discussion, it can be concluded that the use of learning videos can improve students' critical thinking skills with phlegmatic personalities in SPLDV material. This can be proven by an increase in critical thinking ability scores in the

baseline-1 phase (A), the intervention phase (B), and the baseline-2 phase (A'). In this study, the subjects got the mean level increased from 48.6 at baseline-1 (A) to 74 at the time of intervention (B) and 91 at baseline-2 (A'). This is also supported by a low percentage of overlap. The percentage of overlap between baseline-1 (A) and intervention (B) conditions is 0% and the percentage of overlap between intervention (B) and baseline-2 (A') conditions is also 0%. This research is expected to be a reference in further research related to the critical thinking skills of phlegmatic students and can be continued with research that focuses on other mathematical abilities for phlegmatic students.

ACKNOWLEDGEMENT

We would like to thank the Institute for Research and Community Service (LPPM) Universitas Sarjanawiyata Tamansiswa which has facilitated us to carry out this research. In addition, we would like to thank all parties who have supported this research so that it can be carried out well.

REFERENCES

- Anderson, T., & Dron, J. (2014). Teaching Crowds: Learning and Social Media. In *Teaching Crowds: Learning and Social Media*. <https://doi.org/10.15215/aupress/9781927356807.01>
- Anggraeni, D. M., & Sole, F. B. (2018). E-Learning Moodle, Media Pembelajaran Fisika Abad 21. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, 1(2), 57–65.
- Anggreini, D., Priyoadmiko, E., & Setiana, D. (2020). Analisis Koneksi Matematika Ditinjau dari Tipe Kepribadian Sanguinis, Koleris, Melankolis, dan Plegmatis. *Buana Matematika: Jurnal Ilmiah Matematika Dan Pendidikan Matematika*, 10(1), 71–88.
- Anwar, N. T. (2018). Peran kemampuan literasi matematis pada pembelajaran matematika abad-21. *Prisma, Prosiding Seminar Nasional Matematika*, 1, 364–370.
- Ariani, T. (2020). Analysis of Students' Critical Thinking Skills in Physics Problems. *Kasuari: Physics Education Journal*, 3(1), 1–17. <https://doi.org/10.37891/kpej.v3i1.119>
- Benyamin, B., Qohar, A., & Sulandra, I. M. (2021). Analisis Kemampuan Berpikir Kritis Siswa SMA Kelas X Dalam Memecahkan Masalah SPLTV. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(2), 909–922.
- Bialik, M., Fadel, C., Trilling, B., Nilsson, P., & Groff, J. (2015). *Skills for the 21 st Century: What Should Students Learn? Center for Curriculum Redesign*. www.curriculumredesign.org
- Blanton, M., Stephens, A., Knuth, E., Gardiner, A. M., Isler, I., & Kim, J.-S. (2015). The development of children's algebraic thinking: The impact of a comprehensive early algebra intervention in third grade. *Journal for Research in Mathematics Education*, 46(1), 39–87.
- Butler, H. A., Pentoney, C., & Bong, M. P. (2017). Predicting real-world outcomes: Critical thinking ability is a better predictor of life decisions than intelligence. *Thinking Skills and Creativity*, 25, 38–46. <https://doi.org/10.1016/j.tsc.2017.06.005>

- Byiers, B. J., Reichle, J., & Symons, F. J. (2012). Single-subject experimental design for evidence-based practice. *American Journal of Speech-Language Pathology*, 21(4), 397–414. [https://doi.org/10.1044/1058-0360\(2012/11-0036\)](https://doi.org/10.1044/1058-0360(2012/11-0036))
- Chairilisyah, D. (2012). Pembentukan kepribadian positif Anak sejak usia dini. *Jurnal Educhild: Pendidikan Dan Sosial*, 1(1), 1–7.
- Clark, R. E. (1994). Media will never influence learning. *Educational Technologies Research and Development*, 42(2), 21–29. <https://doi.org/10.1007/BF02299088>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2014). A Comparison Of Convenience Sampling And Purposive Sampling. *Journal of Nursing*, 5(1), 1–4. <https://doi.org/j.ajtas.20160501.11>
- Firdaus, M., & Wilujeng, I. (2018). Pengembangan LKPD inkuiri terbimbing untuk meningkatkan keterampilan berpikir kritis dan hasil belajar peserta didik. *Jurnal Inovasi Pendidikan IPA*, 4(1), 26–40.
- Freeman, K. A., & Eagle, R. F. (2011). Single-subject research designs. In *Understanding Research in Clinical and Counseling Psychology, Second Edition* (pp. 124–154). <https://doi.org/10.4324/9780203831700>
- Gast, D. L., & Ledford, J. R. (2014). Single subject research methodology in behavioral sciences. In *New York: Routledge*. Routledge.
- Ibrahim, I., Sujadi, I., Maarif, S., & Widodo, S. A. (2021). Increasing Mathematical Critical Thinking Skills Using Advocacy Learning with Mathematical Problem Solving. *Jurnal Didaktik Matematika*, 8(1), 1–14. <https://doi.org/10.24815/jdm.v8i1.19200>
- Istiqomah, I., Yuliani, R., Ekawati, R., & Widodo, S. A. (2022). Number recognition development with number card: Single subject research. *International Journal of Evaluation and Research in Education*, 11(3), 1171–1182. <https://doi.org/10.11591/ijere.v11i3.22662>
- James, K. P. (2016). Single-subject research method: The needed simplification. *British Journal of Education*, 4(6), 68–95. www.eajournals.org
- Jonassen, D. H., Campbell, J. P., & Davidson, M. E. (1994). Learning with media: Restructuring the debate. *Educational Technology Research and Development*, 42(2), 31–39. <https://doi.org/10.1007/BF02299089>
- Jupri, A., & Drijvers, P. (2016). Student difficulties in mathematizing word problems in algebra. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(9), 2481–2502. <https://doi.org/10.12973/eurasia.2016.1299a>
- Jupri, A., Drijvers, P., & van den Heuvel-Panhuizen, M. (2014). Difficulties in initial algebra learning in Indonesia. *Mathematics Education Research Journal*, 26(4). <https://doi.org/10.1007/s13394-013-0097-0>
- Kurniawati, E., Sujiran, S., & Puspananda, D. R. (2020). Analisis Kemampuan Pemecahan Masalah Ditinjau Dari Tipe Kepribadian Materi Soal Cerita Perbandingan Pada Siswa Kelas VII SMP Pancasila Dander Tahun Pelajaran 2019/2020. *Jurnal Pendidikan Educatma*, 1–9.
- Lestari, K. E. (2014). Implementasi Brain-Based Learning untuk meningkatkan kemampuan koneksi dan kemampuan berpikir kritis serta motivasi belajar siswa SMP. *Judika (Jurnal Pendidikan Unsika)*, 2(1).

- Martyanti, A., & Suhartini, S. (2018). Etnomatematika: Menumbuhkan Kemampuan Berpikir Kritis Melalui Budaya Dan Matematika. *IndoMath: Indonesia Mathematics Education*, 1(1), 35–41.
- Meylina, S., & Jatmiko, J. (2019). Proses Berpikir Kritis Siswa dalam Pemecahan Masalah Matematika Berdasarkan Tipe Kepribadian Tipologi Hippocrates-Galenus. *Prosiding SEMDIKJAR (Seminar Nasional Pendidikan Dan Pembelajaran)*.
- Nanda, K. K., Tegeh, I. M., & Sudarma, I. K. (2017). Pengembangan video pembelajaran berbasis pendekatan kontekstual kelas V di SD Negeri 1 Baktiseraga. *Jurnal Edutech Undiksha*, 5(1), 88–99.
- Nurussafa'at, F. A., Sujadi, I., & Riyadi, R. (2016). Analisis kesalahan siswa dalam menyelesaikan soal cerita pada materi volume prisma dengan fong's shcematic model for error analysis ditinjau dari gaya kognitif siswa. *Jurnal Pembelajaran Matematika*, 4(2).
- Nuryanti, L., Zubaidah, S., & Diantoro, M. (2018). Analisis Kemampuan Berpikir Kritis Siswa SMP. *Jurnal Pendidikan*, 3(2), 155–158. <https://doi.org/10.17977/jptpp.v3i2.10490>
- Pamungkas, D. Y., & Siswanto, R. D. (2021). Identifikasi Pemecahan Masalah Matematis Peserta Didik Berdasarkan Tipe Kepribadian Hippocrates-Galenus dan Gender. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 05(03), 2324–2343. <https://doi.org/10.31004/cendekia.v5i3.789>
- Prasetyo, R., & Ma'arif, I. (2021). Kemampuan Berpikir Kritis Siswa Pada Pelajaran PJOK Saat Pembelajaran Daring Selama Pandemi Covid-19. *Jurnal Pendidikan Tambusai*, 5(2), 3470–3474.
- Priatna, N., Lorenzia, S. A., & Widodo, S. A. (2020). STEM education at junior high school mathematics course for improving the mathematical critical thinking skills. *Journal for the Education of Gifted Young Scientists*, 8(3), 1173–1184. <https://doi.org/10.17478/JEGYS.728209>
- Priyadi, R., Mustajab, A., Zaky Tatsar, M., & Kusairi, S. (2018). Analisis Kemampuan Berpikir Kritis Siswa SMA Kelas X MIPA dalam Pembelajaran Fisika. *Jurnal Pendidikan Fisika Tadulako Online*, 6(1), 53–55. <http://jurnal.untad.ac.id/jurnal/index.php/EPFT/article/view/10020>
- Rohimah, S. M. (2017). Analisis learning obstacles pada materi persamaan dan pertidaksamaan linear satu variabel. *JPPM (Jurnal Penelitian Dan Pembelajaran Matematika)*, 10(1).
- Septikasari, R., & Frasandy, R. N. (2018). Keterampilan 4C abad 21 dalam pembelajaran pendidikan dasar. *Tarbiyah Al-Awlad*, 8(2), 107–117.
- Stringfield, S. G., Luscre, D., & Gast, D. L. (2011). Effects of a story map on accelerated reader postreading test scores in students with high-functioning autism. *Focus on Autism and Other Developmental Disabilities*, 26(4), 218–229. <https://doi.org/10.1177/1088357611423543>
- Sunanto, J. (2005). Mengembangkan Potensi Anak Berkelainan Penglihatan. *Jakarta: Departemen Pendidikan Nasional*.

- Sunanto, J., Takeuchi, K., & Nakata, H. (2006). Penelitian dengan subjek tunggal. *Bandung: UPI Pres.*
- Suraji, Maimunah, & Saragih, S. (2018). Analisis Kemampuan Pemahaman Konsep Matematis dan Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi Sistem Persamaan Linear Dua Variabel (SPLDV). *Suska Journal of Mathematics Education*, 4(1), 9–16. <https://doi.org/10.24014/sjme.v3i2.3897>
- Susilowati, S., Sajidan, S., & Ramli, M. (2017). Analisis Keterampilan Berpikir Kritis Siswa Madrasah Aliyah Negeri di Kabupaten Magetan. *Prosiding Seminar Nasional Pendidikan Sains (SNPS)*, 223–231.
- Verawati, A., Agustito, D., Pusporini, W., Utami, W. B., & Widodo, S. A. (2022). Designing Android learning media to improve problem-solving skills of ratio. *Advances in Mobile Learning Educational Research*, 2(1), 216–224. <https://doi.org/10.25082/AMLER.2022.01.005>
- Widodo, S. A. (2018). Selection of Learning Media Mathematics for Junior School Students. *Turkish Online Journal of Educational Technology - TOJET*, 17(1), 154–160.
- Widodo, S. A., Kustantini, K., Kuncoro, K. S., & Alghadari, F. (2021). Single Subject Research: Alternatif Penelitian Pendidikan Matematika di Masa New Normal. *Journal of Instructional Mathematics*, 2(2), 78–89. <https://doi.org/10.37640/jim.v2i2.1040>
- Widodo, S. A., Sari, D. D., Maarif, S., Setiana, D. S., & Perbowo, K. S. (2022). Learning achievement of extroverted students in algebraic operations by tutorial learning: A single subject research. *Int J Eval & Res Educ*, 11(1), 99–107. <https://doi.org/10.11591/ijere.v11i1.21747>
- Yanti, O. F., Prahmana, R. C. I., & Fitriyah, F. (2018). Single subject research: Pembelajaran pythagoras pada siswa introvert kelas VIII. *Beta: Jurnal Tadris Matematika*, 11(1), 37–49.