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Algebraic Thinking Ability with Creative Problem Solving Integrated 4C Model Viewed from Mathematical Disposition

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Abstract

The purpose of this research is to describe the ability to think algebra with Creative Problem Solving (CPS) integrated 4C based on students' mathematical disposition levels. This research is a mix method with a sequential explanatory design. The population in this study were students of class XI MA Salafiyah Simbang Kulon Pekalongan in the academic year 2020/2021.The results showed that the Creative Problem Solving (CPS) integrated 4C was effective on students' algebraic thinking skills. The results of the descriptions of students with high mathematical disposition categories are able to complete generational, transformational and global meta-level algebraic thinking skills, students with moderate mathematical disposition categories are able to complete generational and transformational algebraic thinking skills, students with low mathematical disposition categories are only able to complete generational level algebra thinking skills.

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INTRODUCTION

Algebra is a part of mathematics (Nurlaeli et al, 2018). Mathematicians define algebra as the ability to use and recognize variables functionally as the relationship between known and unknown variables (Panasuk & Beyranevand, 2010; Choudhury & Kumar, 2012). Driscoll (1999) states that algebraic ability is the ability to represent quantitative forms so that the relationship between variables becomes clear. So algebraic ability can be interpreted as a person's ability to explain algebraic understanding as a form of relationship, abstraction, and various forms of calculation.

Previous research on algebraic thinking focused on the problems of students' difficulties in algebraic thinking. Some of the difficulties faced by students in algebraic abilities include misconceptions in the completion of algebraic operations (Holmes, 2013; Dwirahayu, 2018; Mashuri, et al, 2018;Maudy et al, 2019).

Factors that make it difficult for students to understand mathematics, especially in algebra, are students 'personal factors, student learning factors and students' attention to learning mathematics. Students with high mathematical abilities can think algebraically in restating information mathematically by stating the relationships found in a pattern or rules that generally apply to a given problem through representations in the form of algebra, pictures, and words, applying and interpreting mathematical findings by applying these rules or patterns to provide a solution to each problem (Warsitasari, 13: 2015). Kieran (2004) in working on algebra problems, students carry out generational activities, transformational activities,

The disposition of mathematics as a tendency to think and act positively. This disposition is reflected in students' interest and belief in learning mathematics and a willingness to reflect on their own thinking(NCTM, 2000). Mathematical disposition is one of the factors supporting the success of students' learning mathematics (Setiawan, FT, 2017; Rakhmi, 2018). the experience of an individual will form one's mathematical disposition (Feldhaus,: 2014)

Creative problem solving (CPS) is a creative problem solving model, where this model emphasizes the ability of students to solve problems creatively. The ability of students to make and solve questions shows students' understanding of what they have learned, so that in this case students are required to think creatively and can increase motivation in students. The CPS model is a learning model that focuses on problem-solving skills, which is followed by strengthening creativity. The purpose of the CPS model according to Hudojo (2008: 155) is to determine the completeness of learning on learning outcomes, activeness and thinking skills and student processes. According to Lestari and Yudhanegara (2015: 65) CPS is a variation of the problem solving learning model with systematic techniques in organizing creative ideas to solve a problem. According to Rosita and Rohmad (2016), CPS is a learning model based on problem solving. This learning model is applied to improve students' problem solving skills. 21st century skills or termed 4C (Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation).

Based on the observations of researchers from the initial mathematical ability test conducted by researchers at the school, the mean of 208 students was 66.62 with a standard deviation of 15.31. This means that the students' initial mathematical ability is still low. It was found that algebra is one material that is still difficult for students to master. This is indicated by the results of interviews with mathematics teachers who said that students still have difficulty learning algebra, especially those related to problem solving using algebraic form operations. Students also still have difficulty changing problems into algebraic form, for example in solving three-variable linear equation system problems, some students have difficulty in modeling it into mathematical form and solving the problems given. Students also lack confidence in doing math problems given by the teacher. Therefore, the teacher only focuses on students who have high courage and confidence in doing math problems. The teacher also does not fully implement the problem based learning (PBL) learning model even though the lesson plan uses the PBL learning model.

Based on this background, the purpose of this study is to describe algebraic thinking skills through Creative Problem Solving (CPS) integrated 4C based on the level of students' mathematical disposition.

METHOD

This type of research is a mix method with a sequential explanatory design (Creswell, 2016). This research was conducted in class XI MA Salafiyah Simbang Kulon Buaran Pekalongan Academic Year 2020/2021. The research was conducted in the odd semester of the 2020/2021 school year, namely July - August 2020. The population in this study were students of class XI MAS Simbang Kulon Academic Year 2021/2022 which consisted of 5 classes. The sample in this study were two classes in class XI. One class was chosen as the experimental class using the CPS integrated 4C learning model, namely class XI P1 and one class as a control class using PBL learning, namely XI P2. The following is a picture of the quasi experimental design model nonequivalent control group design which is presented in Table 3.

Table 3. 1 Model Nonequivalent Control Group Design

Class	Early Abilities	Treatment	Final ability
Experiment	P_1	X_1	P_2
Control	P_1	*X2*	P_2

The instruments used in this study were worksheet for 4C integrated CPS learning, student response questionnaires to 4C integrated CPS learning and a final test of algebraic thinking skills. The 4C integrated CPS learning model is said to be effective in this study if it meets the criteria (1) The average algebraic thinking ability of students using the 4C integrated CPS learning model is more than or equal to the minimum completeness criteria, which is equal to the average plus 0.25 standard deviation, (2) The algebraic thinking ability of students using the CPS integrated 4C learning model achieves classical completeness, namely students who achieve learning completeness of more than or equal to 75%, (3) The average algebraic thinking ability of students in a class using the CPS integrated 4C learning model is better than the average algebraic thinking ability of students in a class using the PBL learning model, (4) The proportion of completeness of students' algebraic thinking skills using the CPS learning model integrating 4C is higher than the proportion of students' algebraic thinking skills using the PBL model. The test used in this study was to use the Independent t test and Z test.

Student responses to CPS integrated 4C learning were based on the results of student questionnaires. (4) The proportion of students 'completeness of algebraic thinking skills using the CPS integrated 4C learning model is higher than the proportion of students' algebraic thinking abilities using the PBL model. The test used in this study was to use the Independent t test and Z test. Student responses to CPS integrated 4C learning were based on the results of student questionnaires. (4) The proportion of students 'completeness of algebraic thinking skills using the CPS integrated 4C learning model is higher than the proportion of students' algebraic thinking abilities using the PBL model. The test used in this study was to use the Independent t test and Z test. Student responses to CPS integrated 4C learning were based on the results of student questionnaires.

The mathematical disposition questionnaire was given to students in the experimental class, namely class XI P1, the questionnaire given only covered the mathematical disposition. The purpose of giving the questionnaire was to group students according to 3 categories, namely students who had high mathematical dispositions, students who had moderate mathematical dispositions and students who had low mathematical dispositions. Each category was chosen by 2 students so that there were 6 people as research subjects.

RESULTS AND DISCUSSION

The results of the analysis of the initial ability to think algebra before treatment can be seen in Table 4.1.

Table 4. 1 Results of the Initial Ability to Think Algebra

Class	$\bar{X}$	Variance	t_{count}	$t_{tab;s}$
Experiment	67.09.00	1.866.074	-0.237	2,023
Control	67,175			

Based on Table 4.1, the average results of the initial mathematical thinking algebraic thinking ability in the experimental class and control class are 67,175 and 67.9. The results of calculations with Microsoft Excel software obtained the value$t_{count} = -0.237$ $t_{table} = 2.023$. Accepted H_0 if $-t_{table} < t_{count} < t_{table}$. The result show that $-2.023 < -0.237 < 2.023$. Accept if so it is obtained, so H_0 was accepted. This means that there is no average difference between the experimental and control classes. Furthermore, in the division of the learning group, the group division is randomly

Based on the test scores of the initial ability to think algebra, so that in each group there are students with high algebraic abilities, students with medium algebraic skills, and students with low algebraic abilities.

After carrying out learning in the experimental class and control class, then a final test of the students' algebraic thinking ability was carried out. The data obtained were then analyzed by means of normality and homogeneity tests. The calculation of the data normality test for the final ability of students assisted by the Microsoft Excel program can be seen in Table 4.2 below

Table 4. 2 Result of Calculation of Normality of Final Ability to Think Algebra

Statistics	TKABA
N	80
$\bar{X}$	75.075
s	7.0052
D_{count}	0.0781
D_{table}	0.1520
Decision	H_0 be accepted

Based on Table 4.2, the results of the calculation of the normality test obtained a value $D_{count} = 0.0781$. At the 5% significance level and N = 80 obtained $D_{table} = 0.1520$. It can be seen that the value $D_{count}<D_{table}$ in this case H0 is was accepted. The calculation of the normality test with SPSS 16.0 can be seen in Table 4.3 below

Table 4.3 Results of SPSS Normality Test Final Test of Algebraic Thinking Ability

Statistics	Asymp. Sig	Decision
TAKBA	.200	H_0 is accepted

Based on Table 4.3, the sig. value = 0.200, the fact is that $0.200 > 0.05$, it meaning H_0 was accepted. Based on the calculation of the normality test with SPSS and Microsoft Excel, it can be concluded that the data sample of students' final algebraic thinking skills comes from a normally distributed population.

The calculation of the homogeneity test of the final ability of students' algebraic thinking assisted by the Microsoft Excel program can be seen in Table 4.4 below.

Table 4. 4 Recapitulation of Students' Final Ability Homogeneity Test

Statistics	$\boldsymbol{n}$	k	w	F_{table}	Decision
TKABA	80	2	1,869	3.11	Accept H_0

Based on Table 4.4, the results of the calculation of the homogeneity test for the final test of students' algebraic thinking abilities were obtained $w = 1.86$. At the 5% significance level and $dk = n - 2$ indigo is obtained $F_{(table)} = 3.11$. It can be seen that the value $w < \boldsymbol{F}_{(table)}$ in this case is H_0wa accepted so that it can be concluded that the data sample of the final ability to think algebra comes from the same variance. The calculation of the homogeneity test was also carried out using the Levene test with the help of SPSS 16.0, the results of calculations using SPSS can be seen in Table 4.5

Table 4. 5 SPSS Results Homogeneity Test of Students' Final Ability in Algebraic Thinking

Statistics	Asymp. Sig	Decision
TKABA	.176	H_0 is accepted

Based on Table 4.5 the value of Sig = 0.176, the fact is that 0.176> 0.05 so that H_0 was accepted. From the calculation of the Lavene Test and the SPSS calculation it can be concluded that H_0 was accepted, it meaning that the data sample of the final ability to think algebra comes from the same variance.

The criteria for completeness of algebraic thinking in CPS integrated 4C learning

The determination of algebraic thinking completeness is obtained from the results of the initial test of critical thinking skills conducted before students in the experimental class are given treatment or treatment. The data analysis from the actual completion limit of the initial test of algebraic thinking skills is used as a reference for completeness of the final test of mathematical algebraic thinking skills. The results of the analysis show that $\bar{x} = 68.39$the standard deviation is 15.97 the minimum completeness criteria is $= \bar{x} + 0,25 = 68.39 + 0.25 = 70$..

Individual completeness test of algebraic thinking skills in 4C integrated CPS learning

Individual completeness tests are carried out to find out whether students' algebraic thinking skills in 4C integrated CPS learning are more than KKM. Based on the calculations, the calculation results are obtained in Table 4.6

Table 4.6 Individual Compliance Test Results

$\bar{x}$	77.7
μ_0	70
S	5.612
N	40
t_{table}	1.683
t_{count}	8.6184
Decision	H_0 rejected

Decision criteria are H_0 rejected if $t_{count} \geq t_{table}$ the dk $=(n-1)$ and the significance level used is 5%. Obtained t_{count} = 8.6184 while . t_{table} = 1.683, so that t_{count} = 6.398432 > t_{table} = 1.69092. so the average final test students' algebraic thinking ability exceeded 70. The results of the individual mastery test calculations are strengthened by the results of calculations with the one sample t-test assisted by the SPSS program which can be seen in Table 4.7 below.

Table 4. 7 Results of the SPSS Individual Completeness Test

Statistics	Asymp. Sig	Decision
TKABA	.00	H_0 rejected

T Table 4.7 shows that the significance value is 0.0 <0.05, in this case H0 is rejected. Based on the description above, it can be concluded thatThe average final test students' algebraic thinking ability exceeded 70

Classical completeness test of algebraic thinking skills in CPS integrated 4C learning

The classical completeness criteria set are at least 75% of students who pass the KKM. Calculation of classical completeness test can be seen in Table 4.8 below.

Table 4. 8 Recapitulation of Students' Classical Completeness Test

Class	Experiment
N	40
X	38
π_0	0.75
z_{count}	2.921
z_{table}	1.64
Decision	H_0 rejected

Based on Table 4.8 shows that there are 38 students from a total of 40 students who have exceeded 70. The obtained z_{count} value is z_{count}= 2,921. Determination of critical value z_{table}= $z_{0,5-\alpha}$, where α is the significance level of 5%, is obtained z_{table} = 1.64. This shows that the value z_{count} is more than the value z_{table} so H_0 it is rejected, meaning that the proportion of students who are subject to 4C integrated CPS learning reaches completeness has exceeded 75%The results of the calculation of the classical completeness test are strengthened by the results of calculations with the Binomial test assisted by the SPSS program which can be seen in Table 4.9 below.

Table 4.9 Classical Completeness Test Calculation Results

Statistics	Asymp. Sig	Decision
TKABA Experiment	0,000	H_0 is rejected

Table 4.9 shows that the significance value is 0.000 <0.05, in this case H_0 is rejected. Based on the description above, it can be concluded thatthe proportion of students who are subject to learning CPS integrated 4C completeness has exceeded 75%,

Different test of average algebraic thinking skills in 4C integrated CPS learning with algebraic thinking skills in PBL learning

The average difference test is used to determine whether the algebraic thinking skills of students who are subjected to 4C integrated CPS learning in the experimental class are better than students who are subjected to using the PBL model in the control class. Calculation of the average difference test assisted Microsoft Excel program can be seen in Table 4.10 below.

Table 4. 10 Average Difference Test Results

Class	N	$\bar{X}$	t_{count}	t_{table}	**Decision**
Experiment	40	77.65	3,282	1,683	H_0rejected
Control	40	72.50			

Table 4.10 shows that the average algebraic thinking ability test results in the experimental class and control class are 77.65 and 72.50 respectively and the value is obtained.t_{count}= 3,282. Nt table critical value where the significance level is 5%, the value is obtained αt table=1,683. This shows that value$t_{count} > t_{table}$ so that H_0 rejected.

The results of the calculation of the average difference test are strengthened by the results of calculations assisted by the SPSS program which can be seen in Table 4.11 below

Table 4. 11 Results of Average Difference Test Using SPSS

Statistics	Asymp. Sig	Decision
TKABA	.176	H_0rejected

Table 4.11 shows that the significance value is 0.176> 0.05 in this case H_0 rejected. Based on the description above, it can be concluded that the average algebraic thinking ability of students in CPS integrated 4C learning is more than the average mathematical critical thinking ability of students in PBL learning.

Proportion difference test algebraic thinking skills in 4C integrated CPS learning with algebraic thinking skills in PBL learning

The test for different proportions is used to determine the difference in the number of students who achieve completeness ability algebraic thinking in the CPS integrated 4C model and the number of students who achieved completeness ability algebraic thinking on PBL learning. Proportion difference test calculation assisted Microsoft Excel program can be seen in Table 4.12 below.

Table 4.12 Proportion Difference Test Results

Class	N	X	π_0	z_{count}	z_{tablr}	Decision
Experiment	40	38	0.75	3.15	1.64	H0 is rejected
Control	40	27				

Based on Table 4.12, the results of the calculation of the proportion test obtained value $z_{count} = 3.15$. At the 5% significance level $.z_{table} = z_{0,5-\alpha} = 1.64$, it is seen that the value $Z_{count} < Z_{table}$ in this case H_0 is rejected, meaning that the proportion of students 'algebraic thinking skills in CPS integrated 4C learning is more than the proportion of students' algebraic thinking abilities in PBL learning.

Student responses to CPS integrated 4C learning

The CPS integrated 4C model has four stages, namely the stages of clarifying problems, expressing ideas, evaluation and selection, implementation. The stage of clarification is by explaining phenomena or facts that motivate students to be involved in solving the selected problem. The stage of expressing ideas guides students to identify problems and formulate an authentic problem. The evaluation and selection stages help and direct students to come up with original ideas to find solutions. The implementation stage directs students to solve questions that are relevant to the material.The learning of the 4C integrated CPS model was held four times. The first meeting studied about finding the concept of numbers, definition of arithmetic sequences and arithmetic series. The second meeting studied about finding the definition of geometric sequences and series. The third meeting studied solving problems related to arithmetic sequences and series. The fourth meeting studied solving problems related to geometric sequences and sequences. Learning the 4C integrated CPS model begins with an orientation stage through providing learning motivation so that students know the benefits of learning sequences and series. Then the teacher divides the students into several groups, each group consisting of 4-5 people and the teacher asks the students to appoint their members to be the group leaders. Furthermore, the teacher provides Student Worksheets to the group leader to work on with their members and invites students to understand the concept of sequences and series. During the discussion, the teacher goes around each group to help (provide a little guidance) students in understanding the concept. Furthermore, the concept formation stage, the teacher provides questions that can guide students to think algebraically related to what students have done. This question serves to help students construct cognitive abilities. In the last stage, the teacher provides exercises in the form of questions that are in the worksheet. The teacher goes around to each group to help (provide a little guidance) students in understanding the concept. Furthermore, the concept formation stage, the teacher provides questions that can guide students to think algebraically related to what students have done. This question serves to help students construct cognitive abilities. In the last stage, the teacher provides exercises in the form of questions that are in the worksheet. The teacher goes around to each group to help (provide a little guidance) students in understanding the concept. Furthermore, the concept formation stage, the teacher provides questions that can guide students to think algebraically related to what students have done. This question serves to help students construct cognitive abilities. In the last stage, the teacher provides exercises in the form of questions that are in the worksheet.

After implementing the 4C integrated CPS learning, students fill out a questionnaire related to the learning that has been implemented. Based on the results of the questionnaire, students' difficulties in understanding algebra can be seen in Figure 1.

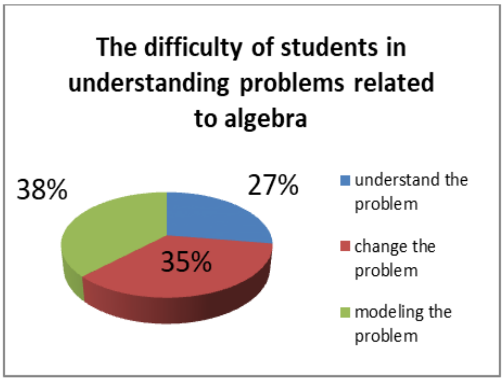

Figure 1 The difficulty of students in understanding problems related to algebra

Based on Figure 1, it was found that the difficulty of students in understanding problems related to algebra was 27%, the difficulty in changing the questions into other forms was 35% and the difficulty in modeling the problem was 38%. Kieran (2004) states that in working on algebraic problems, students carry out generational activities to understand questions, transformational activities, namely changing questions into other forms, and global meta-level activities. namely modeling the problem. This means that 27% of students have difficulty in generational activities, 35% of students have difficulty in transformational activities and 38% of students have difficulty in global meta-level activities.

The level of understanding of students in the 4C integrated CPS learning model can be seen based on the results of the questionnaire on the level of understanding of students using the 4C integrated CPS model in Figure 2.

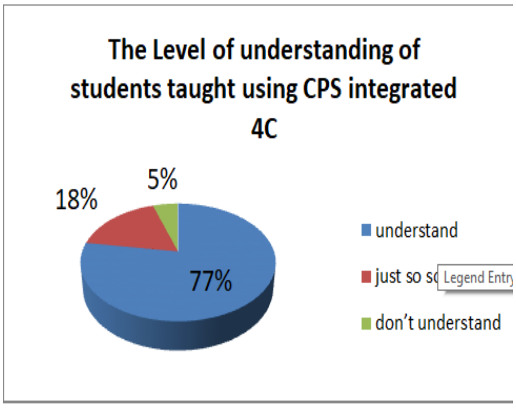

Figure 2 the level of understanding of students taught using CPS integrated 4C

Based on Figure 2, it is obtained that the level of students' understanding of the material in CPS integrated 4C learning is 77%, students who feel normal are 18%, and students who feel they do not understand are 5%. This is reinforced by the results of the students' algebraic thinking ability test results in Table 4.7. Rosita and Rohmad (2016) state that Creative Problem Solving is a learning model based on problem solving.

The 4C integrated CPS model helps students understand the material. Student responses to CPS integrated 4C learning can be seen in Figure 3.

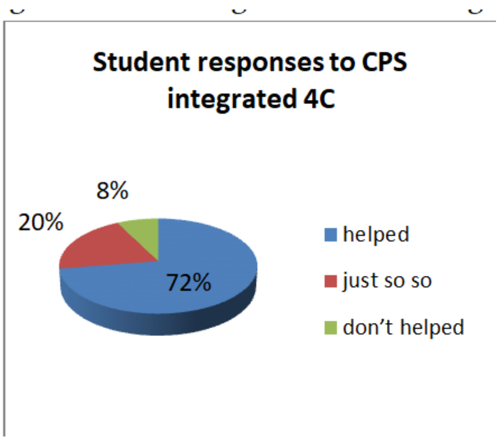

Figure 3 Student responses to CPS integrated 4C learning

Based on Figure 3, it was found that 72% of students were helped by CPS integrated 4C learning, 20% of students felt normal and 8% of students were not helped in learning CPS with the 4C approach. Lestari and Yudhanegara (2015: 65) state that creative problem solving is a variation of problem solving learning with systematic techniques in organizing creative ideas to solve a problem. This is in line with Ridong Hu (2017). Apart from issuing ideas, it is also necessary to know how to deal with problems, define questions, mobilize resources to solve problems, evaluate values and put solutions into practice. There are several difficulties students have in solving problems, especially questions related to algebraic thinking.

The CPS model integrates the 4C with regard to student cognitive. Piaget stated that based on the cognitive development of students, there is a schema. The scheme consists of three processes, namely assimilation, accommodation, and equilibration (Fosnot & Wadsworth in Ensar: 2014). This is in accordance with Vygotsky's theory which states that the interaction of interpersonal, cultural-historical, and individual factors is the key to human development (Crain, 2007).

Learning with the 4C integrated CPS model is said to be complete if it meets individual completeness and classical completeness and the algebraic thinking ability of students who are subject to the 4C integrated CPS learning model is better than students who are subjected to the PBL learning model, and the proportion of completeness of students' mathematical critical thinking skills who are subjected to the CPS learning model integrates 4C better than students taught with PBL learning model.

Based on the results of the final algebraic thinking ability test, it shows that students achieve mastery individually and classically. This means that the algebraic thinking ability of students exceeds the actual completeness limit of 70 and the number of students who complete more than 75%. In line with Ramdani (2017), the average score of students' mathematics learning outcomes after applying the creative problem solving model was 87.32 with a standard deviation of 8.09. From these results, it was found that 24 students (96%) had achieved individual completeness and this meant that classical completeness had been achieved. The average algebraic thinking ability of students who are subjected to the CPS integrated 4C model is more than the average algebraic thinking ability of the PBL model. The average of each class is 77. 65 for the experimental class, while for the control class, it was 72.50. In addition, the proportion of completeness of the algebraic thinking skills of students who are subjected to 4C integrated CPS learning is more than the algebraic thinking abilities of students who are subjected to the PBL model. Research conducted by Veronika (2018) is proven by the percentage of student learning activities using the CPS model in learning cycle I of 77.7% with a fairly good category and in cycle II of 86.8% with a good category. This represents an increase of 9.1%. The completeness of student learning outcomes on the prerequisite material obtained from the pre-cycle pretest was 80.8%. While the completeness of student learning outcomes in the first cycle of learning reached 84.6% in the good category and had achieved the classical percentage of completeness. Whereas in the second cycle it reached 96.2% in the very good category.

The completeness of the 4C integrated CPS learning model on students' algebraic thinking skills is supported by the results of previous research. The CPS model achieves classical completeness such as research conducted by Utami (2019) completeness of learning outcomes is achieved by 88% of all students have reached KKM. This is also in accordance with Maliya's research (2019). The proportion of the CPS learning model reaches 75%.

Factors that affect the completeness of learning the 4C integrated CPS model on algebraic thinking skills are the steps in the stages of expressing ideas, evaluation and selection and implementation. In the stage of expressing ideas, there are student activities to formulate problems into an algebraic calculation. The evaluation and selection stages include activities to carry out experiments so that original ideas emerge from students. The implementation stage consists of student activities, namely analyzing and evaluating problem solving processes. This is supported by the results of research by Efendi (2019) which states that the CPS learning method improves students' metacognitive measures.

Based on the information above, it can be concluded that the 4C integrated CPS model is complete on students' algebraic thinking skills and makes students more active in teaching and learning activities.

Description of algebraic thinking skills based on students' mathematical dispositions

Based on the results of a mathematical disposition questionnaire, 6 students were selected as informants to be interviewed. The criteria chosen were high mathematical disposition ($skor > 84$), medium mathematical disposition ($79 \leq skor \leq 84$)and low mathematical disposition ($skor < 79$) can be seen in Table 4.13.

Table 4.13 Research Subject Category

Student code	Questionnaire Score	Criteria
E 25	103	High
E 19	99	High
E 27	81	Medium
E 34	81	Medium
E 21	71	Low
E23	70	Low

Analysis of algebraic thinking skills is divided into 3 abilities, namely generational abilities with the following indicators (1) Students are able to understand generalizations that arise from sequences and numbers (2) Students are able to understand generalizations that arise from geometric patterns (3) Students are able to determine the meaning of variables from a problem (4) Students are able to present problems in the relationship between variables. Transformational ability consists of the following indicators (1) Students are able to determine the equivalent algebraic form (2) Students are able to perform algebraic operations (3) Students are able to determine the solution of an equation in algebra. Global meta-level abilities consist of the following indicators (1) Students are able to use algebra to analyze changes, relationships,

Students with low mathematical dispositions are able to solve algebraic problems at the generational level. Based on the research findings, the student's mathematical disposition is low because students are not confident in working on the questions given by the teacher, are confident in providing ideas and explanations during the discussion, but are less confident in conveying the results of their thoughts in front of the class. Never looking for additional material, relying on methods from the teacher, sometimes trying to use a variety of methods to test understanding but it takes a little encouragement from the teacher. Students in this category tend not to show productive dispositions so that they affect students' algebraic thinking skills. need training to support algebraic thinking skills. Ayber, G, & Tanışlı, D. (2017) stated that assignments and exercises can increase the arithmetic generalization of quantitative reasoning.

Students with the mathematical disposition category are solving problems of algebraic thinking skills working randomly, namely between questions that measure generational and transformational abilities. Then students with the mathematical disposition category are completing the work on algebraic thinking skills that measure the indicators of global meta-level abilities. The mathematical disposition of the students is moderate, students sometimes lack confidence in working on the questions given by the teacher, are confident in giving ideas and explanations during the discussion, but lack confidence in conveying the results of their thoughts in front of the class. Sometimes looking for additional material, sometimes relying on the teacher's way of trying to use a variety of methods to test understanding but it takes a little encouragement from the Teacher. This is in line with the statement (Pratiwi 2020) stating that students with moderate learning interest can complete generational and transformational activities, but have difficulty completing global meta-level activities. Kats (2009) mathematical disposition is related to how students solve mathematical problems, are they confident, diligent, interested and think flexibly to explore various alternative problem solving

Students with a high mathematical disposition category in working on algebraic thinking skills coherently from generational, transformational abilities and global meta-levels. Patmasari (2017) states that students with high mathematical dispositions find ways to solve shorter problems by learning the first method that has been used or linking it to other previously studied material that other students rarely think about. This is in line with Pampaka and Williams' statements. (2016) students' dispositions towards mathematics are manifested through attitudes and actions in choosing approaches to complete tasks which include self-confidence, responsibility, curiosity looking for alternatives, persevering and being challenged by never giving up, and the tendency of students to reflect on the way they think they do. Setiawan, FT (2017) stated that the students' mathematical disposition was high, students were confident in working on the questions given by the teacher, were confident in giving ideas and explanations during discussions and were confident in conveying the results of their thoughts in front of the class. Sometimes looking for additional material, rarely relying on methods from the teacher, trying to use a variety of methods to test understanding but still need a little encouragement from the teacher. Saputro & Mampouw (2018), subjects with good algebraic skills are those who have high math skills as well. The ability to think algebra that is owned by students can make it easier for students to solve problems based on open-ended confident in providing ideas and explanations during discussion and confident in conveying the results of his thoughts in front of the class. Sometimes looking for additional material, rarely relying on methods from the teacher, trying to use a variety of methods to test understanding but still need a little encouragement from the teacher. Saputro & Mampouw (2018), subjects with good algebraic abilities are those who have high mathematical abilities as well. The ability to think algebra that is owned by students can make it easier for students to solve problems based on open-ended confident in providing ideas and explanations during discussion and confident in conveying the results of his thoughts in front of the class. Sometimes looking for additional material, rarely relying on methods from the teacher, trying to use a variety of methods to test understanding but still need a little encouragement from the teacher. Saputro & Mampouw (2018), subjects with good algebraic abilities are those who have high mathematical abilities as well. The ability to think algebra that is owned by students can make it easier for students to solve problems based on open-ended Mampouw (2018) subjects with good algebraic abilities are subjects who have high mathematical abilities as well. The algebraic thinking skills of students can make it easier for students to solve open-ended problems Mampouw (2018) subjects with good algebraic abilities are subjects who have high mathematical abilities as well. The ability to think algebra that is owned by students can make it easier for students to solve problems based on open-ended

CONCLUSION

Based on the results of the research and discussion of the conclusions of this study, it can be argued that the increase in students' algebraic thinking skills along with changes in learning models is due to the learning that emphasizes students to develop ideas and ideas. As a result, students tend to be active in solving problems related to algebra.

This study recommends suggestions for developing students 'algebraic thinking skills by creating a special module related to algebraic thinking with open-ended question types with the aim of developing students' level of creativity in algebraic thinking skills. Assistance by the teacher is needed so that students can confirm the correctness of the answer. It needs a special study related to student difficulties in solving problems about algebra in terms of mathematical disposition.

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