Analyzing the influence of concept understanding and self efficacy on student's algebraic thinking ability in flipped classroom learning model

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A R T I C L E I N F O	Abstract
	The concept understanding and self efficacy are needed in mathematics learning. One of the student's skills in mathematics learning is the ability to think. The aims of this study is an analyzing the influence of concept understanding and self-efficacy on students' algebraic thinking ability and describe the algebraic thinking ability in the flipped classroom learning model based on concept understanding and self efficacy. This research is included in the mix-method research with sequential explanatory design. The results showed that (1) the average concept understanding and algebraic thinking ability of students who were given the flipped classroom learning model achieved learning completeness; (2) the average concept understanding and algebraic thinking ability of students who were given the flipped classroom learning model were better than those given the direct instruction learning model; (3) there is an influence between concept understanding and self-efficacy on students' algebraic thinking ability both simultaneously and partially; (4) i) students who have high concept understanding and high self efficacy tend to have high algebraic thinking ability; ii) students who have high concept understanding and moderate self efficacy than moderate concept understanding and moderate and low self efficacy tend to have moderate algebraic thinking ability; and iii) students who have low concept understanding and self efficacy tend to have low algebraic thinking ability.

1. Introduction

Education is one of the important things in human life. According to Law No. 20 of 2003, education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and country. Mathematics as one of the sciences taught in formal educational institutions is an important part in efforts to improve the quality of education (Novitasari, 2016). The main problem in Indonesian education that occurs is that students' absorption of lessons is still low, so that achieving educational goals is still difficult to achieve. According to Permendiknas No. 22 of 2006 the standard content of mathematics subjects aims to make students have the ability, namely: (1) Understanding mathematical concepts; (2) Using reasoning; (3) Solving problems; (4) Communicating ideas; and (5) Having attitudes in appreciating the usefulness of mathematics in life. According to Munaji and Setiawahyu (2020) in the TIMSS study, students' mathematical achievement is measured by their ability to solve problems in the form of students' knowledge of mathematical concepts, applying mathematical concepts to solve everyday problems, and doing reasoning, giving reasons based on information, draw conclusions, and make generalizations. Based on the results of TIMSS in 2015 Indonesia has an average of 397 with a rank of 44. The average international score for TIMSS is 500 (P4TK, 2011).

Understanding of mathematical concepts is very necessary for students, with sufficient understanding and mastery of concepts it will make it easier for students to learn something. In studying

mathematics, the ability to understand mathematical concepts is very important for students to have, because basically mathematical concepts are interrelated between one concept and another. Therefore, in learning it must be coherent and continuous. If students already understand mathematical concepts, then students will find it easier to learn more complex concepts. Rosmawati states that concept understanding is the mastery of a number of learning materials, where students not only introduce and know, but they are able to re-express concepts in a form that is easier to understand and able to apply them (Pranata, 2016). According to the Ministry of National Education, indicators of conceptual understanding include restating a concept, classifying objects according to certain properties according to the concept, providing examples and not examples of a concept, presenting concepts in various forms of mathematical representation, developing necessary or sufficient condition for a concept, using, utilizing and choose a particular procedure or operation, and apply a problem-solving concept or algorithm.

Based on the information that the researcher obtained in the Field Experience Practice activity in October-November 2020 at SMA Negeri 9 Semarang, Mrs. Budiyarti as a mathematics teacher explained that, there were still students in class X and class XI had difficulty in factoring a quadratic equation. In solving and factoring problems, there are students that still making mistakes, for example, students are sometimes wrong in determining the sign of the operation that meets or misplaces the appropriate number to determine the result of factoring. Supported by the acquisition of the average percentage score for odd math 2020/2021 specializations that have not been completed mastery learning from class XI MIPA 1 to XI MIPA 7, which is 50.79% where the average percentage is that there are still many students who get final exam scores below the mastery learning completeness. This happens because students only memorize the existing formula without understanding the concept.

Self-efficacy is a person's belief and confidence in his ability to carry out tasks or actions in achieving certain goals. Bandura (in Awaluddin, 2018) states that self-efficacy is a person's belief about his ability to carry out tasks or actions needed to get certain results. Self-efficacy is a state where a person trusts and believes that they can control the results of the efforts that have been made. It seems very clear that high self-efficacy will make a positive contribution in all aspects of life. Individuals who can achieve goals, results, and can overcome problems usually have high self-efficacy. On the other hand, individuals who have low self-efficacy will feel incapable and even hopeless and think that they only have a small chance of dealing with problems. Based on the observations of researchers during Field Experience Practice activities at SMA Negeri 9 Semarang, it was also found that students lacked confidence in presenting the results of their work in the learning process. In addition, students are still shy with their opinions, even just being silent and listening to the information given. Then, it was also found during learning, when researchers gave math problems with low, medium, and high difficulty levels, some students did not solve the problems, especially questions with medium and high difficulty. The reason, they find it difficult and confused to solve it, and also the lack of the students' enthusiasm in reviewing the material provided. Students who can answer questions with high difficulty, these students feel less confident with the answers they get when asked to explain and present the results. This shows that the low self-efficacy in aspects of level, strength, and generality.

In facing global challenges marked by the rapid development of science and technology, a generation with high-level thinking ability is needed. Along with the times, it is necessary to change the mindset of humans or students (Wijaya, et al: 2016). Through the process of learning mathematics, higher order thinking contexts can be developed that need to be mastered by students in 21st century learning. Mashuri et al. (2018) stated abstract algebra is one of the fields of study in mathematics. Algebra is one of the branches of mathematics that must be mastered by students in learning mathematics. Algebra is a material that is closely related to the process of thinking ability. Things that are needed to improve and develop algebraic thinking ability include focusing on relations, not only calculating answers and focusing on representation in problem solving rather than solving them (Kieran, 2004). The ability to think algebraically is one of the abilities that students really need, because by thinking algebraically students carry out activities in an effort to analyze, present, generalize symbols, patterns, and numbers presented in words, tables, diagrams, and so on. According to Kieran (2004) indicators of algebraic thinking ability in

this study are generational ability, transformational ability, and global meta-level ability. Generational ability included the formation of algebraic expressions and equations of the object. Transformational ability involved changing the transformation of an expression or equation based on rules. Global Meta-Level ability included the use of algebraic to solve other problem.

The selection of appropriate teaching strategies, such as learning models, learning methods, or approaches has a significant influence on success in learning mathematics. This must be adjusted to the expected goals so that the goals can be achieved and the implementation must be in line. Many alternatives can be done to provide a better understanding of concepts and students' thinking abilities. The flipped classroom learning model is one of the learning models that can be applied in the 21st century. The flipped classroom learning model is basically implemented in the classroom. However, it is done by students at home so that students can learn independently. Flipped Classroom is a learning model that "reverses" the traditional method, where students are given learning videos to watch at home and activities in class are used for discussion and doing assignments (Dewi and Harahap, 2019). Based on the explaination above then the researcher trying to research and Analyze the Influence of Understanding Concept and Self Efficacy on Student's Algebraic Thinking Ability in Flipped Classroom Learning Model.

The problems of this study are: 1) does the average concept understanding and algebraic thinking ability of students in the flipped classroom learning model achieve complete learning?; 2) are the results of the students' conceptual understanding and algebraic thinking ability in the flipped classroom learning model better than those given by direct instruction learning model?; 3) is there any influence between concept understanding and self-efficacy on students' algebraic thinking ability in the flipped classroom learning model?; 4) how is the students algebraic thinking ability in the flipped classroom learning model based on students' conceptual understanding and self-efficacy?. The aims of this study is an analyzing the influence of concept understanding and self-efficacy on students' algebraic thinking ability and describe the algebraic thinking ability in the flipped classroom learning model based on concept understanding and self efficacy.

2. Methods

This section describes when the research has been performed. The researchers explain experimental design, equipment, data collection methods, and control types. Authors describe the research area, location, and also explain the work done. The general rule to keep in mind is that this section should describe in detail and clearly so that the reader has the basic knowledge and techniques to be duplicated.

The method used in this study is a mixed method with an explanatory sequential design. This design combines quantitative and qualitative research methods sequentially, where the first stage is carried out using quantitative methods and the second stage is carried out using qualitative methods (Sugiyono, 2016). This research was conducted at SMAN 9 Semarang, which is located at Jalan Cemara Raya, Padangsari, Banyumanik, Semarang. This research was carried out approximately two months from April to May 2021. The population of this study was class XI MIPA SMAN 9 Semarang with research samples of class XI MIPA 2 and XI MIPA 4 which were selected by simple random sampling. The steps in the research with a sequential explanatory design are described in the following chart.
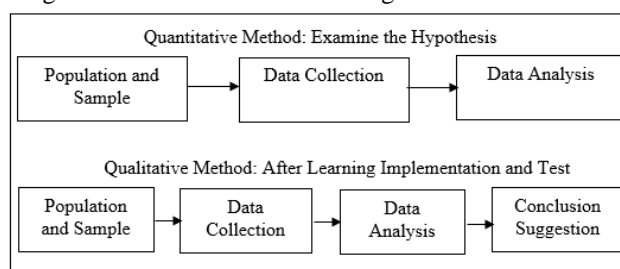
Figure 1. Sequential Explanatory Design

The design used in this quantitative study is a posttest-only control group design. In this study, to determine the initial condition of students, the researchers used the results of the Even Semester Mid-Exam. Meanwhile to obtain qualitative data, it used interview techniques. The research design that will be used in this quantitative research is described as follows:

Table 1. Quantitative Research Design

Class	Treatment	Final Test
Experiment	X_1	T_1
Control	X_2	T_2

Note:

X_1 : Flipped Classroom Learning Model

X_2 : Direct instruction Learning Model

T_1 : Test given after treatment on experimental group

T_2 : Test given after treatment on control group.

Subjects in qualitative research are students who are in the experimental class. In this study, the subject of qualitative research used purposive sampling. According to Sugiyono (2016: 300) purposive sampling is a sampling technique of data sources with certain considerations. Data collection and retrieval techniques in this study were using test methods in the form of concept understanding tests and algebraic thinking ability tests, using self-efficacy questionnaires, and using interview methods. Data analysis techniques in this study were carried out quantitatively and qualitatively. Quantitative data were analyzed using statistical analysis which included the one-party mean test, the two-average difference test, the proportion test, and regression analysis. Qualitative data were obtained through interviews with research subjects that were written in narrative form.

The score criteria for categorizing high, moderate, and the low student test results the students are as follows.

Table 2. Test Results Categorization Criteria

Interval	Interpretation
$X \geq \bar{X} + SD$	High
$\bar{X} - SD \leq X < \bar{X} + SD$	Moderate
$X < \bar{X} - SD$	Low

(Arikunto, 2013)

Where $\bar{X} = \frac{\sum X}{N}$ and $SD = \sqrt{\frac{\sum X^2}{N} - \left(\frac{\sum X}{N}\right)^2}$

Explanation:

X : Score test

$\bar{X}$: Mean

SD : Standard deviation

The score criteria for categorizing high, moderate, and the low student's self efficacy questionnaires are as follows.

Table 3. Score Criteria to Categorizes Questionnaire

Interval	Interpretation
$X \geq M_i + Sb_i$	High
$M_i - Sb_i \leq X < M_i + Sb_i$	Moderate
$X < M_i - Sb_i$	Low

(Ekawati & Sumaryana, 2011)

Explanation:

X : Respondent score

M_i : Mean ideal $= \frac{1}{2}(\boldsymbol{the\ highest\ score + the\ lowest\ score})$

Sb_i : Ideal Standard deviation $= \frac{1}{6}(\boldsymbol{the\ highest\ score - the\ lowest\ score})$

3. Results & Discussions

3.1. Implementation of Concept Understanding Test

Based on the results of the analysis, the average value of the test results of the ability to understand the concept of 35 students was 81.85 with a standard deviation of 8.65. The number of students who have not achieved the complete mastery learning score is 7 students. Furthermore, the test scores for the ability to understand the concept are categorized based on the criteria presented in the following table.

Table 4. Test Results Concept Understanding Criteria

Interval	Interpretation
$X \geq 90$	High
$73 \leq X < 90$	Moderate
$X < 73$	Low

Based on the concept understanding test scores obtained as many as 8 students with high concept understanding ability, 23 students with moderate concept understanding ability, and 4 students with low concept understanding ability.

3.2. Implementation of the Self Efficacy Questionnaire

Based on the results of the questionnaire, the average self-efficacy score of 35 students was 66.85 with a standard deviation of 5.04. Furthermore, the self-efficacy scores are categorized based on the criteria presented in the following table.

Table 5. Questionnaire Score Criteria of Self Efficacy

Interval	Interpretation
$X \geq 71$	High
$65 \leq X < 71$	Moderate
$X < 65$	Low

Based on the self-efficacy scores, there were 3 students with high self-efficacy, 18 students with moderate self-efficacy, and 13 students with low self-efficacy.

3.3. Algebraic Thinking Ability Test Implementation

Based on the results of the analysis, the average value of the algebraic thinking ability test results from 35 students was 83.42 with a standard deviation of 10.63. The number of students who have not achieved the completeness of the mastery learning score is 6 students. Furthermore, the algebraic thinking ability test scores are categorized based on the criteria presented in the following table.

Table 6. Test Results Algebraic Thinking Ability Criteria

Interval	Interpretation
$X \geq 94$	High
$73 \leq X < 94$	Moderate
$X < 73$	Low

Based on the test scores obtained as many as 7 students with high algebraic thinking ability, 22 students with moderate algebraic thinking ability, and 6 students with low algebraic thinking ability. The percentage criteria of Concept Understanding test, Questionnaire Self Efficacy, and Algebraic Thinking Ability test are presented in the following figure.
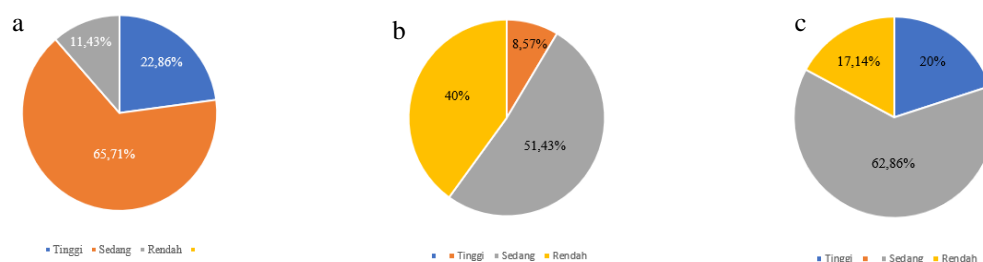
Figure 2. (a) Percentage criteria of concept understanding; (b) Percentage criteria of self efficacy; (c) Percentage criteria of algebraic thinking ability.

3.4. Determination of Research Subject

The determination of research subjects in this study used a purposive sampling technique where research subjects were selected based on the results of the concept understanding ability test and students' self-efficacy scores. Then two students from each group will be taken as research subjects. After carrying out the test and filling out the questionnaire, the research subjects were then interviewed to obtain data about the subject's algebraic thinking ability.

Table 7. The Research Subject

No	Code of Students	Code of Research Subject	Understanding of the Concept	Self Efficacy
1	E-20	TT-01	High	High
2	E-27	TT-02	High	High
3	E-29	TS-01	High	Moderate
4	E-11	TS-02	High	Moderate
5	E-35	SS-01	Moderate	Moderate
6	E-32	SS-02	Moderate	Moderate
7	E-04	SR-01	Moderate	Low
8	E-22	SR-02	Moderate	Low
9	E-31	RR-01	Low	Low
10	E-02	RR-02	Low	Low

Interviews were conducted after the students carried out the concept understanding ability test, algebraic thinking ability, and filling out the self efficacy questionnaire.

Quantitative Data Analysis

1.   Mastery of Learning Concept Understanding

Based on the results of the concept understanding ability test after being given the flipped classroom learning model, the average value of 35 students was 81.85 with a standard deviation of 8.65. After testing the average of one side, the value of $t_{hitung} = 4.69 > t_{tabel} = 1.69$ so H_0 is rejected. From the one-sided average test, it can be concluded that the average value of the students' conceptual understanding ability test in flipped classroom learning model has achieved mastery learning, which mean that the average value of the students' conceptual understanding ability test in flipped classroom learning model results is more than or equal to 75. Furthermore, through the one-party proportion test, the value $z_{hitung} = 0.683 > z_{tabel} = -1.64$ so H_0 accepted. Based on the one-sided proportion test, it can be concluded that the proportion of students who get an average value of student concept understanding in flipped classroom learning model is more than or equal to mastery learning 75 is more than or equal to 75%. Based on the results of the average test of one party and the proportion of one party, it can be concluded that the ability to understand the concepts of students given the flipped classroom learning model has achieved mastery learning, both mastery learning completeness and classical mastery.

2.   Mastery of Learning Algebraic Thinking Ability

Based on the results of the algebraic thinking ability test after being given the flipped classroom learning model, the average value of 35 students was 83.42 with a standard deviation of 10.63. After testing the average of one side, the value of $t_{hitung} = 4.689 > t_{tabel} = 1.69$ so H_0 is rejected. From the one-sided average test, it can be concluded that the average value of the students' algebraic thinking ability test in flipped classroom learning model has achieved mastery learning, which mean that the average value of the students' algebraic thinking ability test in flipped classroom learning model results is more than or equal to 75. Furthermore, through the one-party proportion test, the value $z_{hitung} = 1.073 > z_{tabel} = -1.64$ so H_0 accepted. Based on the one-sided proportion test, it can be concluded the proportion of students who get an average value of student algebraic thinking ability is more than or equal to mastery learning 75 is more than or equal to 75%. Based on the results of the average test of one party and the proportion of one party, it can be concluded that the student's algebraic thinking ability given the flipped classroom learning model has achieved mastery learning, both mastery learning completeness and classical mastery.

3.   The Average Student's Concept Understanding and Algebraic Thinking Ability in the Flipped Classroom Learning Model

Based on the results of the paired observation test of similarity between two averages, the value of $t_{hitung} = 2.150 > t_{tabel} = 1.667$. So that H_0 is rejected. From the paired observation test of similarity of the two averages, it can be concluded that the average value of students' conceptual understanding abilities given the flipped classroom learning model is better than the average value of students' conceptual understanding abilities given direct instruction learning model. It is known that the average value of students' conceptual understanding ability given the flipped classroom and direct instruction learning model is 81.86 and 77.23, respectively.

Based on the results of the paired observation test of similarity between two averages, the value of $t_{hitung} = 2.03 > t_{tabel} = 1.667$. So that H_0 is rejected. From the paired observation test of similarity of the two averages, it can be concluded that the average value of students' algebraic thinking abilities given the flipped classroom learning model is better than the average value of students' algebraic thinking abilities given direct instruction learning model. It is known that the average value of students' algebraic thinking ability given the flipped classroom and direct instruction learning model is 83.42 and 78.45, respectively.

4. *The Influence of Concept Understanding and Self Efficacy on Students Algebraic Thinking Ability in Flipped Classroom Learning Model*

The influence of concept understanding and self-efficacy on students' algebraic thinking ability in flipped classroom learning model can be known through multiple linear regression tests. Based on the test of multiple linear regression, the following regression equation is obtained.

$$\hat{Y} = 0.533X_1 + 0.856X_2 - 17.128$$

Through the partial and simultaneous t-test, it can be seen whether there is a partial and simultaneous (together) effect. From the calculation results, the value of $t_{hitung} = 2.743$ for the ability in understanding concepts and the value of $t_{hitung} = 2.449$ for self-efficacy with $t_{tabel} = 2.036$. Because each t_{hitung} value is more than t_{tabel}, it can be concluded that there is a partial influence between concept understanding and self-efficacy on students' algebraic thinking ability in flipped classroom learning model. In addition, the value of $F_{hitung} = 20.610$ with $F_{tabel} = 3.28$, because the value of $F_{hitung} > F_{tabel}$ so that it can be concluded that there is a simultaneous influence between concept understanding and self-efficacy on students' algebraic thinking ability in flipped classroom learning model. Then, to see how much influence concept understanding and self-efficacy have on students' algebraic thinking ability, correlation coefficient and determination coefficient are calculated. Based on the calculation, the correlation coefficient value is 0.750 and the coefficient of determination is 0.563. This shows that conceptual understanding and self-efficacy have an effect of 56.3% on algebraic thinking ability, while the remaining 43.7% is influenced by other factors.

Qualitative Data Analysis

Description of Algebraic Thinking Ability based on Concept Understanding and Self Efficacy.

1. Algebraic Thinking Ability in High the Concept Understanding and High Self Efficacy Group

Based on the results of the concept ability test and the results of the self-efficacy questionnaire, there were 3 students included in the category high of concept understanding and high self-efficacy. Based on the results of the algebraic thinking ability test, it can be seen that students who have high conceptual understanding and high self-efficacy tend to have high algebraic thinking ability.

Table 8. Score of Algebraic Thinking Ability for High Concept Understanding and High Self Efficacy Group

Students Code	Score of Algebraic Thinking Ability Test	Category
E-08	100	High
E-20	96	High
E-27	96	High

Table 9. Algebraic Thinking Ability Analysis Results for High Concept Understanding and High Self Efficacy Group

Subject Code	Generational		Transformational		Global Meta-Level	
	Understand generalization that appear of the number and the pattern of	Representing matter in the relationship between variable	Determine the equivalent of algebra	Determine completion of an equation.	Using algebra to analyze, change, relations, and predicts a problem in mathematics.	Using algebra to model and work on problems
TT-1	√	√	√	√	√	√
TT-2	√	√	√	√	√	√

Based on the results of qualitative analysis of work results and interview results of research subjects with high concept understanding and high self-efficacy categories, it can be seen that all indicators of generational, transformational, and global meta-level algebraic thinking ability can be met by students with high concept understanding and high self-efficacy categories. It is known that the average value of students' algebraic thinking ability for high concept understanding and high self efficacy is 97.33 respectively. It can be concluded that the highest concept understanding and self efficacy group tend to have high algebraic thinking ability.

2. Algebraic Thinking Ability in High the Concept Understanding and Moderate Self Efficacy Group
Based on the results of the concept ability test and the results of the self-efficacy questionnaire, there were 5 students included in the category of high concept understanding and moderate self-efficacy. Based on the results of the algebraic thinking ability test, it can be seen that students who have high conceptual understanding and moderate self-efficacy tend to have moderate algebraic thinking ability.

Table 10. Score of Algebraic Thinking Ability for High Concept Understanding and Moderate Self Efficacy Group

Students	Score of Algebraic Thinking Ability Test	Category
E-11	88	Moderate
E-23	88	Moderate
E-26	96	High
E-28	96	High
E-29	84	Moderate

Table 11. Algebraic Thinking Ability Analysis Results for High Concept Understanding and Moderate Self Efficacy Group

Subject Code	Generational		Transformational		Global Meta-Level	
	Understand generalization that appear of the number and the pattern of	Representing matter in the relationship between variable	Determine the equivalent of algebra	Determine completion of an equation.	Using algebra to analyze, change, relations, and predicts a problem in mathematics.	Using algebra to model and work on problems
TS-1	√	√	√	√	√	√
TS-2	√	√	√	√	√	√

Based on the results of qualitative analysis of the works and interviews of research subjects with categories of high concept understanding and moderate self-efficacy, it can be seen that the indicators of generational, transformational, and global meta-level algebraic thinking ability were met by students with high concept understanding categories and moderate self-efficacy. It is known that the average value of students' algebraic thinking ability for high concept understanding and moderate self efficacy is 90.40 respectively. It can be concluded that the highest concept understanding and the moderate self efficacy group tend to have moderate algebraic thinking ability.

3. Algebraic Thinking Ability in Moderate the Concept Understanding and Moderate Self Efficacy Group
Based on the results of the concept ability test and the results of the self-efficacy questionnaire, there were 13 students included in the category of concept understanding and moderate self-efficacy. Based on the results of the algebraic thinking ability test, it can be seen that students who have moderate conceptual understanding and self-efficacy tend to have moderate algebraic thinking ability.

Table 12. Score of Algebraic Thinking Ability for Moderate Concept Understanding and Moderate Self Efficacy Group

Students Code	Score of Algebraic Thinking Ability Test	Category
E-06	92	Moderate
E-09	96	High
E-10	80	Moderate
E-12	92	Moderate
E-13	84	Moderate
E-14	96	High
E-15	88	Moderate
E-19	88	Moderate
E-24	92	Moderate
E-30	76	Moderate
E-32	84	Moderate
E-33	80	Moderate
E-35	84	Moderate

Table 13. Algebraic Thinking Ability Analysis Results for Moderate Concept Understanding and Moderate Self Efficacy Group

Subject Code	Generational		Transformational		Global Meta-Level	
	Understand generalization that appear of the number and the pattern of	Representing matter in the relationship between variable	Determine the equivalent of algebra	Determine completion of an equation.	Using algebra to analyze, change, relations, and predicts a problem in mathematics.	Using algebra to model and work on problems
SS-1	√	√	√	√	√	√
SS-2	√	√	√	√	√	√

Based on the results of the qualitative analysis of the work and the results of interviews with research subjects with the categories of concept understanding and self-efficacy, it is seen that some indicators of generational algebraic thinking ability, transformational algebraic thinking ability, and global meta-levels were met by students. It is known that the average value of students' algebraic thinking ability for moderate concept understanding and moderate self efficacy is 87.07 respectively. It can be concluded that the moderate concept understanding and the moderate self efficacy group tend to have moderate algebraic thinking ability.

4. Algebraic Thinking Ability in Moderate the Concept Understanding and Low Self Efficacy Group
Based on the results of the concept ability test and the results of the self-efficacy questionnaire, there were 10 students included in the category of moderate concept understanding and low self-efficacy. Based on the results of the algebraic thinking ability test, it can be seen that students who have moderate conceptual understanding and low self-efficacy tend to have moderate algebraic thinking ability.

Table 14. Score of Algebraic Thinking Ability for Moderate Concept Understanding and Low Self Efficacy Group

Students Code	Score of Algebraic Thinking Ability Test	Category
E-03	80	Moderate
E-04	76	Moderate
E-05	84	Moderate
E-07	84	Moderate
E-17	56	Low
E-18	88	Moderate
E-21	72	Low
E-22	76	Moderate
E-25	68	Low
E-34	84	Moderate

Table 15. Algebraic Thinking Ability Analysis Results for Moderate Concept Understanding and Low Self Efficacy Group

Subject Code	Generational		Transformational		Global Meta-Level	
	Understand generalization that appear of the number and the pattern of	Representing matter in the relationship between variable	Determine the equivalent of algebra	Determine completion of an equation.	Using algebra to analyze, change, relations, and predicts a problem in mathematics.	Using algebra to model and work on problems
SR-1	√	√	√	√	√	√
SR-2	√	√	√	√	√	√

Based on the results of the qualitative analysis of the results of the work and the results of interviews with research subjects in the category of moderate concept understanding and low self-efficacy, it can be seen that the indicators of generational, transformational, and global meta-level algebraic thinking ability were met by students with the category of moderate concept understanding and low self-efficacy. It is known that the average value of students' algebraic thinking ability for moderate concept understanding and low self efficacy is 76.80 respectively. It can be concluded that the moderate concept understanding and the low self efficacy group tend to have moderate algebraic thinking ability.

5. Algebraic Thinking Ability in Low the Concept Understanding and Low Self Efficacy Group
Based on the results of the concept ability test and the results of the self-efficacy questionnaire, there were 4 students included in the category of concept understanding and low self-efficacy. Based on the results of the algebraic thinking ability test, it can be seen that students who have low conceptual understanding and self-efficacy tend to have low algebraic thinking ability.

Table 16. Score of Algebraic Thinking Ability for Low Concept Understanding and Low Self Efficacy Group

Students Code	Score of Algebraic Thinking Ability Test	Category
E-01	72	Low
E-02	68	Low
E-16	76	Moderate
E-31	60	Low

Table 17. Algebraic Thinking Ability Analysis Results for Low Concept Understanding and Low Self Efficacy Group

Subject Code	Generational		Transformational		Global Meta-Level	
	Understand generalization that appear of the number and the pattern of	Representing matter in the relationship between variable	Determine the equivalent of algebra	Determine completion of an equation.	Using algebra to analyze, change, relations, and predicts a problem in mathematics.	Using algebra to model and work on problems
RR-1	√	√	√	×	×	√
RR-2	√	√	√	√	√	√

Based on the results of qualitative analysis of work results and interview results of research subjects with low concept understanding and self-efficacy categories, it can be seen that several indicators of transformational algebraic thinking ability for determine completion of an equation and global meta-levels for using algebra to analyze, change, relations, and predicts a problem in mathematics have not been met by students with low concept understanding and self-efficacy categories. It is known that the average value of students' algebraic thinking ability for low concept understanding and low self efficacy is 69 respectively. It can be concluded that the low concept understanding and the low self efficacy group tend to have low algebraic thinking ability.

4. Conclusion

Based on the result, the conclusion are (1) the average concept understanding and algebraic thinking ability of students who were given the flipped classroom learning model achieved complete learning; (2) the average concept understanding and algebraic thinking ability of students who were given the flipped classroom learning model were better than those given direct instruction learning model; (3) there is an influence between concept understanding and self-efficacy on students' algebraic thinking ability; (4) The description of algebraic thinking ability based on students' conceptual understanding and self-efficacy is as follows. i) students who have high conceptual understanding and high self-efficacy tend to have high category algebraic thinking ability; ii) students who have high conceptual understanding and moderate self-efficacy tend to have moderate category algebraic thinking ability; iii) students who have moderate conceptual understanding and moderate and low self-efficacy tend to have moderate algebraic thinking ability; and iv) students who have low conceptual understanding and self-efficacy tend to have low algebraic thinking ability.

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