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ANALYSIS OF ALGEBRAIC THINKING SKILLS BASED ON THE ORIGIN OF SCHOOL AND THE SEX OF FIRST GRADE STUDENTS ACADEMIC YEAR 2011/2012 MATHEMATICS DEPARTMENT OF TARBIYAH FACULTY IN THE STATE INSTITUTE FOR ISLAMIC STUDIES SYEKH NURJATI CIREBON

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MATHEMATICS DEPARTMENT OF TARBIYAH FACULTY
THE STATE INSTITUTE FOR ISLAMIC STUDIES
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2012

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THESIS

Submitted to the Mathematics Department of The State Institute for Islamic Studies (IAIN) Syekh Nurjati Cirebon in Partial Fulfillment of the Requirement for Graduate Degree of Scholar in Mathematics Education

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2012

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ABSTRACT

Samari. Reg.Number.58450991. **ANALYSIS OF ALGEBRAIC THINKING SKILLS BASED ON THE ORIGIN OF SCHOOL AND THE SEX OF FIRST GRADE STUDENTS ACADEMIC YEAR 2011/2012 MATHEMATICS DEPARTMENT OF TARBIYAH FACULTY IN THE STATE INSTITUTE FOR ISLAMIC STUDIES SYEKH NURJATI CIREBON.** Thesis. Cirebon: Tarbiyah Faculty, Mathematics Tadris, The State Institute for Islamic Studies Syekh Nurjati Cirebon, July 2012.

Branch of mathematics that provides a fundamental role for allied disciplines, interdisciplinary, and human life it is algebra. Some research indicates a difference in algebraic skills between male and female. These differences are caused by several factors, including social status and gender. Based on this, the researcher moved to conduct research related to algebraic skills and algebraic thinking ones are reviewed by origin of School and Sex.

The research aims to determine: (1) mean achievement of algebraic skills' thinking skills' indicators, (2) differences of algebraic thinking skills reviewed based on the origin of school, (3) differences of algebraic thinking skills reviewed based on the sex, and (4) most dominant indicators of algebraic thinking skills. The origin of school is divided into three categories, those are Senior High School (SMA), Vocational School (SMK), and Islamic School (MA). While the sex is divided into two ones, these are male and female.

The research uses quantitative approach by using survey and expos facto methods. Reviewed by explanation level, it is include comparative research. Meanwhile, reviewed by the time, it includes cross sectional ones.

Results of research showed that: (1) greatest mean achievement of algebraic thinking skills related to solving story mathematical problems by achievement was 40.88 % and the lowest one related to representation skills by achievement was 2.55 %; (2) there was no difference of algebraic thinking skills based on the origin of the school by the achievement of significance obtained 0.735 (significance 0.735 > 0.05); (3) there was no difference of algebraic thinking skills based on the sex by the achievement of significance obtained 0.631 (significance 0.631 > 0.05), and (4) there were seven the most dominant indicators that can explain algebraic thinking skills by the achievement of cumulative eigenvalue obtained 89.345 %.

According to the results, the conclusion were (1) students have good skill related to number operation and bad one in representation skill such as using diagram, graph, and table; (2) the origin of school didn't influence algebraic thinking skills; (3) the sex didn't influence algebraic thinking skills; (4) there were seven dominant indicators of algebraic thinking skills.

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PREFACE

In the name of Allah, Most Gracious and Merciful. All praises and thanks be to Allah because of His blessing the writer was able to finish this thesis. May invocation and peace always be with Prophet Muhammad Peace be Upon Him, family, colleageus, and his followers up to the end of the world. Making of the thesis entitled is **ANALYSIS OF ALGEBRAIC THINKING SKILLS BASED ON THE ORIGIN OF SCHOOL AND THE SEX OF FIRST GRADE STUDENTS ACADEMIC YEAR 2011/2012 MATHEMATICS DEPARTMENT OF TARBIYAH FACULTY IN THE STATE INSTITUTE FOR ISLAMIC STUDIES SYEKH NURJATI CIREBON** was companied by challenges that gave satisfaction for the writer.

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8. Special thanks to my parents and family for support and pray.

May this thesis is useful for Stakeholder of education, especially for the writer and mathematics education.

Cirebon, July 2012

The Writer,

Samari

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CONTENTS

Page

COVER

ABSTRACT

APPROVAL

OFFICIAL NOTE

LETTER OF AUTHENTICITY

RATIFICATION

DEDICATION

BIOGRAPHY

PREFACE i

CONTENTS iii

LIST OF TABLES AND DIAGRAMS vi

LIST OF APPENDICES vii

CHAPTER I INTRODUCTION

A. Problem Background 1

B. Identification of Problems 5

C. Limitations of Problems 5

D. Research Questions 6

E. Research Objectives 6

F. Usefulness of Research 7

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CHAPTER II THEORETICAL FRAMEWORK

A. Theoretical Description 9

1. Mathematical Skills 9

2. Algebraic Thinking Skills 19

B. Overview of Relevant Research 27

C. Framework of Thinking 33

D. Hypothesis of Research 36

CHAPTER III RESEARCH METHODOLOGY

A. Place and Time of Research 37

1. Place of The Research 37

2. Time of The Research 37

B. Methods and Design of The Research 38

C. Population and Sample of Research 40

1. Population of Research 40

2. Sample of Research 41

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D. Data Collection Technique 42
1. Observation 42
2. Documentation 42
3. Test Instrument 43
E. Data Analysis Techniques 51
1. Requirements Tests of Analysis 51
2. Test of Hypothesis 56
F. Statistical Hypothesis 62
CHAPTER IV RESULT AND DISCUSSION
A. Description of The Data 63
B. Data Analysis..... 67
1. Requirement Tests of Analysis..... 67
2. Testing Hypothesis 69
3. Principal Component Analysis 74
C. Discussion 79
CHAPTER V CONCLUSION AND SUGGESTION
A. Conclusions 82
B. Suggestions 83
BIBLIOGRAPHY
APPENDICES

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LIST OF TABLE AND DIAGRAM

Page

Table 3.1 Schedule of The Research 37

Table 3.2 Population of The Research 40

Table 3.3 Sample of The Research 41

Table 3.4 Interpretation of Coefficient Correlation 45

Table 3.5 Interpretation of Reliability Instrument 47

Table 3.6 Interpretation of Index of Difficulty 48

Table 3.7 Interpretation of Differentiator 49

Table 3.8 Result of Testing Instrument of Algebraic Thinking Skills..... 50

Table 3.9 Interpretations of Learning Achievement 51

Table 4.1 Mean Achievement of Algebraic Thinking Skills' Indicators..... 64

Diagram 4.1 Mean Achievement of Algebraic Thinking Skills' Indicators..... 65

Table 4.2 Normality Test of Algebraic Thinking Skills 67

Diagram 4.2 Normality Test of Algebraic Thinking Skills..... 68

Diagram 4.3 Trend Normality Test of Algebraic Thinking Skills..... 68

Table 4.3 Algebraic Thinking Skills based on Origin of School 69

Table 4.4 Kruskal Wallis Test of Algebraic Thinking Skills based on Origin of School 70

Diagram 4.4 Mean Achievement of Algebraic Thinking Skills 71

Table 4.5 Algebraic Thinking Skills based on The Sex..... 71

Diagram 4.5 Mean Achievement of Algebraic Thinking Skills based on The Sex 72

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Table 4.6 Mann Whitney Test of Algebraic Thinking Skills based on The Sex 73

Table 4.7 KMO and Bartlett's Test of Algebraic Thinking Skills 74

Table 4.8 Total Variances Explained First Phase 75

Diagram 4.6 Scree Plot 76

Table 4.9 Total Variances Explained Second Phase 76

Table 4.10 The Dominant Indicator 77

Diagram 4.7 Loading Plot 78

Table 4.11 Achievement of Dominant Indicators 78

LIST OF APPENDICES

Page

Appendix A.1 Data of Preliminary Research 90

Appendix A.2 Lattices of Testing Algebraic Thinking Skills' Instrument 98

Appendix A.3 Instrument of Algebraic Thinking Skills' Testing Instrument 103

Appendix A.4 Result of Algebraic Thinking Skills' Testing Instrument 105

Appendix A.5 Instrument of Research 110

Appendix A.6 Solutions of Instrument 112

Appendix B.1 Populations of Research 122

Appendix B.2 Presence of Research 128

Appendix B.3 Result of Algebraic Thinking Skills' Research 134

Appendix B.4 Design of Requirement Analysis and Hypothesis Test 139

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Appendix B.5 Design of Average Indicator Analysis of Algebraic Thinking Skills 142

Appendix B.6 Result of Normality Test of Algebraic Thinking Skills' Data..... 147

Appendix B.7 Result of Requirement Test of Principal Component Analysis .. 150

Appendix B.8 Result of Hypothesis Test of Algebraic Thinking Skills..... 152

Appendix B.9 Result of Principal Component Analysis 154

Appendix C.1 r Product Moment Table..... 162

Appendix C.2 r Rank Spearman Table 163

Appendix C.3 Kolmogorov Smirnov Table..... 164

Appendix C.4 Liliefors Table 165

Appendix C.5 Kruskal Wallis Table..... 166

Appendix C.6 Chi Square Table 167

Appendix C.7 Mann Whitney Table..... 168

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CHAPTER I
INTRODUCTION

A. Problem Background

Mathematics is a science of patterns in which these patterns encourage people to think about the universe and all components and aspects.[1] Understanding of the universe and all components and aspects are not independent of man's understanding of the extent of ability in mathematics and mathematical thinking. Understanding of mathematics includes an understanding of the contents in the study of mathematics itself, such as geometry, algebra, statistics, discrete mathematics, and other studies relevant to human needs. The ability to think mathematically is an ability to understand, implement, and develop the content of the study of mathematics.

Mathematical thinking ability or skill is influenced by three factors; these are the ability to use these processes to find things related to mathematics (*Enquiry Ability*), confidence in the emotional and psychological control, and the extent of understanding of mathematical content and their understanding of mathematical content of the application area.[2] Three factors are certainly not apart from the background of social status, cultural, ethnic, educational environment, and the tendency of the society mindset.

---

[1] Robert J. Stenberg and Talia Ben-Zeev.1996.*The Nature of Mathematical Thinking.*Routledge. p.254

[2] John Mason, et al.2010.*Thinking Mathematically.*Pearson Education Limited Publishing. p.133

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Mathematics as the science of Universal provides a role for the cognate disciplines such as physics and chemistry; between disciplines such as economics, astronomy, and medicine; as well as aspects of human life such as employment, economy, and education. Fundamental role of mathematics for these aspects is undoubtedly. There are many branches of mathematics such as geometry, algebra, statistics, calculus, and discrete mathematics. A branch of mathematics that provides a big role for both the aspects told before and others ones is algebra. Mastering algebra is important either for education or careers.

Results of research conducted by Aiken in 1976 to 156 students at the junior secondary level in Botsnawa about differences in attitudes between male and female towards mathematics and its achievement of students indicate that there are differences in attitudes towards mathematics and one between male and female.[3] These differences are caused by several factors, including social expectations, family expectations, socioeconomic, and gender. The results of another study of 180 students at 9 grade in Austria by Malle in 1993 of algebra shows that 32% error rate occurred in the discussion of number terms, 37% error rate in the discussion of the equations, and 50% error rate on the discussion of terms with variable. The biggest problem students are transforming the terms and equations.[4]

[3] In Novotna, et al.(Eds.)._.*Proceedings 30th Conference of The International Group for The Psychology of The Mathematics Education (A Comparative Analysis of The Mathematics Achievement and Attitudes of Male and Female Students in Botsnawa Secondary School)*.Vol.1. p.367

[4] In Novotna, et al.(Eds.). *(StudentsErrors in Transforming Terms and Equations). Op.Cit.*, p.348

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This is reinforced by the results of an assessment of the difficulties faced by mathematics teachers and junior high school students in 5 provinces organized by Pusat Pengembangan Penataran Guru (PPPG)[5] Mathematics in 2002. The results showed that almost all provinces face obstacles in the form of low student understanding of concepts related to the operation of the algebra and low skills in solving algebra operations forms. That fact is reinforced by the results of an analysis of basic math skills test organized by the junior high school students PPPG Mathematics 2001, 2002, and 2003 in almost all provinces in Indonesia indicates that there are many students who have difficulty in solving the algebraic operation forms well.[6]

The result still needs efforts to improve mathematics skills, especially algebra skills and algebraic thinking ones. The role of the stakeholders of education, especially policy makers, and teachers determine the quality of algebra skills of the students. The success of the teaching of algebra is determined by the curriculum, educational standards, skills of teachers to understand algebra, how to teach algebra, as well as understand anyone who can succeed in algebra.

[5] Now becomes Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan (PPPPTK) Matematika

[6] Sri Wardani.2004. *Permasalahan Kontekstual Mengenalkan Bentuk Aljabar Di SMP*.Yogyakarta: Departemen Pendidikan Nasional.Direktorat Jenderal Pendidikan Dasar dan Menengah. Pusat Pengembangan Penataran Guru Matematika. p.1

Preliminary results of this study was done on the value of linear algebra and mathematics teaching materials 3 (MPM 3) of Mathematics Department of Tarbiyah Faculty students, The State Institute for Islamic Studies Syeikh Nurjati Cirebon in academic year 2009/2010, it can be found that students of Vocational School (SMK) obtained greater average of linear algebra higher than students from Senior High School (SMA) and Islamic School (MA) with the achievements respectively 3.00, 2.98, and 2.88. While students from SMA obtained the highest average in MPM 3 with the achievements were 3.10 for SMA, 3.03 for MA, and 2.81 for SMK. The male and female have the same average value in linear algebra. Yet female were superior to the MPM 3.

Departing from exposure above, the author is motivated to conduct research related to the skills of algebra and algebraic thinking ones of students mathematics department of the second semester, Tarbiyah Faculty of The State Institute for Islamic Studies Syeikh Nurjati Cirebon academic year 2011/2012 which are categorized by origin of school and sex. Therefore, researcher took the title of the study "Analysis of Algebraic Thinking Skills based on The Origin of School and The Sex of Fisrt Grade Students Academic Year 2011/ 2012 Mathematics Department of Tarbiyah Faculty in The State Institute for Islamic Studies Syeikh Nurjati Cirebon".

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B. Identification of Problems

According to the problem background, can be identified the problems of the research as follows:

1. Do the differences of social status, culture, ethnic, and gender influence mathematical skills?
2. Do the differences of social status, culture, ethnic, and gender influence skills in workplace?
3. Do the differences of educational background influence mathematical skills?
4. Do the differences of educational background influence skills in workplace?
5. How big is the influence of differences in social status, culture, ethnic, gender, and educational background toward mathematical skills?
6. Is there a dominant indicator which describes the mathematical skills in general used to improve the mathematical skills?

C. Limitations of Problems

Based on the identification of the problems above, the researcher took several problems to be studied because of the limitation and some considerations. The studied problems are the mean achievement of algebraic thinking skills' indicators, the difference algebraic thinking skills reviwed based on origin of school and sex, and the most dominat indicators of algebraic thinking skills.

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D. Research Questions

Research questions are the questions about the aspects to be found in the research activity so that researcher is encouraged to know the answer of the quaestions. Thus, research questions should involve the aspects which are being prior or major of the research. The questions are related to algebraic thinking skills. Based on the background of the issues, identifying problems, and limitations of the problem, the questions of the research are as follows:

1. How great is the mean achievement of indicators of algebraic thinking skills?
2. Are there the differences between students' algebraic thinking skills reviewed based on the origin of school?
3. Are there the differences between students' algebraic thinking skills viewed based on the sex?
4. Is there the most dominant indicator of algebraic thinking skills?

E. Research Objectives

After formulating the problems, the next step is determining the goals or objectives of the research. Research objectives are statements related to what will be found or determined. The objectives are described as questions of the research. Based on the research questions, the objectives of this research are as follows:

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1. To know how the mean achievement of indicators of algebraic thinking skills
2. To know if there are differences between students' algebraic thinking skills reviewed based on the origin of school
3. To know if there are differences between students' algebraic thinking skills reviewed based on the sex
4. To know which is the most dominant indicators of algebraic thinking skills

F. Usefullness of Research

Research on mathematics has two main usage those are pure (theoretical) and applied (practical).[7] Here the explanations of those usefulness:

1. Pure Usefullness (Theoretical)

Pure usefullness (theoretical) research refers to the understanding of thinking mathematically and mathematics teaching and instructional. The usefulness of pure research is expected to contribute to the development of mathematic science, especially algebraic thinking.

2. Sciences Usefullness (Practical)

The applied (practical) usefullness of the research is more on understanding mathematics to enhance the learning of mathematics. The usefullness of applied research is expected to provide an overview to the

[7] Derek Holton.2001.*The Teaching and Learning of Mathematics at University Level*.New York.Kluwer Academic Publishers. p.222

institution where the research was conducted, in this case is The State Institute for Islamic Studies Syekh Nurjati Cirebon, especially mathematics department of Tarbiyah Faculty about algebraic thinking skills of the students to be one consideration in policy making related the efforts to enhance the learning of mathematics at the college so that achieved the goals of education.

3. For Lecturers

The results of the research can be used by the lecturers to know students mathematical skills, especially algebraic thinking skills. The results can be used as the consideration of the lecturers to get the best way, strategy, and curriculum to teach algebra.

4. For Students

By this research, students are able to know their mathematical skills, especially algebraic thinking skills in the hope that they will be encouraged to improve their skills. The students and the lecturers should cooperate to obtain the best results.

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