An Analysis of Gender Difference in Academic Achievement of Elementary and Middle School Students

Lee, Soon-joo*
(E-mail : soonjoolee@hanbat.ac.kr)

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* Ph. D. earned at Moscow State University
Present Office: Professor at Hanbat National University

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<Abstract>

This study has the following three topics: first, gender differences in academic achievement among elementary and middle school students; second, gender distribution at each performance level on the basis of the results of academic achievement assessment and changes in the achievement level for each gender with grades; third, the percentage of boys and girls at each performance level (superior and inferior groups). The results of this study can be discussed as follows: First, while girls achieved better performance for the subject of Korean over all grades from the 3rd in elementary school through the 2nd grade in middle school, there was no gender difference in performance for the subject of mathematics over all grades except the 3rd grade. Another result is that gender differences in academic performance vary by school level. Second, Gender differences were compared at each academic achievement level for Korean and mathematics. Results indicated that, while boys and girls showed a similar trend in the average total score from the 3rd grade in elementary school through the 2nd grade in middle school, gender differences in the percentage of students in the superior group (with score of 90s or higher) for the subjects of Korean and mathematics became larger from a certain moment on. That is, the percentage of girls began to be remarkably higher in the superior group for the subject of Korean at the 5th grade, and the percentage of

boys began to be higher in the superior group for the subject of mathematics at the 2nd grade in middle school. Third, the phenomenon that girls achieved better academic results for each subject than boys was more remarkable in the inferior group than in the superior group.

[주제어] educational achievement, assessment, gender differences, high group, low group, grade, gender distribution

Ⅰ. Introduction

Academic achievement is an important factor affecting students' life in very diverse aspects, including values, school life, and career decision as well as self-concept, and is also considered to be one of the most important goals of school education. In addition, students' academic performance is regarded as an important predictor of the social class they will belong to and the role they will play in society during adulthood. For this reason, teachers in schools make great efforts to help students improve their academic achievement and those involved in education also try to identify diverse variables affecting academic achievement and apply their results to the teaching-learning process with the objective of devising a plan to help students improve their academic achievement. To determine what causes differences in academic achievement among individual students, many educational experts strive to find out a clue to it among genetic and environmental factors.

The variables that have been shown to affect academic achievement include environmental, learner, and instructional ones; it is found that intelligence among learner variables determines up to 50 percent of learners' academic achievement and that affective properties, including learning motivation, achievement motivation, self-concept, personality, attitude, interest, and anxiety, determine up to 25 percent of possibility of succeeding in learning tasks and even serve to allow human beings to continue their learning(Bloom 1971). Another variable among genetic factors of leaners that can affect academic achievement is gender difference. Many experts have long conducted research in diverse respects to reveal how learners' gender is related to academic achievement and how academic achievement varies by gender. Still, the results of studying this question have very multifaceted aspects. That is, the results confirming the gender differences in academic achievement strongly oppose those giving no such confirmation, and no definite cause of the gender differences has been found and no problem-solving plan has been presented. Even in this situation, however, a very dominant view is that boys are better at mathematics than girls and the reverse is true with languages, which is becoming a main issue of research in this field(Hedges & Nowell 1995; Naglieri & Rojahn 2001; Vermeer and, Boekaerts 2000).

Such research tends to indicate correlation between learners' gender and academic achievement and value their gender properties affecting academic achievement. According to lots of prior research, it should be more rational to insist that gender differences in academic achievement come from acquired-environmental levels, or socio-cultural factors, such as the socialization process within a specific context, rather than from biological factors(Yeom 2003). Therefore, it will be necessary to constantly provide differentiated educational activities with different educational objectives, contents, and methods in consideration of students' gender properties, and these activities will also be able to be used as a way to reduce gender differences in academic achievement found in specific subjects(Kim & Bhang 1986). In particular, an approach needs to be made to raise the level of academic achievement by giving priority to higher efficacy and more interest in subjects with poor performance and by cultivating positive attitude in consideration of these gender differences in academic achievement(Ju 2005). In addition, it will be possible to overcome some of the gender differences in the way of thinking and

improve poorer academic achievement found for specific subjects as compared with that of the other gender by giving different problem-solving experiences and reinforcements of performance results to boy and girl students.

This study tried to expand the scope of issues for gender differences in academic achievement for the subjects of mathematics and Korean language. That is, the data from diagnostic assessment in March 2010 were used to make a comparison in terms of academic achievement between boys and girls in both elementary and middle schools with the objective of understanding various phenomena related to gender differences in academic achievement for the subjects of mathematics and Korean language. Some overseas researchers conducting research on gender differences in academic achievement pay great attention at the fact that the ratio of boys to girls varies by academic performance levels. Hedges and Friedman(1993) stressed that while girls showed higher average scores than boys, the percentage of boys was higher in the top class than that of girls and proved that there were great differences in percentage between boys and girls in the top 5% class for mathematics. On the basis of these results, it can be predicted that the boy-girl ratio will also differ by achievement levels, regardless of average differences between boys and girls, for other subjects. To prove this prediction, this study tried to examine the changes in the achievement levels for each gender according to gender distribution at each performance level and grade shifts on the basis of the results of academic achievement assessment. In addition, superior and inferior groups were formed on the basis of students' achievement levels found in the diagnostic assessment of basic competency to see how the boy-girl ratio differed by the achievement levels, or between superior and inferior groups. A comparison was made in average scores and standard deviation between boys and girls within the inferior group to see gender differences in academic achievement.

On the basis of these results, an attempt was made to identify gender differences in academic achievement for the subjects of mathematics and Korean language and in academic performance by the academic achievement levels and obtain basic data to help develop a program that would fit students' gender properties and devise a teaching plan. It is expected that through this attempt, more positive research on diverse teaching plans will be conducted in consideration of students' gender properties, consequently obtaining such effects as realization of teaching-learning methods with differentiated approaches for each academic level and gender of students.

Ⅱ. Methods and Procedure

1. Subjects

To make a comparative analysis of gender differences in academic achievement among elementary and middle school students, the research was conducted with 3rd, 4th and 5th-graders in elementary school and 1st, 2nd-graders in middle school, who had gone through diagnostic assessment of basic competency in March 2010. We made 3556 elementary school students(1151 students in the 3rd grade, 1213 students in the 4th grade and 1191 students in the 5th grade) and 438 middle school students(219 students in the 1st grade and 219 students in the 2nd grade) the subject of study. Of these there are 2153 boys and 1843 girls. In particular, efforts were made to minimize inter-regional variables in order to generalize the results in sampling subjects. So regional division was made into large cities, small or medium-sized cities, and agricultural areas on the basis of cultural-economic environment so that students from each region could be equally selected for this study. That is, 34 elementary schools and 8 middle schools with a total of 3,994 students were selected from those regions.

<Table 1> Subjects' grade and gender composition

	Elementary school			Middle school		Total
	3rd	4th	5th	1st	2nd	
M	603	682	642	113	113	2,153
F	548	531	550	106	106	1,843
Total	1151	1213	119	219	219	3,994

To see gender differences in academic achievement by academic achievement levels, the inferior group was formed with students whose academic achievement was at the bottom 5% level and the superior group was formed with those getting a perfect score for each subject to make a comparative analysis of the boy-girl ratio in two groups. By doing so, gender differences at lower- and higher-score levels and how these gender differences varied by score levels were investigated. Since students with under-achievement who show severely poor academic competency are generally defined as belonging to the bottom 5% class among all the students, those belonging to the bottom 5% class were also classified into the inferior group in this study.

2. Instrument

In this study, the results of diagnostic assessment of basic competency conducted with elementary and middle school students at the national level in March 2010 were used as data for academic achievement. The data used in this study was selected with the assistance of "G" provincial office of education. The diagnostic assessment of basic competency at the national level, which is conducted with students at each school level all over the nation, is a criterion-referenced test to see how much of educational goals for curricula is achieved, contrary to simple academic evaluation, college scholastic test, or every type of screening tests. Therefore, the criterion for assessing academic achievement is an educational goal identified in curricula, and with this criterion, national elementary and middle school students' academic achievement levels are determined.

3. Statistical Analysis

The collected data were processed using an SPSSWIN program after going through a retrieval process. Independent sample t-test was performed to see gender differences in academic achievement by grade, and a comparison was made between superior and inferior groups in terms of gender differences in academic achievement to see gender differences in academic achievement by students' academic achievement levels. To do this, gender differences in performance between two groups were analyzed using independent sample t-test. To see how the boy-girl ratio differed between superior and inferior groups, the percentage of each gender within two groups was compared, and significance of the difference between the number of boys and girls was analyzed by χ^2 test.

III. Results

1. Analysis of Gender Differences in Academic Achievement

1) Analysis of Gender Differences in Academic Achievement among 3rd-Graders in Elementary School

To see gender differences in academic achievement among 3rd graders, first, the mean and standard deviation were calculated for Korean and mathematics in each gender, followed by t-test. The results are presented in Table 2. Girls showed significantly higher grades in Korean

language and mathematics than boys, and this difference in grades was also statistically significant.

<Table 2> Gender differences in academic achievement among 3rd-graders in elementary school

Grade	Subject	M		F		T
		Mean	SD	Mean	SD	
3rd	Korean	90.33	13.05	92.95	11.02	-3.92** *
	Math	90.84	12.19	92.30	11.31	-2.24*

* p<.05, ** p<.01, *** p<.001

2) Analysis of Gender Differences in Academic Achievement among 4th-Graders in Elementary School

To see gender differences in academic achievement among 4th-graders, t-test was performed. The results showed that there was significant gender difference only in Korean language and that girls got higher grades for two subjects. It was found that contrary to the 3rd grade at which girls showed significantly higher academic achievement for Korean language and mathematics, there was little gender difference in academic achievement for mathematics at the 4th grade.

<Table 3> Gender differences in academic achievement among 4th-graders in elementary school

Grade	Subject	M		F		t
		Mean	SD	Mean	SD	
4th	Korean	85.55	13.60	88.41	11.04	-4.11** *
	Math	85.90	14.00	86.38	12.65	-.64

* p<.05, ** p<.01, *** p<.001

3) Analysis of Gender Differences in Academic Achievement among 5th-Graders in Elementary School

To see the tendency of gender differences in academic achievement for each subject among 5th-graders, t-test was performed. The results showed that girls made significantly higher academic performance for Korean language, whereas there was no gender difference in performance for mathematics.

<Table 4> Gender differences in academic achievement among 5th-graders in elementary school

Grade	Subject	M		F		t
		Mean	SD	Mean	SD	
5th	Korean	81.55	12.66	86.42	10.62	-7.31***
	Math	82.43	18.23	82.70	17.22	-.26

* p<.05, ** p<.01, *** p<.001

4) Analysis of Gender Differences in Academic Achievement among 1st-Graders in Middle School

To see gender differences in academic achievement for each subject among 1st-graders in middle school, t-test was performed. The results showed that there was no significant gender difference in performance for Korean language and mathematics as shown in Table 5. In contrast, it was found that boys began to show higher performance than girls for mathematics, which was statistically insignificant, when they went to middle school, contrary to elementary school where girls made better performance.

<Table 5> Gender differences in academic achievement among 1st-graders in middle school

Grade	Subject	M		F		t
		Mean	SD	Mean	SD	
1st	Korean	79.13	15.43	81.83	13.32	-1.36
	Math	78.00	19.36	77.23	18.38	.29

5) Analysis of Gender Differences in Academic Achievement among 2nd-Graders in Middle School

As for gender differences in academic achievement for each subject among 2nd-graders in middle school, there was no statistically significant gender difference in performance for mathematics. In other words, girls showed higher performance than boys for the subject of Korean language alone at the 1% significance level. The phenomenon of boys making better performance for mathematics, which was statistically insignificant, continued into the 2nd graders.

<Table 6> Gender differences in academic achievement among 2nd-graders in middle school

Grade	Subject	M		F		t
		Mean	SD	Mean	SD	
2nd	Korean	74.72	18.69	80.72	12.19	-2.69**
	Math	69.92	22.11	67.73	21.66	.72

* p<.05, ** p<.01, *** p<.001

2. Gender Distribution of Academic Achievement for Each Subject at Each Performance Level

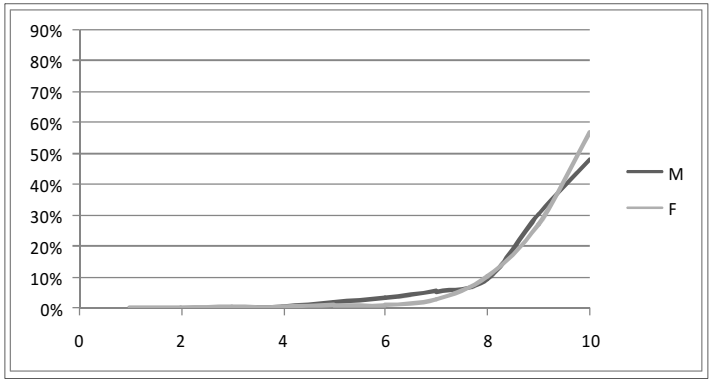
As for gender differences in distribution of academic achievement for each subject at each performance level, there were differences particularly in the subjects of Korean language and mathematics. In this chapter, gender distribution at each performance level for the subjects of Korean and mathematics was analyzed. By doing so, how gender distribution at each performance level differed by subject properties.

1) Gender Distribution of Academic Achievement for Korean Language at Each Performance Level at Each Grade

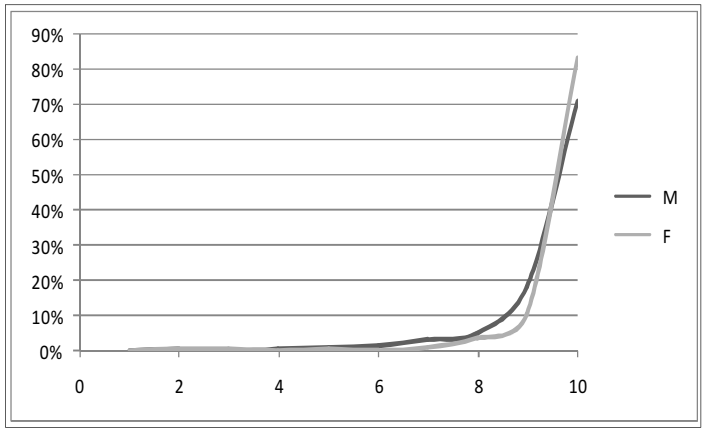
Gender distribution of academic achievement for Korean language at each performance level from the 3rd grade in elementary school to 2nd grade in middle school, which is graphically presented in Figures 1 to 5,

is absolutely different from that of the average total score. Contrary to the average total score for which gender distribution at each performance level tended to be consistent at each grade, it was consistent at the 3rd and 4th grade (even in this case, the percentage of girls was significantly higher than that of boys in the 90s group) but there were remarkable gender differences among those with a high score of 90 or more at the 5th grade or higher for the subject of Korean language. In other words, the shape of distribution graphs of Korean language at each performance level was almost identical for 3rd and 4th-graders, whereas gender distributions crossed each other at the 90s level from the 5th grade on. That is, the percentage of girls begins to be significantly higher than that of boys in the group getting a score of 90 or higher for the subject of Korean from the 5th grade on. For 2nd-graders in middle school, while there was no remarkable gender difference at the 90s level, the percentage of girls was significantly higher than that of boys at the 80s level and there were some boys getting a score less than 40 but no girl got a score less than 40.

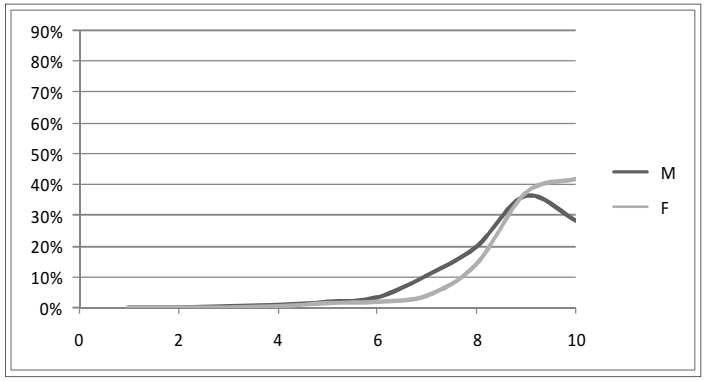
<Figure 1> Gender distribution of academic achievement for Korean at each performance level for 3rd-graders in elementary



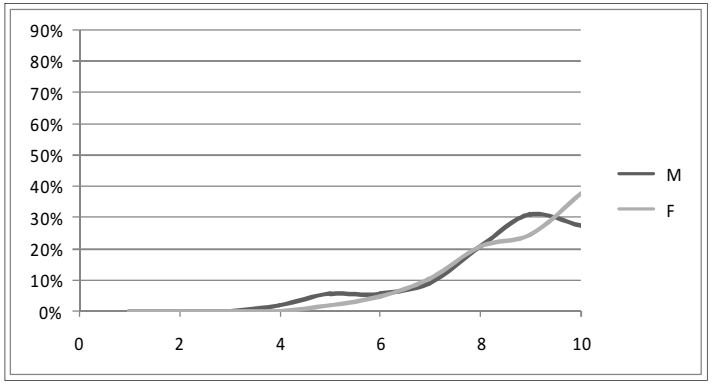
<Figure 2> Gender distribution of academic achievement for Korean at each performance level for 4th-graders in elementary



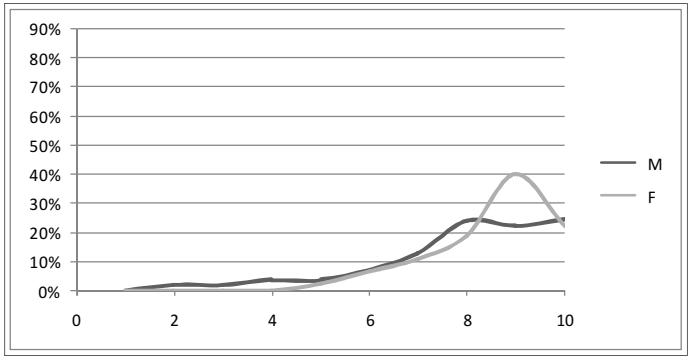
<Figure 3> Gender distribution of academic achievement for Korean at each performance level for 5th-graders in elementary



<Figure 4> Gender distribution of academic achievement for Korean at each performance level for 1st-graders in middle



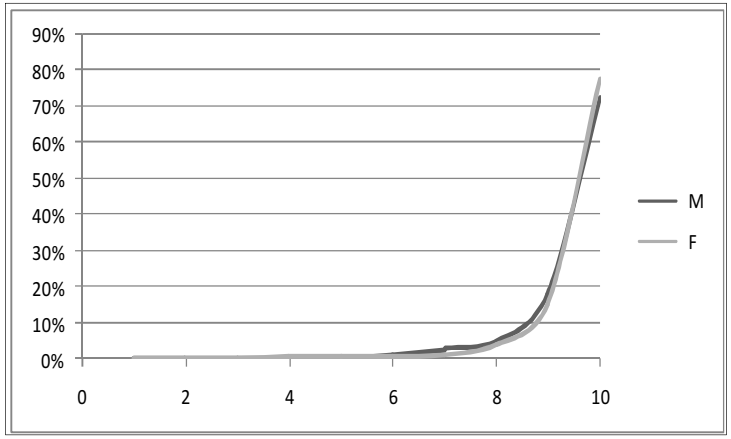
<Figure 5> Gender distribution of academic achievement for Korean language at each performance level for 2nd-graders in middle



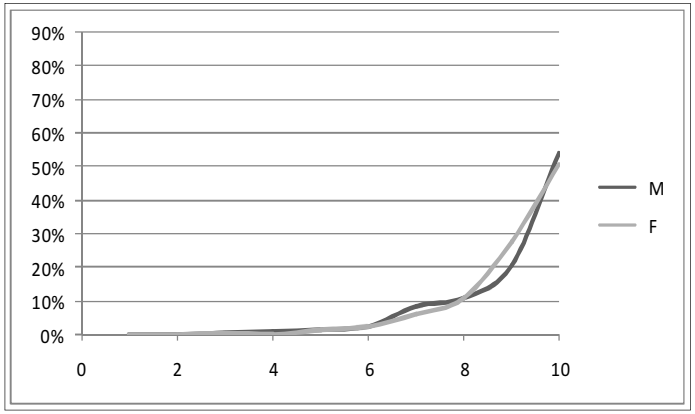
2) Gender Distribution of Academic Achievement for Mathematics at Each Performance Level at Each Grade

Gender distribution of academic achievement for mathematics at each performance level was different from both the average total score and the subject of Korean language. The shape of distribution graphs showing the gender distribution at each performance level was almost identical until the 5th grade, whereas they began to differ from each other at the 90s level or higher from the 1st grade in middle school and there were great gender differences in distribution at the 90s level or higher for the 2nd-graders in middle school as well. The percentage of girls was significantly higher than that of boys at the 90s level for 1st-graders, whereas the latter was higher than the former at the 90s level for 2nd-graders in middle school.

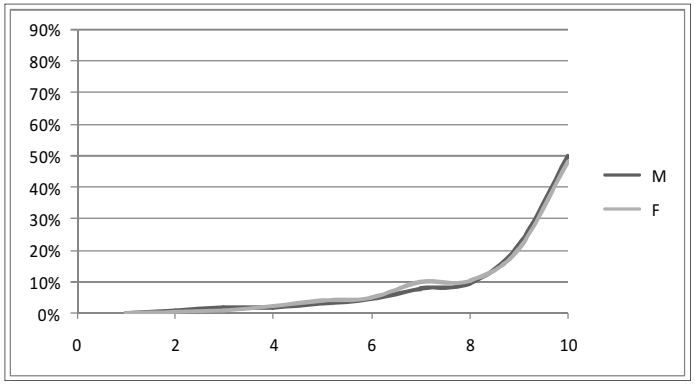
<Figure 6> Gender distribution of academic achievement for math at each performance level for 3rd-graders in elementary



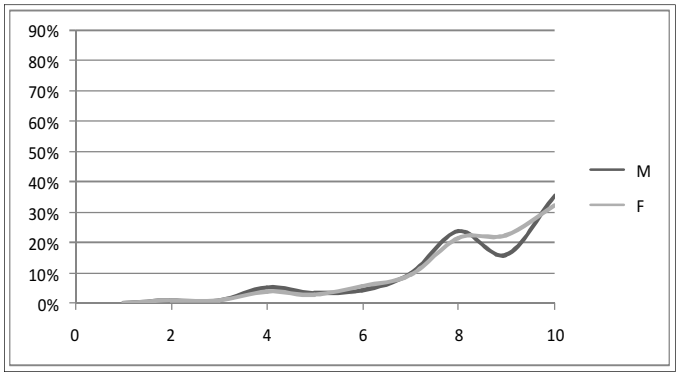
<Figure 7> Gender distribution of academic achievement for math at each performance level for 4rd-graders in elementary



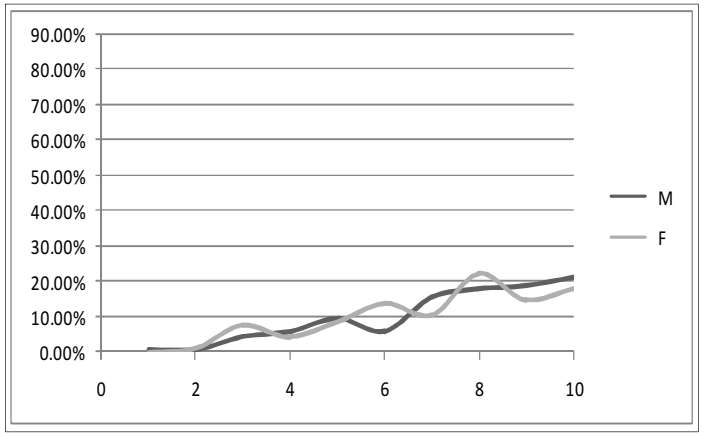
<Figure 8> Gender distribution of academic achievement for math at each performance level for 5th-graders in elementary



<Figure 9> Gender distribution of academic achievement for math at each performance level for 1st-graders in middle



<Figure 10> Gender distribution of academic achievement for math at each performance level for 2nd-graders in middle



3. Gender Differences in Academic Achievement by Academic Achievement Level

1) Gender Differences in Academic Achievement within Inferior Group

(1) Percentage of Boys and Girls in Inferior Group

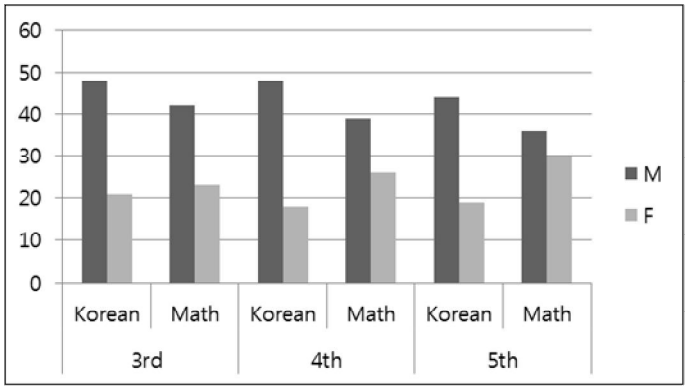
To determine gender difference in percentage within the inferior group and its significance, χ^2 test was performed. As shown in Table 7, for Korean language the percentage of boys was significantly higher at all grades but mathematics at the 4th grade and the 5th grade. In other words, the significantly larger number of boys belonged to the inferior group for the subject of Korean language. And the percentage of boys was also higher for the subject of mathematics at the 3rd grade, but there was no statistically significant gender difference in the number of students within the inferior group for the subject of mathematics at 4th and 5th grades.

<Table 7> Percentage of boys and girls in inferior group at 3rd, 4th, and 5th grades

Group	3rd			4th			5th		
	M	F	χ^2	M	F	χ^2	M	F	χ^2
Korean Lang-uage	48 (70%)	21 (30%)	10.56**	48 (73%)	18 (27%)	13.63***	44 (70%)	19 (30%)	9.9**
Math	42 (65%)	23 (35%)	5.55*	39 (60%)	26 (40%)	2.6	36 (55%)	30 (45%)	0.54

* p<.05, ** p<.01, *** p<.001

<Figure 11> Percentage of boys and girls in inferior group



2) Percentage of Boys and Girls in Superior Group

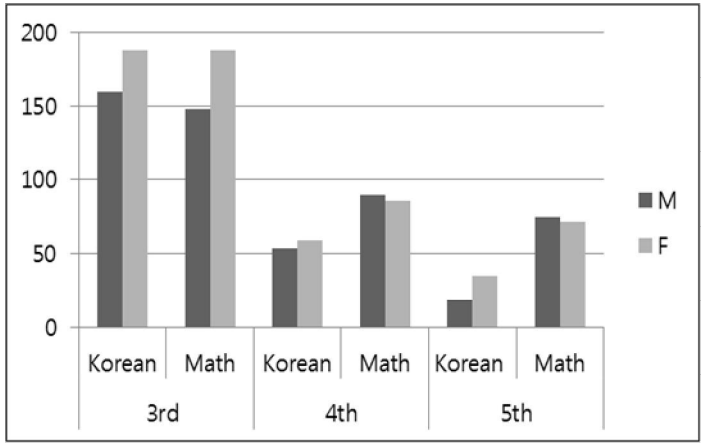
χ^2 test was performed to analyze gender distribution of students in the superior group for the subject of Korean language and mathematics, with the results shown in Table 8, which can be graphically presented as in Figures 12. The percentage of boys and girls in the superior group tended to be somewhat different from that in the inferior group. Contrary to the inferior group with the remarkably higher percentage of boys for most cases at each grade, except two cases—mathematics at the 4th grade and mathematics—there was statistically significant gender difference in the number of students in the superior group for mathematics at the 3rd grade and Korean at the 5th grade. Therefore, the trend of girls making high academic achievement was remarkable in most cases within the inferior group but was shown for the subjects of Korean (4th grade) within the superior group. Contrary to Hedges and Friedman(1993) indicating that the percentage of boys is three times higher than that of girls within the top performance group for mathematics, this study showed that the percentage of girls is higher than that of boys within the superior group for the subject of mathematics at the 3rd grade. This result also disagrees with Kimball(1989) indicating that gender differences advantageous to boys are greater within the superior group.

<Table 8> Percentage of boys and girls in superior group at 3rd, 4th, and 5th grades

Group	3rd			4th			5th		
	M	F	χ^2	M	F	χ^2	M	F	χ^2
Korean Language	159 (46%)	188 (54%)	2.42	54 (49%)	57 (51%)	0.08	19 (35%)	35 (65%)	4.74*
Math	149 (44%)	188 (56%)	4.51*	90 (51%)	86 (49%)	0.09	75 (51%)	72 (49%)	0.06

* As a very few students got a perfect score for the average total score at 4th and 5th grades, the superior group was formed with students in the top 5% class.

<Figure 12> Percentage of boys and girls in superior group



IV. Conclusion and Discussion

Although the issue of gender differences in academic achievement is the field that has been studied for a relatively long period of time, it is still the principal topic of research for educational experts as there has not been decisive conclusion yet. This study intended to investigate gender differences in academic achievement and those by achievement levels among elementary and middle school students. This study has the following three topics: first, gender differences in academic achievement among elementary and middle school students; second, gender distribution at each performance level on the basis of the results of academic achievement assessment and changes in the achievement level for each gender with grades; third, the percentage of boys and girls at each performance level (superior and inferior groups). The results of this study can be discussed as follows:

First, gender differences in academic achievement among elementary and middle school students.

Prior research(MacDonald 1980; Thomas 1989; Wong and Lam et. al. 2002) suggests that generally girls are better at subjects related to linguistic skills, while boys are better at those related to mathematical skills, such as mathematics or science. While this result is still questioned by many researchers, it is accepted as being true and even supported by sophisticated meta-technical research(Song 2006). It is also supported by this study. While girls made better performance for the subject of Korean over all grades from the 3rd grade in elementary school through the 2nd grade in middle school, there was no gender difference in performance for the subject of mathematics over all grades but the 3rd grade. This result agrees with prior research: many researchers analyzing gender differences for subjects reported that for mathematics, no gender difference in achievement could be found from the lower grade through the middle-school grade but boys outdid girls from the high-school grade on.

Meece(1982) suggested that no gender difference in numerical skills was found before the tenth grade, and Fennema(1980) revealed that there was no statistically significant gender difference in numerical skills before 9 to 13 years old. Other prior studies(Gwon & Im 1997; Aiken 1986-1987; Hyde and Fennema et. al. 1990; Maccoby & Jacklin 1974) revealed that girls were better at dealing with problems requiring a low level of recognition, such as calculation, while boys were better at solving the problems requiring a high level of recognition, such as reasoning or multi-level problem-solving. This is also supported by the result of this study that while girls made significantly higher academic performance for mathematics at the 3rd grade but failed to do so after the 4th grade. This is possibly due to the fact that boys who make poor academic achievement for mathematics at the 3rd grade show another trend after the 4th grade as the percentage of contents at the high level of recognition in the mathematics curriculum increases with grades and school levels.

As mentioned above, if these phenomena are actually caused by girls' lack of high-level learning skills for mathematics, as compared with boys, since the elementary school age and such gender difference generally begin to increase in middle school, it is essential to develop and employ a differentiated teaching plan —for mathematical thinking skills—suitable for girls' thinking properties as soon as possible. Furthermore, this issue will serve as an important element to bring about gender differences among majors and gender inclination toward certain disciplines. Ju(2005) suggested that students' academic achievement should be able to be treated in pursuit of interest, efficacy, or positive attitude toward the subject rather than through acquisition of relevant knowledge.

The phenomenon that girls make better performance for the subject of Korean (or their own language for other countries) than boys in elementary and middle school alike can be found both domestically and internationally; Love and Hamston(2003) contends that this results from the situation that girls participate more actively in reading, writing, and

conversation with people around them. In other words, boys generally read less, for entertainment or for learning, and, consequently, are less successful with subjects dependent on books, which are media of cultural delivery. Another result is that gender differences in academic performance vary by the school level. Girls made better performance for Korean language but mathematics in elementary school.

Second, gender distribution at each performance level on the basis of the results of academic achievement assessment and changes in the achievement level for each gender with grades.

Gender differences were compared at each academic achievement level for Korean and mathematics known as typical subjects with the greatest gender differences to see how gender distribution varied by subject properties at each performance level. As a result, while boys and girls showed a similar trend in the average total score from the 3rd grade in elementary school through the 2nd grade in middle school, gender differences in the percentage of students in the superior group (with score of 90s or higher) for the subjects of Korean and mathematics became larger from a certain moment on. That is, the percentage of girls began to be remarkably higher in the superior group for the subject of Korean at the 5th grade, and the percentage of boys began to be higher in the superior group for the subject of mathematics at the 2nd grade in middle school.

Third, the percentage of boys and girls at each performance level (superior and inferior groups).

The superior and inferior groups showed different trends in the percentage of boys and girls. The significantly larger number of boys belonged to the inferior group at the bottom 5% level. In particular, the percentage of boys was significantly higher than that of girls even for the subject of mathematics in the inferior group, contrary to the general idea that boys have superior academic abilities for the subjects related to numerical skills (mathematics and science). It confirms that the general idea that boys make better academic achievement for the subjects related to numerical skills (mathematics and science) than girls fails to be applied to the inferior group. Therefore, it is necessary to give stronger focus on boys' academic properties in devising an educational program or a teaching plan for students in the inferior group.

As for the percentage of boys and girls in the superior and inferior groups, the phenomenon that girls made better academic achievement than boys was more remarkable in the inferior group than in the superior group. Girls made remarkably high academic achievement in most cases within the inferior group but failed to do so for all cases but language in the superior group. In addition, the percentage of boys was not statistically significantly higher than that of girls from the 3rd through 5th grade in elementary school and, rather, the number of girls was significantly larger than that of boys in the superior group for the subject of mathematics at the 3rd grade. It implies that the result of prior research (Gwon & Im 1997; Hedges & Friedman 1993) that the percentage of boys is higher than that of girls in the superior group for mathematics is not supported by this study.

To put the results together, gender differences in academic achievement vary by grades and subjects and the percentage of boys and girls differs by the performance level. For more effective school education, it is essential to consider gender properties of boys and girls and develop and devise many types of educational programs and teaching plans. To realize these efforts, approaches considering students' gender properties must be differentiated by grades and subjects, and different approaches need to be made at each academic achievement level to activate practical research for finding a way to realize each of the approaches.

< Reference >

Aiken, L., 1986-1987, "Sex differences in mathematical ability: A review of the literature", *Educational Research Quarterly*, 10. pp. 25-35.

Armstrong, J. M., 1981, "Achivement and participation of women in mathematics: results of two national survey", *Journal for Research in Mathematics Education*, 12(5), pp. 356-372.

Benhow, C. P. and J. C. Stanley, 1983, "Sex differences in mathematical reasoning ability: More facts", Science, 222, pp. 1029-1031.

Bloom, B. S., 1971, *Handbook on formative and summative evaluation of student learning*. New York: McGraw-Hill.

Carey, S. W., 1955, "The orocline concept in geotectonics", part 1. Papers and Proceedings of the Royal Society of Tasmania, 89, pp. 255-288.

Feldman, S. D., 1974, "Masculine and femine academic discipline", in. Escape from the Doll's House: Women in Graduate and Professional School Education. New York: McGrow-Hill Book Company.

Fennema, E., 1980, "Sec-related differences in math-ematics achievement: Where and why", in. Fox, L. H., Brody, Linda and D. Tobin(Eds.). Women and the mathematical mystique. Baltimore, MD: Johns Hopkins University Press.

Fennema, Elizabeth, Carpenter, Thomas P., Jacobs, Victoria R., Franke, Megan L., and Linda W. Levi, 1998, "A longitudinal study of gender differences in young children's mathematical thinking", *Educational Researcher*, 27, pp. 6-11.

Hedges, L. V., & L. Friedman, 1993, "Gender Differences in Variability in Intellectual Abilities: A Reanalysis of Feingold's Results", Review of Educational Research, 63(1), pp. 94-105.

Hedges, L. V. & A. Nowell 1995, "Sex Differences in Mental Test scores, Variability and Numbers of High-Scoring Individuals", . Science, 269, pp. 41-45.

Hyde, J. S., Fennema, E., & Lamon S. J., 1990, "Gender differences in mathematics performance: A meta-analysis", *Psychological Bulletin*, 107, pp. 139-155.

Kahle, J. B., & J. Meece, 1991, "Research on gender issues in the classroom", in. D. L.(Ed). Handbook of research on science teaching and learning. pp. 542-557, Macmillan Publishing Company.

Kimball, M. M., 1989, "A new perspective on women's math achievement", *Psychological Bulletin*, 105(2), pp. 198-214.

Hamston, J., 2003, "A dialogue for 'new times': primary students' struggle with discourses of 'Australia' and 'Asia' in studies of Asia curriculum", Ph. D. Diss. Queensland University of Techology.

Liben, L. S. & S. L. Golbeck, 1980, "Sex differences in performance on Piagetian spatial tasks: Differences in competence or performance?", *Child Development*, 51, pp. 594-597.

Love, K., & J. Hamston, 2003, "Teenage boys' leisure reading dispositions: juggling male youth culture and family cultural capital", *Educational Revies*, 55(2), pp. 161-177.

Maccoby, E. E. & C. N. Jacklin, 1974, *The psychology of sex differences,* Stanford, CA: Stanford University Press.

McDonald, M., 1980, "Schooling and the reproduction of class and gender relation", in. Barton, L., Meighan, R. and Stephen Walker (Eds.) *Schooling, Ideology and the Curriculum*, London: The Falmer Press.

Meece, J. L., 1982, "Sex differences in math achievement: Toward a

model of academic choice", *Psychologicall Bulletin*, 9(2), pp. 324-348.

Meelissen, M. R. M. & M. Drent, 2008, "Gender differences in computer attitudes: Does the school matter?", *Computers in Human Behavior*, 24(3), pp. 969-985.

Naglieri, J. A. & J. Rojahn, 2001, "Gender differences in planning, attention, simultaneous, and successive (PASS) cognitive processes and achievement", *Journal of Educational Psychology*, 93(2), pp. 430-437.

Sanders, B., Soares, M. P. & J. M.D'Aquila, 1982, "The sex difference on one test of spatial visualization: A nontrivial difference", *Child Development*, 53, pp. 1106-1110.

Sherman, J., 1980, "Schooling and sex role: the case of GCE'' level of athematics", *British Journal of Sociology of Education*, 1(2), pp. 193-205.

Signorella, M. L. & W. Jamison, 1978, "Sex differences in the correlations among field dependence, spatial ability, sex role orientation, and performance of Piaget's water-level task", *Developmental Psychology*, 14, pp. 689-690.

Thomas, A., 1989, "Ability and achievement expectations: Implications of research for classroom practice", *Childhood Education*, 65, pp. 235-241.

Vekiri, I. & A. Chronaki, 2008, "Gender issues in technology use: Perceived social support, computer self-efficacy and value beliefs, and computer use beyond school", *Computers and Education*, 51 (3), pp. 1392-1404.

Vermeer, H. J., Boekaerts, M. & G. Seegers, 2000, "Motivational and gender differences: Sixth-grade students mathematical problem-solving behavior", *Journal of Educational Psychology*, 92(2), pp. 308-315.

Wong, S. F., Lam, M. H., & L. C. Ho, 2002, "Transvaginal sonography in the detection of retained products of conception after first-trimester spontaneous abortion", *Journal of Clinical Ultrasound*, 30(7), pp. 428-432.