

The Effect of Between Class Ability Grouping on 7th Grade Students' Academic Achievement on the Unit "If there were no pressure?" In Science and Technology Education

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Abstract

The purpose of the study was to investigate the effect of between class ability grouping on 7th grade students' academic achievement on the unit "If there were no pressure?" in Science and Technology Education. The study was conducted in the second semester of 2006-2007 academic year within a primary school with between class ability grouping in Aydın. The sample of the study is made of total 84 students among the 7th grades from the selected school which has between class ability grouping. "Science Education achievement test" developed by the researchers was used for data collection. Co-variance analysis was performed for analyzing the data gathered in the study. Significant differences were found among the ability grouping classes with regard to achievement test scores ($p < 0.05$). The difference was observed between high-medium classes, high-low classes and medium-low classes. While significant difference was not found among achievement scores of the female students in ability grouping classes ($p > 0.05$), this was reverse for the male students (significant difference was found among the male students with regard to achievement test scores).

Key words

Between Class Ability Grouping, Ability Grouping Class, Science Education, Academic Achievement

Introduction

Science and Technology Education is one of the courses which assess students' experiences in a unique atmosphere and provide an effective mechanism which enable the students to turn their experiences into the level of knowledge and skills. However, in the pre-school period and in the early years of elementary education, it is expected that as their grade increase, students' interest toward science will increase. However, it is shown that students' interest decrease regardless of grade level and the love coming from the hearth does not turn into skills including an intellectual mastery (Gürdal et al., 2001). Science and Technology education includes topics which can be hard to comprehend by the students. For that reason, it is getting difficult for the students to like science, and also students are getting away from the science classes. However, raising scientifically literate individuals is crucially important for the future of our country, solving the problems that individuals encounter in new conditions, and developing scientific process skills (Çepni et al., 1996; Doğruöz, 1998; Germann, 1994;).

For this reason, changes have recently been undertaken in the science education curriculum and new curriculum which is in line with the trends has been developed, because the insufficiency of science education and low level science achievement come up frequently. In internationally comparisons, Turkey is one of the countries taking place in the back of the

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list with regard to science achievement. According to the report of TIMSS – Third International Mathematics and Science Study undertaken in 1999, Turkey was in 33rd order out of 38 countries in the study. While the international average score was 488 points with regard to science achievement, the achievement average of Turkey was 433 points (MEB, 2003). Similarly, according to the results of OECD PISA undertaken in 2003, while the highest average science achievement score was 548 and obtained by Finland, the average science achievement score of Turkey was 434. With this average score, Turkey showed the similar performance with the category of the countries including Serbia, Uruguay, and Portugal (MEB, 2003; MEB, 2005).

One of the approaches used for increasing students' achievement is to establish ability groups by ranking students based on their academic achievement. Ability groups refer to clustering students by considering their academic achievement or other determined criteria. In practice, even though it is called as "ability group", in the books related to Instructional Principles and Techniques it is called as "rank groups and "ability class" (Gözütok, 2006; Tok, 2007, Ed. Doğanay, 2007). When the exiting literature is examined, the practice of ability grouping and the research on ability grouping have been performed since 1916 in U.S. and there have been different ability grouping practices (Kulik & Kulik, 1992). For that reason, different definitions of the concept of ability grouping are available. Ability grouping is one type of grouping used according to students' capacity and achievement for the purpose of decreasing the heterogeneity in the class (Slavin, 1987; Mills & Durden, 1992).

Glatthorn (1987) expressed different types of ability grouping, and emphasized that ability grouping plans are administrative tools which address individual differences by decreasing the heterogeneity. Under the scope of these all definitions, ability grouping which categorizes the students in the homogeneous clusters with regard to academic achievement and other capacities is one of the practices of education which organize learning-teaching activities within these groups (Gömleksiz, 1997). In the present study, the assessment of ability grouping practices which was defined as ability grouping based on clustering students according to their academic achievement and intelligence, teacher decisions or any of them or combination of them (Slavin, 1993) was conducted.

According to Halis, teaching considers individual differences. Good teaching is an individualized instruction which considers individual differences. However, this type of teaching is quite expensive. For that reason, in schools, the instructions are realized with grouping the students. Students are grouped based on their similar characteristics. The purpose of grouping students is to facilitate the instruction (Halis, 2002).

According to Braddock, Mcpartland (1990) and Gamaron (1992), the reasons for establishing ability grouping are stated as: when the students who have similar characteristics are instructed together, their needs will be satisfied more; and thanks to this, the students in the high level will move fast and more help will be provided to the students in the low level. As a results of coming together the students whose achievement level are so different, since the students in low level will compete with their more successful and skillful friends, they will be more suffered in terms of their academic achievement. In addition, these students may also be suffered in the emotional level. In some of the studies in the literature, in the schools where between class ability grouping were practiced, this practice had a positive impact for the students placed in high ability grouping classes, but negative impact for the students in low ability grouping classes (Slavin, 1990; Betts & Shkolnik, 2000; Karabacak, 2001).

It is apparent in the literature that theoretically, there should be transition among/between ability grouping classes. However, the number of the transitions for this practice seems to be very scarce because of making both instruction and classroom

management easy. In other words, when a student in low ability grouping class becomes successful, the possibility for that student to pass to medium and/or high ability grouping class is very small (Felmlee & Eder, 1983). These inequalities which are received by the students in ability grouping classes influence these students' achievement as well as self-confidence, esteem, and communication with their friends. The studies in the literature also support these findings. In the research studies undertaken by Kitchen (1990), Oakes (1991), Braddock and Dawkins (1993), Brewer, Rees and Argys (1995), and Oakes and Guiton (1995), it was found that the students placed in low ability grouping classes were more unwilling during university preparation, ability grouping increased the disparity between the students in low SES and high SES with regard to academic achievement, and their realization of the ability grouping classes where they were placed influenced their views on themselves and academic achievement. As far as these impacts of ability grouping classes are concerned, it is believed that the students in low ability grouping class developed feeling of inferiority.

Furthermore, thanks to ability grouping, since homogeneous classes are established, teaching of the subjects will be easier. Thanks to this, teachers' classroom management and principals' school management will be easier. Also, being a teacher of the students at the same level will be easier.

The Purpose of the study

In the present study, the effect of between class ability grouping on 7th grade students' academic achievement on the unit "If there were no pressure?" in Science and Technology education was investigated. The problem statement was described as "Is there any significant difference between pre- and post- achievement test scores of the students in high, medium and low ability grouping classes?"

Sub-Questions

1. Is there any significant difference between pre-test and post-test achievement scores of the female students in high, medium and low ability grouping classes?
2. Is there any significant difference between pre-test and post-test achievement scores of the male students in high, medium and low ability grouping classes?

Method

Research Design

This study investigated the effect of between class ability grouping on 7th grade students' achievement on the unit "If there were no pressure?" of Elementary School Science and Technology Curriculum. The researchers were not involved in the administration process. The effect of between class ability grouping was investigated by considering pre- and post-test administration. Since, in the present study, the effectiveness of between class ability grouping were merely investigated; in the other words, there was no control group, the pilot of the study was designed as pretest- posttest one group experimental design (Karasar, 2003). Pre-pilot study designs are not considered as real pilot study designs. The main purpose of using pre-pilot study design is to understand other models (real and half-experimental) better. Symbolic representation of pre-pilot pretest- posttest one group experimental design used in the study is as below (Baştürk, 2009, Ed. Tanrıögen, 2009).

Group	Grouping	Pretest	Application	Posttest
A	R	O _{1.1}	X	O _{1.2}
B	R	O _{2.1}		O _{2.2}

X: Independent variable (ability grouping practice was considered as independent variable)

Participants

The students who were selected in the 2006-2007 academic year among 7th graders from between class ability grouping in a school in the district of Aydın constituted the study group of the study. For the study, a total of 84 students; 31 students from high ability grouping class, 34 students from middle ability grouping class and 19 students from low ability grouping class, were selected from the school that practice the ability grouping system. Students were placed in the ability grouping classes based on their achievement level as a result of scores from the test including subjects of 5th grade Science and Technology, Turkish, Social Studies and Mathematics. These students continued their education in the same ability group classes throughout their 6th, 7th and 8th grade education. The present study lasted seven weeks with 7th graders during the unit of “If there were no pressure?”. In all groups, the administration was realized during the unit with the same science and technology education teachers and in the same conditions.

Table 1. The distribution of 7th grade students in ability grouping classes according to gender

Ability Grouping Classes				
Gender	High Level	Middle Level	Low Level	Total
Female	19	19	9	47
Male	12	15	10	37
Total	31	34	19	84

Data Collection Instrument

For data collection, an achievement test developed by the researchers on the unit of “If there were no pressure?” in Science and Technology Education was administered as pre- and post-test.

Achievement Test

In the study, an achievement test was developed for investigating students’ academic achievement on the unit “If there were no pressure?” in Science and Technology Education. In the 2006-2007 academic year, the achievement test was administered at the beginning and at the end of the unit as pre- and post-test. The preparation of the test covering the unit “If there were no pressure?” was realized in the following steps;

1. The existing literature was reviewed by the researchers
2. Attainments in the level of knowledge, comprehension and application within the unit of “If there were no pressure?” in elementary school Science and Technology Curriculum determined under the rule numbered 118 and dated 12.07.2006 by MONE, Board of Education were selected. By considering the level of preparedness of the students, at least two multiple choice questions for each selected attainment was written.
3. These written were examined by two experts in the departments of curriculum and instruction and of science education and also by two science and technology teachers working in MONE schools. Those items which were considered as inappropriate were excluded from the test and changes were done over the required items. At the end, pilot form including 34 items covering the selected unit was obtained.
4. The pilot form was given to ten students in elementary schools and the understandability of the items were assessed. Necessary changes were done over the items which were not understood. Finally, the test was administered to a total of 98 students in three classes. The students were required to read the questions carefully

and then indicate complicated parts in the questions. Sufficient time was given to the student to read all questions in the test.

- After students' responses were entered in a SPSS file as 1 for correct answer and 0 for the wrong answer, item and test analyses were run over the data. Firstly, item difficulty level was examined. Item difficulty is the ratio of number of the correct answer to a question by total answer given to that question. A question with difficulty level approaching to zero is hard question whereas a question with difficulty level approaching to one is easy question. The difficulty level of the questions in the test ranged from 0.30 to 0.71. Secondly, standard deviations of the items were calculated. The items with standard deviation valued about 0.50 were considered for the test. Thirdly, item discrimination power of the items was calculated. The items with lower than .30 discrimination power were excluded from the test (Tekin, 2004; Atılgan, 2006). Discrimination powers (r_{jx}) of 6 items out of 34 items were observed to be lower than 0.30 and these items were excluded from the test. KR20 reliability of the remaining items was found 0.90. It can be said that the test had acceptable reliability score for using in the study. Item analysis scores regarding achievement test are given in Table 2.

Table 2. Items analysis scores of the “if there were no pressure?” unit achievement test

Item No	pj	rjx	sj	Item No	pj	rjx	Sj
1	0.71	0.48	0.45	15	0.67	0.51	0.47
2	0.45	0.30	0.50	16	0.48	0.42	0.50
3	0.52	0.52	0.50	17	0.39	0.56	0.48
4	0.45	0.47	0.50	18	0.65	0.58	0.47
5	0.38	0.35	0.48	19	0.44	0.66	0.50
6	0.57	0.57	0.49	20	0.49	0.45	0.50
7	0.69	0.42	0.46	21	0.52	0.57	0.50
8	0.55	0.54	0.50	22	0.39	0.39	0.48
9	0.50	0.66	0.50	23	0.39	0.44	0.48
10	0.55	0.53	0.50	24	0.61	0.44	0.48
11	0.61	0.52	0.48	25	0.59	0.51	0.49
12	0.53	0.60	0.50	26	0.45	0.54	0.50
13	0.55	0.52	0.50	27	0.45	0.70	0.50
14	0.48	0.59	0.50	28	0.48	0.39	0.50

Pj: Item difficulty index Sj: Item standard deviation rjx: Item discrimination power index

A ratio of the item difficulty index of the items in the test by total number of the items is defined as average difficulty (Atılgan, 2006). By considering this definition, the average difficulty of the test was calculated .51. It can be said that the test had average level difficulty.

- After checking whether test items represented the attainments in the unit, the test with 28 items were administrated two times to total 84 elementary school students at the beginning and at the end of the unit (seven weeks periods) as pre-and post- test. 1 was given to correct answers and 0 was given to wrong answers. The highest score that one student obtain from the test was 20.

Table 3. Test results of achievement test

	Number of the Item	N	\bar{X}	SD	Median	Mod	KR20
Pilot	28	98	13.74	6.92	12.50	6.00	0.90
Pre-test	28	84	9.36	3.57	9.00	8.00	0.67
Post-test	28	84	12.69	4.72	12.00	8.00	0.71

Data Collection

Achievement test related to the unit “If there were no pressure?” used and it was applied to the participants for two times at the beginning and end of the unit.

Analysis of Data

In the present study, while examining the effect of experimentation on the dependent variable, one or more variables which were assumed to be associated with dependent variable were controlled and Co-variance analysis which identify the comparison of average scores (Büyüköztürk, 2004). The significance level was accepted as 0.05.

1. One-way ANOVA, was used in order to examine the differences among the students in high, medium and low ability grouping classes with regard to achievement test scores obtained from pre-test.
2. Analysis of co-variance was conducted in order to examine the difference between pre- and post- achievement test scores of students in high, medium and low ability grouping classes.
3. Analysis of co-variance was conducted in order to examine the difference between pre- and post- achievement test scores of *female* students in high, medium and low ability grouping classes.
4. Analysis of co-variance was conducted in order to examine the difference between pre- and post- achievement test scores of *male* students in high, medium and low ability grouping classes.

Findings

The sub-question of the study was identified as “Is there any significant difference between pre- and post- achievement test scores of the students in high, medium and low ability grouping classes?”

Table 4 summarizes average and standard deviations of pre and post-achievement test scores and average and standard deviations of post-test corrected scores calculated after co-variance analysis and multiple comparisons among the scores gathered from achievements test of students in all ability grouping classes.

As observed in Table 4, average post-test achievement scores of high ($\bar{X}=16.06$) ability grouping class was higher than post-test achievement scores of medium ($\bar{X}=11.64$) and low ($\bar{X}=9.05$) ability grouping classes. In order to assess whether this difference was significant, co-variance analysis was run. The results are given in Table 5.

Table 4. Average and standard deviations of pre-and post-test scores and average and standard error of corrected post-test scores of the students in all groups

Groups	N		Total scores		Corrected post-test averages	
			\bar{X}	SD	\bar{X}	SH
High level	31	Pre-test	11.83	3.56		
		Post-test	16.06	4.59	14.77	0.79
Medium level	34	Pre-test	7.82	2.88		
		Post-test	11.64	3.61	12.45	0.71
Low level	19	Pre-test	8.10	2.37		
		Post-test	9.05	2.85	8.96	0.95

Table 5. Co-variance analysis results of post-test achievement scores of students in all ability grouping classes with controlling pre-test achievement scores

Source of Variance	Sum of Squares	df	Mean Square	F	p
Pre-test, controlled variable	148.846	1	148.846	11.194	0.001
Main effect of grouping	278.142	2	139.071	10.459	0.000
Error	1063.737	80	13.297		
Total	15382.000	84			
Corrected total	1853.952	83			

As seen in Table 5, according to the co-variance analysis, the effect of grouping of the classes on groups' corrected post-test achievement scores was significant [$F=10.459$, $p=0.000$] when the pre-test achievement score was controlled. In order to investigate the source of differences (pair-wise differences), Bonferroni multiple comparison test was run. The results are given in Table 6.

Table 6. Bonferroni test results of the significant difference among ability grouping classes with regard to pre-test and post-test corrected average scores of the students

Comparison	Real difference	Standard Error	p
High Level/Middle Level	2.639*	1.050	0.042
High Level / Low Level	5.358*	1.172	0.000
Middle Level / Low Level	2.719*	1.045	0.033

*It shows the significant difference for the comparison

According to the results, significant difference was found among the ability grouping with regard to achievement test scores ($p=0.000$). These differences were between high-middle level, high-low level and middle-low level.

The Results on First Sub-Question

The first sub-question of the study was identified as "Is there any significant difference between pre-test and post-test achievement scores of the female students in high, medium and low ability grouping classes?"

The average and standard deviations of pre and post-achievement test scores and average and standard deviations of post-test corrected scores calculated after co-variance analysis and used in multiple comparisons among the scores gathered from achievements test of the female students in all ability grouping classes are given in Table 7.

Table 7. Average and standard deviations of pre-and post-test scores and average and standard error of corrected post-test scores of the female students in all groups

Groups	N		Total Scores		Corrected post-test averages	
			\bar{X}	SD	\bar{X}	SE
High level	19	Pre-test	12.31			
		Post-test	15.73	5.49	14.33	1.07
Middle level	19	Pre-test	8.36			
		Post-test	11.94	3.95	12.91	1.01
Low level	9	Pre-test	8.44			
		Post-test	10.11	3.17	11.03	1.42

As seen in Table 7, post-test average achievement score of female students in high ability group ($\bar{X}=15.73$) was higher than post-test average achievement score in medium ability group ($\bar{X}=11.94$) and low ability group ($\bar{X}=10.11$). In order to examine whether this difference was significant, co-variance analysis was conducted. The results are given in Table 8.

Table 8. Co-variance analysis results of post-test achievement scores of female students in all ability grouping classes with controlling pre-test achievement scores

Source of Variance	Sum of Squares (SS)	df	Mean Square	F	p
Pre-test, controlled variable	152.494	1	152.494	8.708	0.005
Main effect of grouping	54.940	2	27.470	1.569	0.220
Error	753.026	43	17.512		
Total	9243.000	47			
Corrected Total	1143.234	46			

As seen in Table 8, according to the co-variance analysis, the effect of grouping of the classes on groups' corrected post-test achievement scores was not significant [$F=1.569$, $p=0.220$] when the pre-test achievement score was controlled.

The Results on Second Sub-Question

The second sub-question of the study was identified as "Is there any significant difference between pre-test and post-test achievement scores of the male students in high, medium and low ability grouping classes?"

The average and standard deviations of pre and post-achievement test scores and average and standard deviations of post-test corrected scores calculated after co-variance analysis and used in multiple comparisons among the scores gathered from achievements test of the male students in all ability grouping classes are given in Table 9.

Table 9. Average and standard deviations of pre-and post-test scores and average and standard error of corrected post-test scores of the male students in all groups

Groups	N		Total Scores		Corrected post-test averages	
			\bar{X}	SD	\bar{X}	SE
High level	12	Pre-test	11.08			
		Post-test	16.58	2.77	15.96	0.90
Middle level	15	Pre-test	7.13			
		Post-test	11.26	3.23	11.62	0.76
Low level	10	Pre-test	7.80			
		Post-test	8.10	4.37	8.29	0.89

As seen in Table 9, post-test average achievement score of the male students in high ability group ($\bar{X}=16.58$) was higher than post-test average achievement score in medium ability group ($\bar{X}=11.26$) and low ability group ($\bar{X}=8.10$). In order to examine whether this difference was significant, co-variance analysis was conducted. The results are given in Table 10.

Table 10: Co-variance analysis results of post-test achievement scores of male students in all ability grouping classes with controlling pre-test achievement scores

Source of Variance	Sum of Squares (SS)	df	Mean Square	F	p
Pre-test, controlled variable	18.779	1	18.779	2.384	0.132
Main effect of grouping	269.719	2	134.860	17.119	0.000
Error	259.971	33	7.878		
Total	6139.000	37			
Corrected Total	690.324	36			

As seen in Table 10, according to the co-variance analysis, the effect of grouping of the classes on groups' corrected post-test achievement scores was significant [$F=17.119$, $p=0.000$] when the pre-test achievement score was controlled. In order to investigate the source of differences (pair-wise differences), Bonferroni multiple comparison test was run. The results are given in Table 11.

Table 11. Bonferroni test results of the significant difference among ability grouping classes with regard to pre-test and post-test corrected average scores of male students

Comparison	Real difference	Standard Error	p
High Level/Middle Level	4.342*	1.257	0.005
High Level / Low Level	7.673*	1.311	0.000
Middle Level / Low Level	3.331*	1.151	0.020

*It shows the significant difference for the comparison

There was a significant difference among male students' achievement scores in all level of ability grouping ($p=0.000$).

Conclusion and Discussions

In the present study, the effect of between class ability grouping on 7th grade students' achievement on the unit of "If there were no pressure?" in Science and Technology Education. Based on the results emerging from the study, there were significant differences among ability grouping classes with regard to academic achievement ($p=0.000$). The difference was observed between high-medium ability grouping classes, high-low ability grouping classes and medium-low ability grouping classes. While there was no significant difference among female students' achievement scores in all ability groups ($p=0.220$), there was significant difference among male students' achievement scores in these groups ($p=0.000$). There is no finding found in the literature supported to this findings of the present study. In his study, Gömleksiz (1997) examined the effect of between class ability grouping on 6th, 7th and 8th grade students' academic achievement on Science Education, English, Mathematics and Turkish in one of the private school and also investigated teachers' views on this practice. The research was conducted with 272 students in 6th, 7th and 8th grade in a private school where ability grouping classes were practiced. At the end of the study, significant differences was found between pre-test and posttest scores of the ability grouping classes used for 6th, 7th and 8th grades with regard to academic achievement. It was found that the students placed in low ability grouping class were negatively influenced. When teacher

responses were considered, teachers were found to be very happy while teaching to high ability groups, but to have difficulty while teaching to low ability groups. Also, teachers were satisfied with the practice of ability grouping classes and want this practice to be continued.

Similarly, in the study of Toomela et al. (2006), the quality of the schools and the effects of between class ability grouping on students' achievement were investigated. The study was realized within five schools and achievements of the schools were compared. The students were taken to a school (called as Elite School) based on their academic achievement and capacity whereas the students were randomly taken to other schools. Special tests were used in order to determine students' achievement. At the end of the study, it was found that the achievement differed according to schools and the success of Elite School was highest among other schools. Furthermore, in the study of Akbaba (1996) entitled "ability grouping classes in elementary school and practice", it was reported that while the classes where mixed education were practiced resulted in students' negative behaviors (misbehaviors), in the ability grouping classes students worked harder in the competitive environment. Generally, in the study, while the benefits of constructing ability grouping classes were given, students showed relaxation in their responsibilities and their achievement was decreased due to lack of competitive environment in the mixed classrooms. As far as teachers were concerned, in the study, it was reported that the teachers who would teach in ability grouping classes should be carefully selected among the ones whose success was already assured. In line with the results, the effect of ability grouping classes on academic achievement was observed. However, it is also reported that when students were placed in the same ability group from 5th grade to at the end of their elementary school education and when the students' grouping class was not changed according to their achievement level, the students placed in lower ability groupings would be unsuccessful and did not try to be more successful and also their personality would be influenced in the negative manner. In some of the studies in the literature, in the schools where between class ability grouping were practiced, this practice had a positive impact for the students placed in high ability grouping classes, but negative impact for the students in low ability grouping classes (Slavin, 1990; Betts & Shkolnik, 2000; Karabacak, 2001). Specifically, in terms of the criteria used for placing the students to ability grouping classes, inequality among the students are observed. In addition, the studies showed that when one student was placed to ability grouping class, the possibility for that student to pass to other ability class was quite small (Felmlee & Eder, 1983). In the study, the students in the 5th grade were placed to ability grouping class according to their test scores and continued their education in the same group at the end of elementary school, and even if their success was increased in the following years, ability groups were not changed until the end of the elementary education. It is apparent in the literature that theoretically, there should be transition among/between ability grouping classes. However, the number of the transitions for this practice seems to be very scarce because of making both instruction and classroom management easy. In other words, when a student in low ability grouping class becomes successful, the possibility for that student to pass to medium and/or high ability grouping class is very small. These inequalities which are received by the students in ability grouping classes influence these students' achievement as well as self-confidence, esteem, and communication with their friends. The studies in the literature also support these findings. In the research studies undertaken by Kitchen (1990), Oakes (1991), Braddock and Dawkins (1993), Brewer, Rees and Argys (1995), and Oakes and Guiton (1995), it was found that the students placed in low ability grouping classes were more unwilling during university preparation, ability grouping increased the disparity between the students in low SES and high SES with regard to academic achievement, and their realization of the ability grouping classes where they were placed influenced their views on themselves and academic achievement. As far as these impacts of ability grouping classes are concerned, it is believed that the students

in low ability grouping classed developed feeling of inferiority. The factors which caused feeling of inferiority may come from two sources. First source is students themselves. A student compares her/his behaviors with her/his peers and friends and when she/he perceives her/himself as unsuccessful and incompetent, she/he may develop feeling of inferiority. Second source is other people. When a student is treated contemptuously and externalized because of her/his behaviors, a student may develop feeling of inferiority (Başaran, 2000).

In addition, when the foreign literature is examined, while there are several studies focusing on the ability grouping classes, number of the studies which investigated the effect of this practice is very little (Aldan Karademir, 2007; Gömleksiz, 1997; Karabacak, 2001). In other words, it is not well known in Turkey that the positive or negative influences of the between class ability grouping on students, teacher and students' opinions on this practice, and societal problems due to the ability grouping practice. Furthermore, it is observed that this practice has not been discussed sufficiently among the educationalists. At the same time, the resources regarding ability grouping practices are very limited and no sufficient place are given to the studies investigating the effects of this practice (Gözütok, 2006; Halis, 2002; Tok, 2007; Doğanay, 2007).

Suggestions

The suggestions based upon the results and conclusions of the study are as follows;

- In Turkey, the answers of the questions pertaining to (1) the problems that the students in the ability grouping classes are encountered, (2) the effects of ability grouping practices on students achievement and other variables, (3) the opinions of students, teachers, parents and other interest groups on the practice of ability grouping are not known. In this respect, new studies should be designed to address these questions.
- This study is limited with the effect of between class ability grouping on 7th grade students' science achievement. In other educational institution and other class levels, the effects of between class ability grouping on academic achievement and other variables should also be investigated.
- In the present study, the effects of between class ability grouping, one type of the ability groups, was investigated. Further research can be designed to investigate the effects of other types of ability groups.

References

- Akbaba, A. (1996). İlköğretim Kurumlarında Seviye Sınıfları ve Uygulama. *Çağdaş Eğitim*.21(226), 36–38.
- Aldan Karademir, Ç. (2007). *Düzey Dersliklerinin İlköğretim 6. Sınıf Öğrencilerinin Fen Bilgisi Dersine İlişkin Akademik Başarıları ve Benlik Saygısı Üzerine Etkisi*. Yayınlanmamış Yüksek Lisans Tezi, Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü.
- Atılgan, H. (2006). *Eğitimde Ölçme ve Değerlendirme*. Ankara: Anı Yayıncılık.
- Başaran, İ.E. (2000). *Eğitimin Psikolojik Temelleri Eğitim Psikolojisi*. Ankara: Feryal Matbaası.
- Betts, J. R. & Shkolnik, J.L. (2000). The Effects Of Ability Grouping On Student Achievement And Resource Allocation In Secondary Schools. *Economics of Education Review* 19: 1–15.

- Braddock, J.H. & Dawkins, M.P. (1993). Ability Grouping, Aspirations, And Attainments: Evidence From The National Educational Longitudinal Study Of 1988. *Journal of Negro Education*. 62(3), 324–336.
- Braddock, J.H. & McPartland, J.M. (1990). Alternatives To Tracking. *Educational Leadership*. 47(6), 76–79.
- Brewer, D.J., Rees, D.J. & Argys, L.M. (1995). Detracking America's Schools: The Reform Without Cost?. *Phi Delta Kappan*. 77(3), 210–215.
- Büyüköztürk, Ş. (2004). *Sosyal Bilimler İçin Veri Analizi El Kitabı*. Ankara: Pegem Yayıncılık.
- Çepni, S., Ayas, A., Johnson, D. ve Turgut, M. F. (1996). Fizik Öğretimi. Ankara: Milli Eğitim Geliştirme Projesi Hizmet Öncesi Öğretmen Eğitimi Deneme Basımı.
- Doğanay, A. (Ed.). (2007). *Öğretim İlke ve Yöntemleri*. Ankara: Pegem Yayıncılık.
- Doğruöz, P. (1998). *Bilimsel İşlem Becerilerini Kullanmaya Yönelik Yöntemin Öğrencilerin Akıfkanların Kaldırma Kuvveti Konusunu Anlamalarına Etkisi*. Yayınlanmamış Yüksek Lisans Tezi. Orta Doğu Teknik Üniversitesi,.
- Felmlee, D. ve Eder D. (1983). Contextual Effects in the Classroom: The Impacts of Ability Groups on Student Interaction. *Sociology of Education*, 56: 77–87.
- Gamaron, A. (1992). Is Ability Grouping Equitable?. *Educational Leadership*. 50(2): 11–17.
- Glatthorn, A.A. (1987). *Curriculum Renewal*. Virginia: Association for Supervision and Curriculum Development.
- Germann, Paul J. (1994). Testing a Model of Science Process Skills Acquisition: an Interaction with Parents' Education, Preferred Language, Gender, Science Attitude, Cognitive Development, Academic Ability, and Biology Knowledge. *Journal of Research in Science Teaching*. 31 (7), 749-783.
- Gömlüksiz, M. (1997). *Düzeş Kümeleri: Temeleğitim İkinci Aşama Öğrencileri Üzerinde Bir Araştırma*. Adana: Baki Kitap ve Yayınevi, No.11.
- Gözütok, D.F. (Ed.). (2006). *Öğretim İlke ve Yöntemleri*. Ankara: Ekinoks Yayınları.
- Gürdal, A., Şahin, F., ve Çağlar, A. (2001) *Fen Eğitimi: İlkeler, Stratejiler ve Yöntemler*. Marmara Üniversitesi Yayını No: 668, İstanbul.
- Halis, İ. (2002). *Demokratik Sınıf Ortamı İçin Profesyonel Sınıf Yönetimi*. (2. Baskı). Konya: Mikro Yayınları.
- Karabacak, K. (2001). *İlköğretimde Seviye Gruplaması*. Yayınlanmamış Yüksek Lisans Tezi, Sakarya Üniversitesi Sosyal Bilimler Enstitüsü.
- Karasar, N. (2003). *Bilimsel Araştırma Yöntemi*. (12. Baskı). Ankara: Nobel Yayınları
- Kitchen, D.J. (1990). Ability Grouping And Dropping Out. *Dissertation Abstracts International*. 51 (6), 1978-A.
- Kulik, J.A. & Kulik, C.L.C. (1992). Meta-Analytic Findings On Grouping Programs. *Gifted Child Quarterly*. 36(2), 73–77.
- MEB, (2003). *TIMSS 1999 3. Uluslararası Matematik ve Fen Bilgisi Çalışması Ulusal Rapor*. <http://earged.meb.gov.tr/>
- MEB, (2005). *PISA 2003 Projesi Ulusal Nihai Rapor*. www.pisa.oecd.org

- Mills, C.J. & Durden, W.G. (1992). Cooperative Learning And Ability Grouping: An Issue Of Choice. *Gifted Child Quarterly*. 36(1), 11–16.
- Oakes, J. (1991). *Keeping Track. Taking Sides: Clashing Views on Controversial Educational Issues*. J.Wm. Noll (editör). Connecticut: The Dushkin Publishing Group. 276–285.
- Oakes, J. & Guiton, G. (1995). Matchmaking: The Dynamics Of High School Tracking Decisions. *American Educational Research Journal*. 32(1): 3–34.
- Slavin, R.E. (1987). Ability Grouping And Student Achievement In Elementary Schools: A Best Evidence Synthesis. *Review of Educational Research*. 57(3), 293–336.
- Slavin, R.E. (1990). Achievement Effects of Ability Grouping in Secondary Schools: A Best-Evidence Synthesis. *Review of Educational Research* 471–499.
- Tanrıöğen, A. (Ed.). (2009). *Bilimsel Araştırma Yöntemleri*. Ankara: Anı Yayıncılık.
- Tekin, H. (2004). *Eğitimde Ölçme ve Değerlendirme*. Ankara: Yargı Yayınevi.
- Toomela, A., Kikas, E. & Mottus, E. (2006). Ability Grouping In Schools: A Study Of Academic Achievement In Five Schools In Estonia. *Trames*, 10(60/55), 1, 32–43.