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AN ANALYSIS OF THE INFLUENCES OF SOME SELECTED PHYSICAL AND ACADEMIC VARIABLES ON THE ACADEMIC ACHIEVEMENT OF STUDENTS IN THE LYCEES IN THE PROVINCE OF ANKARA

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ABSTRACT

AN ANALYSIS OF THE INFLUENCES OF SOME SELECTED PHYSICAL AND ACADEMIC VARIABLES ON THE ACADEMIC ACHIEVEMENT OF STUDENTS IN THE LYCEES IN THE PROVINCE OF ANKARA

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M.S. in Educational Sciences

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The purpose of the study was to investigate the influences of some selected physical and academic variables on the achievement of students in the lycees in the Province of Ankara.

The sample of the study consisted of 72 public lycees, 4 Anadolu lycees, 12 private lycees, and the Ankara Fen Lycee; a total of 89 lycees located in the Province of Ankara, in the 1991-1992 academic year. In the study, the public lycees were grouped as the sub-sample of ``Public Lycees'' whereas all the others were grouped as the sub-sample of ``Other Lycees''.

The analyses were carried out tried to determine the possible relationships between certain selected independent variables, such as; facilities-FAC, students-teacher ratio-STR, students per class-SPC and teachers per class-TPC

upon the dependent variables; ``Average ÖSS score-ÖSS`` (Average score of University Student Selection Examination for each lycee), and ``ÖYS Ratio-ÖYS`` (The rate of the succesfull students among all the students who entered the University Student Placement Examination for each lycee).

Stepwise multiple regression analysis was utilized in the analyses of the data. Analyses were carried out for both the lycees within the whole sample, and the sub-samples, as well.

The data analyses revealed that considering all the lycees as a whole, FAC appeared as the only significant predictor of achievement in terms of the average ÖSS scores within the whole sample, while variables FAC and SPC were found to be the significant predictors together explaining approximately one-quarter of the total variance in achievement when the success in ÖYS was considered. In the sub-sample of Public Lycees, although SPC appeared to be the only significant predictor of achievement in terms of the ÖSS results, the ``positive'' sign of this influence was found to be contrary to the expectations. As far as the success in the ÖYS is concerned, none of the independent variables were found to be significant.

When the sub-sample of ``Other Lycees`` was taken into consideration, as far as the average ÖSS scores were concerned, none of the independent variables were found to be significant. Within the sub-sample of ``Other Lycees`` SPC appeared to be the only significant predictor of achievement in terms of the ÖYS Examination, but again the sign of this influence was found to be contrary to expectations.

The results further revealed that even though the FAC and SPC appeared to be significant predictors of the achievement within the whole sample, none of the ``school-characteristics" used in this study were found to be ``educationally" and ``meaningfully" determining factors of achivement within each of the sub-samples of Public and Other Lycees.

Key Words: School Facilities, Student-Teacher Ratio, Class Size, Students per Class, Teachers per Class, Achievement in Lycees, Achievement in University Entrance Examinations.

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ÖZ

SEÇİLMİŞ BAZI FİZİKSEL VE AKADEMİK DEĞİŞKENLERİN ANKARA İLİ LİSELERİNDEKİ ÖĞRENCİLERİN AKADEMİK BAŞARILARI ÜZERİNDEKİ ETKİLERİNE İLİŞKİN BİR İNCELEME

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Bu çalışmanın amacı, seçilmiş bazı fiziksel ve akademik değişkenlerin, Ankara İli'ndeki lise öğrencilerinin akademik başarıları üzerindeki etkilerini incelemektir.

Çalışmanın örneklemi, 1991-1992 akademik yılında, Ankara İli sınırları içinde yer alan 72 Devlet Lisesi, 4 Anadolu Lisesi, 12 Özel Lise ve Ankara Fen Lisesi`nden oluşan toplam 89 liseyi kapsamaktadır. Bu çalışmada, Devlet Liseleri ``Devlet Liseleri'' Alt-örneklem Grubu altında, diğer tüm liseler ise ``Diğer Liseler'' Alt-örneklem Grubu altında toplanmıştır.

Analizler, dört bağımsız değişkenin, ayrı ayrı olarak iki bağımlı değişken üzerindeki olası birleşik etkilerini incelemek üzere gerçekleştirilmiştir.

Çalışmada kullanılan dört bağımsız ve iki bağımlı değişken, araştırmacı tarafından oluşturulmuştur. Birinci bağımsız değişken ``Tesisler'' herbir okul için öğrencilerin yararlandığı okul tesislerini (yani her türlü laboratuar, kütüphaneler, kapalı spor salonları ve okuldaki açık oyun alanları) temsil etmektedir. İkinci bağımsız değişken ``öğrenci-öğretmen oranı'' herbir okul için toplam öğrenci sayısının, toplam öğretmen sayısına bölünmesiyle elde edilmiştir. Üçüncü bağımsız değişken ``şube başına öğrenci'' herbir okul için toplam öğrenci sayısının, toplam şube sayısına bölünmesiyle oluşturulmuştur. Dördüncü bağımsız değişken ``şube başına öğretmen'' herbir okul için toplam öğretmen sayısının, toplam şube sayısına bölünmesiyle meydana getirilmiştir.

Birinci bağımlı değişken ``ortalama ÖSS puanı'' herbir okul için öğrencilerin 1992 yılındaki Üniversite Seçme Sınavı (ÖSS) puanlarının aritmetik ortalamalarını sembolize etmektedir. İkinci bağımlı değişken ``ÖYS oranı'' herbir okul için 1992 yılındaki Üniversite Seçme Sınavı'na (ÖYS) giren öğrenciler içinde bu sınavı kazananların oranını temsil etmektedir.

Verileri analiz etmek için ``Basamaklı Çoklu Regrasyon Analizi`` yöntemi kullanılmıştır. Analizler, hem örneklem genelindeki bütün liseler birarada değerlendirilerek ve hem de ``Devlet Liseleri'' ve ``Diğer Liseler'' Alt-örneklem grupları ayrı ayrı ele alınarak gerçekleştirilmiştir.

Tüm liselerin birarada incelendiği analiz sonuçlarına göre, ``ortalama ÖSS puanları`` dikkate alındığında, okullardaki ``tesisler`` başarıyı etkileyen tek faktör olarak görülmüştür. ÖYS oranları dikkate alındığında ise hem ``tesisler``, hem de ``şube başına düşen öğrenci sayısı`` başarıyı etkileyen faktörler olarak ortaya çıkmıştır.

``Devlet Liseleri`` ve ``Diğer Liseler`` Alt-örneklem Grupları ayrı ayrı incelendiğinde ise ne ortalama ÖSS puanlarını, ne de ÖYS oranlarını tek başına veya beraberce etkileyen faktörler bulunamamıştır.

Anahtar Sözcükler: Okul tesisleri, Öğrenci-Öğretmen Oranı, Şube Başına Düşen Öğrenci, Şube Başına Düşen Öğretmen, Liselerdeki Başarı, Üniversite Giriş Sınavlarındaki Başarı.

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Orsoy GİRGİÇ

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CHAPTER I

INTRODUCTION

It has always been very important to educators to develop educational systems of appropriate size with those physical and academic facilities which may make a difference to the outcome of the system (improve student behaviour). For example, most people believe that we can not train and develope olympic swimming champions, if we do not have appropriate pools, properly trained educators/trainers, body conditioning facilities and psychologically motivated and physically developed young people. Other educational systems have their own particular set-ups, of course. These facilities are all very expensive to set-up, utilize and operate. It therefore becomes crucial to search for those facilities which make a significant influence on the outcome of that educational system.

The relationships between school variables - such as students per class, students per teacher, facilities - and educational outcomes have been vital issues in the process of educational planning and policy-making, because of their manpower and fiscal implications.

In the review of educational literature, it is frequently argued by many researchers (e.g, Glass et al., 1982; Sindelar et al., 1984; Heyneman and Loxley, 1982) that the ``school effect'' approach on the quality of education is

dependent on a variety of factors including class-size, teacher quality, and the availability of the facilities. Any report on a school or school system, seems to include statistics on class-size (no matter, whether in the ratios of student per class, or, student per teacher).

Many educators frequently use a small student-teacher ratio (STR) as one of the factors explaining ``a good school system'' and a large ratio as an excuse for a ``poor one''.

Boocock (1980) points out that from the teacher's point of view, smaller classes are an obvious convenience. Fewer students mean fewer papers and tests to grade, fewer individuals with whom to communicate, a smaller probablity of a classroom getting ``out of control'' and so on.

Haddad (1978) indicates that the major proponents of smaller classes are teachers. He states that, the arguments for small classes seem to concentrate more on educational objectives related to the teaching-learning process.

On the other hand, we know that the teaching-learning environment is where most learning occurs. In crowded classes this is not easy to accomplish. There is also the argument that quicker and more frequent intervention of the teacher in the pupils' activities may deprive the child of discovering problems and solutions on his own.

Glass and his colleagues (Glass et al., 1982) analized the relationship between class-size and the cognitive, affective, and instructional outcomes of education. Their study contains not only their analysis of the size-outcome relationship, but also discussions of the theoretical grounds for expecting class size to affect

student outcomes and of the policy context for subsequent decisions. Glass and his colleagues concluded that smaller classes were, on balance, better than large ones.

The basic questions considered here, are:

-Does students' achievement level increase much better in smaller classes than it does in larger classes?

-Is there any optimum class-size that maximizes educational benefits or cost-effectiveness?

-Do the educational benefits of smaller classes, if any, justify the additional costs?

Even though it is difficult today to find an educator - or, indeed, anyone - who believes that students learn better in large classes than in small ones, the empirical literature is similarly inconclusive: Small classes seemed better, but the effects of class-size are hard to discern.

Although a number of studies have been conducted to determine the relationship between school variables and student achievement as measured by a variety of standardized tests, educational opinion is divided over the issue of class size. Most of the studies performed throughout the world have shown that class-related factors contribute to students' achievement in some countries, whereas not in the others.

Some of the studies conducted to determine the relationship between class size and student achievement concluded that smaller classes are more effective than larger ones, while the others revealed the opposite, namely, that large classes lead to increased pupil achievement (Haddad, 1978).

Depending on the literature on this issue, it can not be concluded that an increase in class size will necessarily lead to a decrease in the level of academic achievement of pupils. Likewise, a decrease in class size does not guarantee an improvement in the social environment of learning. What is more important is not the class-size, but what the teacher does with the opportunities the size of the class offers for learning. Thus, decisions regarding class size are bound by a fiscal policy on one hand and a curriculum policy on the other hand.

Köse's (1989) study indicates that "out-of-school" family background factors are mainly responsible in explaining the variance on educational performance of the Turkish high school seniors, while no meaningful effect of "within-school" quality factors on educational performance can be observed. However, Köse also mentioned that the findings of the past studies suggest that family versus school impacts on academic achievement are not consistent and do not exhibit a clear-cut trend across studies.

In other literature, it is also observed that while some studies (e.g. Sindelar et al., 1984; Walberg et al., 1986; Altman and Linton, 1971; Heyneman and Loxley, 1982) have unearthed the teacher's importance, some others (e.g. Harnisch, 1987; Heyneman and Loxley, 1982) emphasize the quality of the school facilities as well.

This thesis is an attempt to determine which, if any, physical and educational school-facilities and class availabilities make the greatest contributions or changes towards better developed and succesfull students.

1.1 The Statement of the Problem

What are the influences of some physical and academic variables on the academic achievement of students in lycees in the Province of Ankara?

1.2 The Subproblems of the Study

1) *What are the influences of some physical and academic variables on the academic achievement of students in "Public Lycees" in the Province of Ankara?*

2) *What are the influences of some physical and academic variables on the academic achievement of students in "Other Lycees" in the Province of Ankara?*

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

In the present chapter, a review of related literature is presented. This chapter contains studies concerning the influences of class-related variables and school facilities upon the academic achievement of the students, both in the world and Turkey.

2.2 World Literature

The reviewed studies throughout the world indicated that there is no consensus on the issue of whether the infuences of class size and class-related factors upon the pupils' achievement is significant, or not. While some researchers argue that the class size was one of the major determinants of the achievement, the others have some doubts on this matter.

It is observed that, the studies on this subject usually preferes to explain the effects of class size and other class-related factors by setting some other necessary preconditions.

Some reserach on the relationship between class size and achievement (Glass and Smith, 1979; Smith and Glass, 1980) suggested that student achivement decreases as group size increases, and that the interval of most rapid decline

occurs between group sizes of 1 and 10. Glass and his colleague demonstrated clearly the relationship between class size and the outcomes of instruction: Making very small classes larger diminishes outcomes considerably, making already large classes larger diminishes them much less. Glass and his colleagues began with two quotations, one stating that students benefit from large courses and another that they suffer (Glass et al., 1982). As Glass and his colleagues (Glass et al., 1982) mentioned, part of the explanation for this variation was the uncontrolled nature of most class-size research. Small classes may differ from large ones not only in size but also in subject matter, student ability, and other important variables. For example, for cognitive outcomes Glass and his associates' reportings were as follows:

"1) In 111 of 160 instances (69 %) in which classes of approximately 18 and 28 pupils were compared, the smaller classes achieved at a higher level than large classes.
2) In 45 of 46 comparisons (98 %) of class sizes of about 2 and 28 pupils, the smaller class showed a higher level of achievement than the larger class.
3) At the other extreme, the odds were roughly 50-50 that a class of over 30 pupils would show achievement superior to a class of over 60 pupils.
Overall, among the 725 comparisons of pupil achievement in smaller and larger classes, 435 or 60 % favored the smaller class" (Glass et al., 1982).

Glass and his colleagues concluded from these data that smaller classes were, on balance, better than large ones. However, a study performed by Educational Research Service in 1980, found support for the opposite view in that ``only 60 per cent of the studies reviewed favor smaller classes in achievement" (Glass et al.,1982).

As a synthesis of the similar research (Glass and Smith, 1979: Smith and Glass, 1980) and reviewed (Choppin, 1980: McGaw, 1980: Simpson, 1980), Glass and his colleagues' study also summarized ``meta-analysis", that is one of the several methods for combining evidence from different sources into a

coherent argument. The meta-analysis procedure used in the study has three steps: First, one identifies studies which meet certain criteria, the most important criterion being that the attributes of the classes and the outcome instruments are described. Second, based on these studies, one tabulates the available comparisons, that is, a study that compares an 8-person class, a 20-person class, and a 30-person class provides three comparisons: 8-20, 20-30, and 8-30. Third, one uses an appropriate mathematical model to place these comparisons on a common scale, and plots the results.

The above results represent comparisons between small and very small classes, medium and large classes and large and very large classes. Very small classes are much better than small classes, small classes are better than large classes, and large classes are little better than very large classes for pupil achievement. And class size is even more directly related to teacher attitude (Glass, et al., 1982).

McKenzie (1983) also regarded Glass and his colleagues' research as the authoritative source on how class size effects public achievement and teachers' and public attitudes. According to his opinion, the book may also be regarded as a classic example of the arguments that complicate converting educational research into policy.

Jackson (1983) claimed that learning was not the only variable that class size influences. According to his opinion class size translates school enrollments into staff requirements and instructional expenditures, and thereby into educational revenue needs. As Jackson argued, part of the problem in the class size research, was that one study's ``large" class might be another's ``small" class, and both studies might be correct. Therefore, the issue, is not whether small

is better than large, it is how great an effect specific changes in class size will have, and how much these changes in class size will cost (in the case of reduction) or save (in the case of expansion).

Jackson argued that this was one of the major problems in the class-size literature: Some experts assert that large classes are at worst equivalent to small ones - and, of course, cheaper - while others assert that small classes are better. However, there has always existed some confusion on the definition of the term ``class". Jackson (1983) stated that part of the problem here was that one study's ``large" class might be another's "small" class, and both studies might be correct. Therefore, the issue, is not whether small is better than large, it is how great an effect specific changes in class size will have, and how much these changes in class size will cost (in the case of reduction) or save (in the case of expansion).

According to Haddad:

"Many educators are not surprised by the inconclusiveness of research on the effect of class size on achievement, because they claim that the significant effect is in the noncognitive domain of the teaching-learning process and the education-social classroom environment. A number of researchers tried to determine the nature and extent of such an effort as measured by a variety of observational and quality indicators" (Haddad, 1978).

According to him, the non-uniformity and inconclusiveness of results may be attributed to the following factors:

a) There is a lack of a ``quantified" definition of ``small" and ``large" classes.
b) A wide variety of measures are used for the same variable which makes the comparison of results of different studies in those cases meaningless.
c) Variables, such as methodology of instruction, that may have an interaction effect are often ``suppressed" in the research designs (Haddad, 1978).

In the survey of the past literature, it was often observed that, regarding the influence of school characteristics, some researchers have emphasised the importance of teacher variables, others the importance of school climate and activities, while the remainings most of the variables together.

Sindelar and his collegues (Sindelar et al., 1984) investigated the effects of group size and instructional method on the acquisition of mathematical concepts by fourth grade students. Their purpose was to determine the relationship between student achievement, on the one hand, and group size and mode of instruction, on the other. According to their findings, small group sizes may promote achievement because they allow for the maximization of variables related to achievement. One such variable mentioned is ``substantive teacher interaction".

As Shapson and his colleagues, in 1980, showed class size may exert little effect on achievement, the size of the group in small group instruction, on the other hand, may have considerably influence on learning as Moody, Bausell, and Jenkins reported in 1974 (Sindelar et al., 1984).

Riew (1966), in his study related to the ``economies of scale" in high-school operations, agreed with some previous literature that, size of class had little significant influence on educational efficiency as measured by achievement in the academic subjects.

Preece (1987), in his study related to the class size and learning, proposed a theoretical model of the relationship between class size and achievement. He made an assumption that ``a teacher adjusts the style and pace of a lesson to the least able students in the class".

Preece's model was based on the simple premise that teaching was adjusted to the ability of the least able student in the class, and it followed that the achievemenet deficit in a large class was a consequence of the heterogenity of the class rather than its size per se. The model and an extension took into account the duration of instruction account well for various features of the data collected in the Glass and Smith's meta-analysis of research.

His suggestions were as follows:

"The proposed model accounts for the finding that the relationship between achievement effect size and class size is independent of the age and ability of the students and of the achievement test used. A simple extension of the model also accounts for the appearently contradictionary findings relating to the duration of instruction. But above all there is a substantial correlation (0.62) between predicted and emprical effect sizes" (Preece, 1987).

Barber (1988), studied the effect of grade level on the relationship between class size and academic achievement in his dissertation. The purpose of the study was to investigate the relationship between class size and academic achievement, and to examine the effect of grade level on this relationship. The results from analysis of variance tests showed statistically significant differences in favor of small classes in grades 3 and 6. At the eighth grade level, he found a statistically significant difference only in language. In general, the hypothesis stating that there is an inverse relationship between class size and academic achievement seemed to be supported by the results. He claimed, at the end, that on the basis of the general findings, the null hypothesis on the intereaction effets of grade and class size could not be rejected.

Haddad (1978), on the basis of his deep review of literature, pointed out that it was not possible to conclude that an increase in class size would necessarily

lead to a decrease in the level of academic achievements of pupils, likewise, a decrease in class size did not guarantee an improvement in the social environment of learning. According to him, what seems to be more important is what the teacher does with the opportunities provided by the size of the class.

Boocock (1980) claimed that class size alone was not a strong determining factor but rather was related to other factors that affect classroom productivity. In other words, according to the opinion of him size may be a causal factor, but it can be understood only when considered simultaneously with other factors. He suggested that the appearent lack of relationship between class size and productivity might be due to two effects working in opposite directions. On the one hand, increasing size increases the resources of a group (the total pool of information available and the opportunities for feedback). On the other hand, it diminishes the possibility of getting the maximum contribution from all members.

Harnisch (1987), in his study of the characteristics associated with effective public high schools, identified the school characteristics that were associated with four cognitive achievement measures for students during their last two years of high school. Results from his study revealed that gains were greater in those schools where a large percentage of students were enrolled in the academic curriculum and in the school which offered a large number of additional courses beyond the remediation level. According to Harnisch:

"The quantity of instruction that a student took beyond the remedial level was positively related to test score gain. The school effects (including the quality of facilities and student-teacher ratio) were significant but small in explaining total school variation. One factor that may explain the small school effects is that the cognitive measures used in this study may not be sensitive to detect differences that might exist between public schools in their effects on student achievement during the junior and senior years of high school" (Harnisch, 1987).

As a conclusion, he stated ``schools make a difference". Findings of the researcher showed that schools that had larger percentages of students from a higher socioeconomic status tended to receive higher test scores. Schools with greater academic emphasis tended to have greater achievement scores. Schools that reported fewer disciplinary problems showed greater achievement gains.

Walberg and his colleagues (Walberg et al. 1986) tested a model of educational productivity among senior high school students. The results of their analyses suggested that, among school-alterable productivity factors, motivation, attidute toward the teacher, amount of homework, class environment, and the home environment were significant correlates of both cognitive and attitudinal outcomes when controlled for other factors.

Schneider (1985) in his study of school effects, found that behind school-related factors, non-school factors also affected pupils' achievement. He reported that ``it is through the interaction of the family, school, and peer group that we begin to understand what influences the academic achievement and the affective development of students" (Schneider, 1985).

Fotheringam and Creal (1980), in their study of family socioeconomic and educational-emotional characteristics as predictors of school achievement, concluded that the major influence on the differences in academic achievement among children was the family. According to their findings, the influence appeares to oparate through attidutes toward education and opportunities provided for learning.

Angulo (1988), in her study, analized some selected school variables and mathematics performance of third grade students in Illinois. Among the major findings of this study, one was that, in combination with other student, school and instructional factor variables, ``attendence rate" was positively related to achievement among some students.

Heyneman and Loxley (1982), in their re-analysis of the International Education Association (IEA) data, concluded that, in the countries which were poor in economic terms, the impact of ``school quality" and ``teachers" on achievement seemed to increased.

According to them:

"The fact is that when data on school and teacher characteristics are allowed to express the full measure of impact in their country of origin, these characteristics in low income countries can explain between two and three times the amount of achievement variance that they can in high income countries" (Heyneman and Loxley, 1982).

Heyneman, in his study of influences on academic achievement, in 1976, compared the results from Uganda and more industrialized societies" (Heyneman, 1976). He used the results of this analysis, in order to reach some universal comments related to the achievement.

He commented as follows:

"First, the relationship between socioeconomic status and academic achievement appears weaker in less-industrialized societies. There are substantial differences among societies both in the amount of total variance explained and in the amount within that explicable variance attributable to preschool social milieu, but preschool influence is less in the less industrialized societies. Second, schools in less industrial societies have stronger effects on cognitive achievement than one would expect given the data from industrialized societies, though the evidence on this question is not strong. Nevertheless,

there is now sufficient evidence-particularly from Uganda-to support Schiefelbein's plea for caution when basing decisions about school investment in less industrial societies upon the Coleman or Jenks' conclusions from the United States" (Heyneman, 1976).

Heyneman (1982), after his studies performed in African countries, claimed that Coleman's and others' assumptions about the relationships between family background, school quality, and academic achievement can not be generalized to the less-industrialized countries (Heyneman, 1982).

Heyneman's conclusions were supported also by Mwamwenda and Mwamwenda (1987). They pointed out that their research performed in Botswana supported the argument that ``school facilities are integral to academic achievement". In their study to examine empirically the relationship between academic achievement and variables such as the availability of classrooms furniture and books in Botswana primary schools, they concluded that school facilities were closely related to the gains in achievement. Therefore, as similar to Heyneman's, Mwamwendas' research implied doubts on studies carried out in the West suggesting that school facilities have no impact on academic achievement.

Their views related to Heyneman's studies were as follows:

"Heyneman's research in developed and developing countries in 1980 has led him to the conclusion that students in developing countries perform much belove those of developed countries because of inadequate and poor school facilities. On the other hand, in the context of the West ,it has been contested that such provision has very little impact on academic achievement. In summary, the present research supports the argument that school facilities are integral to academic achievement. Conversely, the present study casts doubts on studies carried out in the West suggesting that school facilities have no impact on academic achievement" (Mwamwenda and Mwamwenda, 1987).

Altman and Linton (1971) in their review, stated that teachers could become more effective contingency managers. After demonstrating both the need for and the value of applied behavioral analysis in the public school classroom, they reported "the immediate and contingent usage of reinforcing events is the crucial element for effective classroom control" (Altman and Linton, 1971).

During reviewing the literature, it was observed that differences among schools also has been treated as one of the main concerns by researcers.

Hoffer and his colleugues, in their study of achievement growth in public and Catholic schools resulted in that "it was difficult to believe that the impact of Catholic school on sophomore-to senior achievement growth is no greater or only trivially greater than that of the avarage public schools" (Hoffer et al., 1985).

Similar to Hoffer and his collegues, Willms, in his study on ``Catholic school effects on academic achievement", on the basis of the results for the curriculum-specific tests, also suggested that there was no perceived Catholic-school effect on academic achievement (Willms, 1985).

Shanahan and Walberg's (1985) study was to determine the productive influences on high school student achievement. They attempted to explain the fixed and alterable conditions which influence the achievement of 26,279 sophomores in reading, writing, mathematics, science, and civics. Multiple regression and partial correlations indicated that those variables beyond the control of educators (i.e., "amount of homework completed", "television viewing", "parental involvement with education", etc.) explained much of the achievement variation. However, variables under school control, such as quantity and appropriateness of academic instruction, were found to explain significant

and educationally meaningful amounts of achievement variance. With background variables controlled, private schools did not outperform public schools. Therefore, Walberg and Shanahan (1985) showed that a number of other factors, totally or partially beyond the control of educators, exerted important influence upon achievement.

In another study concerning the school differences it was concluded that "students in independent schools, in the aggregate, do better than those from government schools on almost all educational, social and economic indicators" (Williams and Carpenter, 1990).

Ornstein (1989), compared private and public schools of United States in his analysis. By using some criterion related to classes and teachers, his underlyings were as follows:

"Student-teacher ratios in private schools have been reduced overall from 31.5 in 1957 to 16.1 in 1987. For public schools, corresponding data show the ratios have declined from 26.2 to 17.7 during the same period. Thus the private student-teacher ratios have dropped more sharply than public school ratios, to the extent that their ratios are now slightly better than the public ratios. Two-thirds of private and catholics school teachers hold a bachelor's degree, compared to half of public school teachers. Also academic time and curriculum standards are important" (Ornstein, 1989).

Therefore, Ornstein recommended that there was a need to focus more on private schools-partially on the basis of competition, choice, and effectiveness.

2.3 Related Literature in Turkey

In his study concerning the determinants of the achievement of lycee seniors in Turkey, Köse (1989) aimed to estimate the joint, unique and incremental contributions of family background, high school quality, and private-preparatory

courses to the explanation of the variance produced on Turkish high school seniors' educational performance.

In his study, Köse tried to determine the joint contribution of the three independent variables to the explanation of the variance on educational performance, was significant. The three variables jointly explained half of the variance on the dependent variable. Köse's results were as follows:

"In order of their relative efficiacies, the unique contributions of father's occupational status and the variable called "preparatory courses for university entrance exams" significantly explained the variance on educational performance. On the other hand, high school quality, as measured by classroom size, teacher-student ratio, teacher job experience, and high school facilities as perceived by teachers, was found to have no significant unique contribution to the explanation of the variance on educational performance" (Köse, 1989).

Köse also indicated that, even though not consistent with some previous studies, the analysis revealed that from among those four factors, teacher-student ratio was relatively the most significant and classroom size the least significant one in explaining the variance on educational performance.

Yıldırım (1972), performed his study upon a sample of high school graduates who had applied to enter the Middle East Technical University and tried to find out if there were any relationships between family background characteristics and entrance examination scores of the students. His findings supported Köse's findings. Yıldırım concluded that, family background characteristics were closely related to the academic achievement of the students.

A search was carried out to analyze ``student failures`` in the Province of Ankara by Çakır (1987). In Çakır's study, most of the teachers (% 70) were found to have the common belief that the ``crowdedness" in the classes" was among the most affective factors behind the failure of the students. The teachers indicated that this problem could be solved if the students family socio-economic status could be improved. This is, of course, a socio-economic problem and not soluable in educational system, itself. In this study, it was also recommended that the number of the students within each class should be lowered, to enhance achievement.

In various studies (Erten, 1991; Aydoğdu 1991; Cankoy, 1989) the effects of ``laboratories`` as one of the most important facilities, and the laboratory instruction were investigated. In most of the cases, positive results concerning the relationship between laboratories and achievement were found. Erten (1991), searched for the importance of biology laboratories within the province of Ankara. In this study, it was found that the laboratories were treated by teachers and the students as a complementary part of learning of biology in schools. But, common belief was found to be that laboratories were not utilized as efficiently as expected. As a recommendation, the researcher mentioned that each lycee should have at least one laboratory concerning biology (Erten, 1991).

In another example of the research concerning the effects of the laboratories on achievement, Aydoğdu (1991) examined the importance of laboratories in chemistry instruction. In Aydoğdu's study, performed in Hacettepe University, it was found that behaviours developed by the students in the chemistry laboratories are sustainable for a long time. It was also observed that the theoretical background of the students was the key factor behind their success.

Cankoy (1989), analized the difference between the traditional method and the mathematics laboratory instruction method in terms of achievement related to a probablity unit. In the study it was briefly reported that usually students who study certain units with mathematics laboratory instruction appear to have better feelings toward mathhematics than the other groups who study certain units with traditional method but almost all students prefer lab situations during the learning process. The results showed that mathematics laboratory instruction method was more effective than the traditional method in teaching probablity unit, especially for prospective mathematics teachers who will teach concepts related to probablity.

Results also show that the mathematics laboratory instruction is effective especially in reaching some higher level learning outcomes (Cankoy, 1989).

CHAPTER III

DESIGN OF STUDY

In this chapter, methodological procedures of the study will be presented. The major topics are: the sample and its characteristics, the limitations, the variables, and the data analysis techniques, respectively.

The sample section deals with the selection procedures and the characteristics of the sample.

The variable section explains the way in which the variables were created.

Finally, the last section of this chapter, data analysis techniques, introduces the statistical tests performed to analyze the data.

3.1 The Sample and its Characteristics

3.1.1 The Limitations

The sample of the present study was chosen from the public and private lycees, located in the Province of Ankara. The variables representing the relevant school characteristics are related to the academic year 1991-1992.

In the process of forming the sample, all the lycees, - except those established very recently and, therefore, had no graduates in the academic year 1991-1992 were selected. Thus, main criterion in selecting the lycees was to have graduate within the 1991-1992 academic year. Meanwhile, all the technical and the professional lycees were excluded from the sample.

72 public lycees, 4 Anadolu lycees, 12 privately owned lycees, and the Ankara Fen Lycee which met the requirements were included in the sample. The sample ultimately consisted of total 89 lycees having 75, 367 students in total, and located in Ankara province.

Turkish private schools are the ones that are established by Turkish citizens and Turkish legal personalities. In Turkey, there exist lycees, as well as the kindergardens, elementary and secondary schools operated privately (MEB, 1991).

The sample represents almost 90 per cent of the total sample of public and private lycees located in the Province of Ankara. Thus, it could be argued that the study was carried out for the whole population, itself.

3.1.2 Characteristics of the Sample

Data used in the creation of the independent variables indicating some physical and the academic characteristics of the schools within the 1991-1992 academic year, were gathered from the Educational Statistics Registers (for official use only) (Eğitim İstatistikleri Defterleri-Hizmete Özel) of the National Educational Directorate of the province of Ankara (Ankara İl Milli Eğitim Müdürlüğü).

In order to obtain more accurate and the updated data,some information was also collected directly from the principals and other officials engaged in the administrations of the lycees.

The data used to create the variables to measure achievement levels of the lycees were obtained from the 1992-ÖSS and the 1992-ÖYS examinations' results, separately. Relevant scores were obtained from `"1992-ÖSS and ÖYS Results Registers" of ÖSYM.

The university entrance examination in Turkey is accomplished by the Student Selection and Placement Center (ÖSYM) in two stages. The first stage (ÖSS) is made for selection, and the second one (ÖYS) is for placement (ÖSYMa, 1992).

During investigations, some strict differences between the relevant scores of the Public and the Other Lycees were observed. Because of this fact, it became necessary to examine each sub-samples (i.e. Public and Other lycees), separately.

Thus, the analysis was performed in two stages: In the first stage, the all types of lycees were treated as members of the same population and therefore, the sample consisted of 89 individual lycees. In the second stage, Public lycees were separated from the Other Lycees in order to create two distinct sub-samples.

In this study, the first sub-sample which consists of the 72 Public lycees will be called: "Public lycees", and the 12 Private Lycees, plus the four Anadolu Lycees and the Ankara Fen Lycee will be called: ``Other lycees".

While performing the analysis, it was noticed that the achievement levels -in terms of the average ÖSS scores and the ÖYS ratios- of each sub-samples showed substantial differences from each other.

The t-test was used in order to test if there were real differences between the achievement levels of the Public and Other Lycees. t-test results of two groups for the mean of the average ÖSS scores are presented in Table 3.1, below:

Table 3.1. t-test Results of the Sub-Samples for the Means of the Average ÖSS Scores

Subjects	N	M	SD	t
Public lycees	72	116.1111	6.053	-5.71*
Other lycees	17	138.5882	15.949	

* p<.01

As shown in table 3.1, the mean of the average ÖSS scores of the Public lycees was at about 116, and that of Other Lycees was 138 and the standard deviations were about 6 and 16, respectively.

The difference between the means of Public and Other Lycees for the average ÖSS results was significant at the level of alpha= .01 (t= - 5.71, p<.01). t-test results of two groups for the mean of the ÖYS ratios are presented in table 3.2.

Table 3.2. t-test Results of the Sub-Samples for the Means of the ÖYS Ratios

Subjects	N	M	SD	t
Public lycees	72	12.7083	6.992	-6.94*
Other lycees	17	57.4706	26.392	

* p< .01

As shown in table 3.2, the mean score of the Public Lycees related to the ÖYS ratios was about 12, while that for the "other lycees" was about 57 with standard deviations of about 7 and 26, respectively.

The difference between the mean scores of Public and other lycees for the ÖYS ratios was significant at the level of alpha= .01 (t= -6.94, p<.01).

In other words, there was a statistically significant difference between these two sub-samples in terms of their achievement levels. It could be argued that, these two sub-samples came from different populations, as far as their achievement levels were concerned, and, therefore, it would be appropriate to analyze these two sub-samples, separately.

3.1.3 Elements of the Sample

In this study, scores related to the facilities, number of students, teachers and the classes for each individual lycee were used in creating the independent variables, which will be explained later in this chapter. When the physical and the

academic size of the lycees were taken into consideration, all these scores were useful to evaluate the existing structures of the schools, relatively.

3.1.3.1 Facilities

In the whole sample, it was observed that while some lycees had limited amount of "facilities", others had 44 in total. In the sub-sample of the Public Lycees, the amount of facilities ranged from 0 to 11. Within the sub-sample of Other Lycees, this range was between 3 and 44. The graphs showing the distribution of the amount of the facilities are given in appendices section (see app. A).

As shown in Table 3.3, the arithmetic mean of the amount of the facilities within the whole sample was 5.80. The mean was 4.47 for Public Lycees, and 11.48 for the Other Lycees.

3.1.3.2 Number of Students (Enrollment)

The average enrollment level for the whole sample was at about 846. The average number of the students per school in the Public Lycees was at about 923, whereas this number was about 523 for the Other Lycees. As can be seen from Table 3.3 the total number of the students ranged between 29 and 3,092 in the Public schools, depending on their location and the establishment year. For the other lycees, the enrollment ranged between 37 and 2,502.

3.1.3.3 Number of the Teachers

As illustrated in Table 3.3, the average number of the teachers per school was about 65 for the whole sample, and 66 and 60 for the Public and the Private Lycees, respectively. The total number of the teachers in each school varied from 4 to 363 for the Other Lycees, and 6 to 175 for the Public Lycees.

3.1.3.4 Number of the Classes

In this study, the term "class" has an unique meaning compared to term "class-room" itself. Here, class indicates the group of the students who take all the relevant courses, together. Type and size of these classes differ from each other with respect to the grades of the specific group of the students who belong to that class and the types of the courses taken by the same group.

Depending on the type of the instructional system, some schools have 2 classes (instead of one) sharing the same class-room for half-day periods, Also, the number of the classes was closely parallel to the enrollment level of each individual lycee. The number of the classes changes with the enrollment level of the lycee.

As it is seen from Table 3.3, while the arithmetic mean of the number of the classes was about 18, in the whole sample and the sub-sample of the Public Lycees. It was just above 16 in the Other Lycees.

The number of the classes changes between 2 to 71, and 3 to 125 for the Other and the Public Lycees, respectively.

Table 3.3. The Arithmetic Means and the Standard Deviations of the Facilities, Students, Teachers and Classes within the Sub-samples

	Facilities		Student		Teacher		Class	
Sub-Sample	M	SD	M	SD	M	SD	M	SD
Public L.	4.47	2.41	923.20	762.60	66.41	44.10	18.87	17.25
Other L.	11.48	11.00	523.29	766.53	60.82	85.50	16.58	20.72
All L.	5.80	5.87	846.82	775.26	65.34	53.88	18.43	17.86

3.1.3.5 The Average ÖSS Scores and ÖYS Ratios

In this analysis, the achievement levels of the lycee graduates were determined from the results of the 1992 university entrance examinations (i.e. ÖSS and ÖYS).

The average achievement levels for each individual lycee were determined by means of two sets of data. The first set of data consisted of the arithmetic averages of the ÖSS examination scores of the students within each lycee. The second set of data contained the ratios obtained by dividing the total number of the winners of the ÖYS examination by the total number of the students who entered the ÖYS examination, for each individual lycee, seperately.

The arithmetic means, the ranges, and the standard deviations of the average ÖSS scores and the ÖYS ratios for the sub-samples are given in the Table 3.4.

Table 3.4. The Arithmetic Means and the Standard Deviations of the Average ÖSS Scores and the ÖYS Ratios within the Sub-Samples

	Average ÖSS Scores		ÖYS Ratios	
Sub-Sample	M	SD	M	SD
Public Lycees	116.11	6.05	12.73	6.99
Other Lycees	138.58	15.94	57.48	26.39
All Lycees	120.40	12.44	21.28	21.88

As seen from Table 3.4, the arithmetic mean of the average ÖSS scores of the Other Lycees is about 138, compared to the 116 for the Public Lycees. The mean of the ÖSS scores for whole sample was at about 120.

When groups were treated together, it could be seen that approximately 21 % of all students were succesfull on the ÖYS. The success rates were 12 % and 57 % for the Public and Other Lycees, respectively.

The average ÖSS scores of the Other Lycees ranged from 116 to 176, while the averages of the Public lycees ranged between 96 and 128. As far as the per cent achievements in the ÖYS examination are concerned, ÖYS ratios of the Other Lycees varied between 18 and 100 per cent, thereas the same ratio for the public Lycees' ranged from 0 to 33 per cent. The graphs showing the distribution of the average ÖSS scores and the ÖYS ratios are given in the appendices section (see app. A).

3.2 The Variables

In the present study, 4 independent and 2 dependent variables were created: Independent variables are ``facilities``, student-teacher ratio``,, ``students per class``, and ``teachers per class``. Dependent variables are ``average ÖSS score`` and ``ÖYS ratio``.

3.2.1 Operational Definitions of the Independent Variables

3.2.1.1 Facilities (FAC)

The number of the facilities in the individual schools consisted of physics, chemistry, mathematics, science, common, language, and the computer science laboratories, and other systems like libraries, gymnasiums and the open areas, and playgrounds available for the students. In order to create the variable FAC, the number of the laboratories and the other facilities mentioned above for each school were summed.

The relevant information related to the means and the ranges of the facilities is given in Table 3.3. The graphs showing the distribution of the amount of the facilities are also given in Appendices section (see App. A).

3.2.1.2 Student-Teacher Ratio (STR)

STR is simply calculated by dividing the total number of the students by the total number of the teachers who work for the same school. STR was created to measure the ``pupil-density" per teacher in each individual school.

The means, the ranges and the standard deviations of STR for each sub-samples are shown in table 3.5. The graphs showing the distribution of the STR's are given in Appendices section (see App. A).

3.2.1.3 Students per Class (SPC)

This independent variable was created to determine ``how crowded'' the classes were on the average in each individual lycee.

SPC is obtained by dividing the total number of students of the school by the total number of the classes that exist within the same school.

The means, the ranges and the standard deviations of SPC for each sub-samples are shown in table 3.5. The graphs showing the distribution of the SPC's are given in Appendices section (see App. A).

3.2.1.4 Teachersper Class (TPC)

This independent variable was created to measure the average ``teacher-availability' of each particular lycee.

This variable is easily obtained by dividing the total number of the teachers of a given lycee, by the total number of the classes that exist within the same lycee.

The means, the ranges and the standard deviations of TPC for each sub-samples are shown in table 3.5. The graphs showing the distribution of the TPC's are also given in Appendices section (see App. A).

Table 3.5. Means, Standard Deviations and Ranges of the independent variables for the sub-samples

Independent Variable		M	SD	R
STR	Public Lycees	12.76	6.20	2-27
	Other Lycees	8.87	5.69	4-24
	Whole Sample	12.01	6.27	2-27
SPC	Public Lycees	45.22	17.41	10-86
	Other Lycees	26.17	7.44	19-46
	Whole Sample	41.58	17.64	10-86
TPC	Public Lycees	3.98	1.60	1-8
	Other Lycees	3.47	1.32	1-5
	Whole Sample	3.88	1.56	1-8

3.2.2 Operational Definitions of the Dependent Variables

3.2.2.1 ÖSS Score (ÖSS)

This variable represents the arithmetic averages of the ÖSS scores for each school. This average was calculated simply by summing the ÖSS scores of all the graduates of any given school, and then dividing this sum by the number of the students entered the ÖSS exam.

The means, the ranges and the standard deviations of average ÖSS scores for each sub-sample are given in Table 3.4. The graphs showing the distribution of the average ÖSS scores are given in Appendices section (see App. A).

3.2.2.2 ÖYS Ratio (ÖYS)

This variable indicates the rate of the success of all the students who entered the ÖYS exam, for a particular lycee. In other words, ÖYS ratio is an indicator of the rate of success of a school in entering the university.

This ratio was found by dividing the total number of the students who won the ÖYS examination by the total number of the students entered the ÖYS examination.

The means, the ranges and the standard deviations of ÖYS ratios for each sub-sample are given in Table 3.4. The graphs showing the distribution of the ÖYS ratios are given in Appendices section (see App. A).

3.3 Analysis of the Data

All the analyses of data were carried out by using stepwise multiple regression, t-test, and the correlation coefficient subprograms of SPSS (Statistical Package for Social Sciences) (Nie, et al., 1975) in the computer facilities of Middle East Technical University.

The main statistical test used to analyze the data in this study was stepwise multiple regression analysis. As it is well-known, multiple regression analysis is a method for studying the effects and the magnitudes of the effects of more than one independent variable upon one dependent variable (Gujarati, 1979).

To determine the degree of linear dependence of achievement on the 4 independent variables mentioned before, checks of independence were made as shown in subsection 3.1.2 of this section. This was done to determine dependence or, equivalently the amount of variation in achievement that could be explained by each of the four independent variables, separately.

The analyses were carried out by using two different models. In the first model, the associated linear effect of the 4 independent variables (i.e. FAC, STR, SPC, and TPC) upon the first dependent variable (ÖSS) was investigated. In the second model, the associated linear effect of the same independent variables upon the second dependent variable (ÖYS) was searched.

CHAPTER IV

RESULTS OF THE STUDY

This chapter presents the results of the study which were obtained by analyzing the data through the statistical techniques described in Chapter III.

The level of significance for this study was set at alpha= .05.

4.1 Degree of Relationship Between Dependent Variables

In order to determine the degree of relationship between the two specified dependent variable, statistical tool of correlation coefficient was used.

Since the correlation coefficients between two dependent variables for the whole sample and the sub-samples were positive and highly significant, these two separate sets of scores were found as strongly in relation with each other. Therefore, it could be argued that the dependent variables, ÖSS and ÖYS, measured the levels of achievement in a very similar fashion. The degree of correlations between ÖSS and ÖYS scores within the whole and the sub-samples are given in Table 4.1, below.

Table 4.1. Correlation coefficients between ÖSS and ÖYS

Whole sample	0.9050 **
Public lycees	0.6508 **
Other lycees	0.8755 **

P< .01**

As seen from Table 4.1, the correlation coefficients between ÖSS and ÖYS are statistically significant at the level of alpha= .01. Since the ``multicollinearity'' is a situation in which some or all of the independent variables are very highly intercorrelated (Nie, et al., 1975; Gujarati, 1986), it became necessary to search whether this sort of intercorrelations existed among the independent variables. As seen in Table 4.2, no ``serious'' level of intercorrelation between the independent variables was detected. Thus, all the independent variables were put the regression analyses without any doubt about over-estimating or under-estimating the degree of the associated influence.

Table 4.2. Correlation Coefficients Between Independent Variables

Whole sample	STR	SPC	TPC
FAC	0.1775	0.1148	-0.0597
STR		0.5748**	-0.5169**
SPC			0.2731**

Public lycees	STR	SPC	TPC
FAC	0.4126**	0.4230**	-0.0361
STR		0.5750**	-0.5407**
SPC			0.2474*

Other lycees	STR	SPC	TPC
FAC	0.2477	0.5049*	0.0135
STR		0.2338	-0.7570**
SPC			0.2313

**P< .01
* P< .05

4.2 Results of Multiple Regression Analysis

The associated effects of the independent variables as predictors of the achievement were determined by using multiple regression analysis.

Joint and seperate equations were computed for the whole sample and for the sub-samples, separately.

4.2.1 Correlation Matrices of Variables

The correlation coefficients between the independent and the dependent variables used in this study are presented in Tables 4.3 and 4.4.

Table 4.3. Correlation Matrix of the Independent Variables and the Dependent Variable ÖSS

		FAC	STR	SPC	TPC
ÖSS	Whole sample	0.4577**	-0.0232	-0.0533	0.0369
	Public lycees	0.2846*	0.2862*	0.5613**	0.2698*
	Other Lycees	0.3297	0.2036	0.3455	0.1071

**p< .01
* p< .05

Table 4.4. Correlation Matrix of the Independent Variables and the Dependent Variable ÖYS

		FAC	STR	SPC	TPC
ÖYS	Whole sample	0.4015**	-0.1203	-0.2414*	0.0709
	Public lycees	0.0326	0.1546	0.2236	-0.0192
	Other Lycees	0.2766	0.2065	0.5035*	0.2126

**p< .01
* p< .05

As indicated in Tables 4.3 and 4.4, considering the significant correlations among the independent and dependent variables, the achievement in terms of average ÖSS scores was found to correlate positively with facilities (FAC) for

the whole sample of the lycees (r=.45, p<.01). The achievement in terms of ÖYS ratios was found to correlate positively with facilities (FAC) (r=0.40, p<.01), and negatively, with student per class (SPC) (r=-0.24, p<.05), as expected, for the whole sample.

As far as the significant correlations for the sub-sample of Public Lycees are concerned, the achievement in terms of average ÖSS scores was found to correlate positively with all the independent variables. Even though existing positive correlations of ÖSS with FAC (r=0.28, p<.05), and with teacher per class (TPC) (r=0.26, p<.05) were as expected, positive correlations obtained between ÖSS and student per teacher (STR) (r=0.28, p<.05), and between ÖSS and student per class (SPC) (r=0.56, p<.01) were found to be opposite to the researcher's expectations.

In the sub-sample of Other Lycees, achievement in terms of ÖSS ratios did not significantly correlate with any of the independent variables. As far as the significant correlations for the sub-sample of Other Lycees were concerned, achievement in ÖYS correlated with SPC, significantly.

For the sub-sample of Other Lycees, the achievement in terms of ÖYS ratios was found to correlate positively with student per class (SPC) (r=0.50, p<.05), unexpectedly.

4.2.2 .Stepwise Multiple Regression Analyses for the whole Sample

Stepwise multiple regression analysis results predicting achievement in terms of ÖSS scores for the whole sample are presented in Table 4.5.

Table 4.5. Summary Table of Multiple Regression Analysis Predicting Achievement in terms of ÖSS for the whole Sample

Variable (N=89)	Multiple R	R Square	b	SE of b	Beta	t
FAC	0.4577	0.2095	2.4019	0.5002	0.4577	4.802**
CONSTANT			89.7732	6.4873		

**p<.01

As can be seen in Table 4.5, FAC appeared to be only significant predictor, explaining approximately 21 % of the total variance in achievement in terms of the ÖSS scores, within the whole sample. As Table 4.5 shows, the result of the regression coefficient indicated a positive correlation between the facilities and the achievement (Beta= 0.4577, p< .01). Furthermore, its unique explanation of the total variance produced on achievement was found to be significant, F(1,87)= 23.0566 p< .01.

Stepwise multiple regression analysis results predicting achievement in terms of ÖYS ratios for the whole sample are presented in Table 4.6.

Table 4.6. Summary Table of Multiple Regression Analysis Predicting Achievement in terms of ÖYS for the whole Sample

Variable (N=89)	Multiple R	R Square	b	SE of b	Beta	t
FAC	0.4015	0.1612	4.0167	0.8710	0.4350	4.612**
SPC	0.4950	0.2450	-0.3614	0.1170	-0.2914	-3.089**
CONSTANT				-14.9376	11.7809	

**p<.01

As can be seen in Table 4.6, facilities (FAC) and student per class (SPC) appeared to be the significant predictors, together explain approximately 25 % of the total variance in achievement in terms of ÖYS ratios within the whole sample. Table 4.6 illustrates that the first variable entered in the equation was FAC. Facilities accounted for a relatively large proportion of the variance (16 %) on achievement. Its unique explanation of the total variance produced on achievement was also found to be significant, $F(1,87)= 16.7219$, $p< .01$.

Furthermore, the second variable entered into the equation was SPC. This variable accounted for almost an additional 8 % of the variance on achievement. Its unique contribution of the total variance produced on achievement was significant, too ($F(2,86)=13.9533$, $p< .01$).

As indicated in the Table 4.6, regression coefficient results showed that there is a positive correlation between facilities and achievement (Beta = .4350, $p< .01$). On the other hand, student per class and achievement correlated negatively (Beta= -.2914, $p< .01$).

4.2.3 Stepwise Multiple Regression Analyses for the Sub-sample of Public Lycees

Stepwise multiple regression analysis results predicting achievement in terms of ÖSS scores for the sub-sample of Public Lycees were presented in Table 4.7.

Table 4.7. Summary Table of Multiple Regression Analysis Predicting Achievement in terms of ÖSS for the Public Lycees

Variable (N=72)	Multiple R	R Square	b	SE of b	Beta	t
SPC	0.5613	0.3150	0.1951	0.0344	0.5613	5.674**
CONSTANT			107.2902	1.6644		

**p<.01

As seen in Table 4.7, student per class (SPC) appeared to be the only significant predictor, explaining approximately 32 % of the total variance in achievement in terms of the ÖSS scores, within the sub-sample of the Public Lycees. But, as Table 4.7 shows, the result of the regression coefficient indicated an unexpected positive correlation between SPC and achievement (Beta= 0.5613, p< .01), although its unique explanation of the total variance produced on achievement was significant, F(1,70)= 32.1971 p< .01). Stepwise multiple regression analysis indicated that none of the independent variables was a significant predictor of achievement in terms of ÖYS ratios for the sub-sample of Public Lycees.

4.2.4 Stepwise Multiple Regression Analyses for the Sub-sample of Other Lycees

Stepwise multiple regression analysis indicated that none of the independent variables was a significant predictor of achievement in terms of average ÖSS scores for the sub-sample of Other Lycees.

Stepwise multiple regression analysis results predicting achievement in terms of ÖYS ratios for the sub-sample of Other Lycees are presented in Table 4.8, below.

Table 4.8.Summary Table of Multiple Regression Analysis Predicting Achievement in terms of ÖYS for Other Lycees

Variable (N=72)	Multiple R	R Square	b	SE of b	Beta	t
SPC	0.5035	0.2535	1.7853	0 .7910	0.5035	2.257*
CONSTANT			10.7386	21.4779		

*p<.05

As can be seen in Table 4.8, student per class (SPC) appeared as the only significant predictor, explaining approximately 25 % of the total variance in achievement scores in terms of the ÖYS ratios, within the sub-sample of Other Lycees. As Table 4.8 shows, the result of the regression coefficient indicated again an unexpected correlation between the SPC and the achievement (Beta= 0.5035, p< .05), although its unique explanation of the total variance produced on achievement was significant, $F(1,15) = 5.0945$ $p< .05$.

4.3 Summary of Findings

4.3.1 Findings Related to Whole Sample

Considering the whole sample, FAC appeared as the only significant predictor of achievement in terms of the average ÖSS scores within the whole sample, while FAC and SPC were found to be the significant predictors together

explaining one-quarter of the total variance in achievement when considering the ÖYS ratios.

4.3.2 Findings Related to Public Lycees

In the sub-sample of Public Lycees, although SPC appeared as the only significant predictor of achievement in terms of the ÖSS results, direction of its influence was found to be contrary to the expectations. Meanwhile, as far as the ÖYS ratios are concerned, none of the independent variables was found to be significant to enter the regression analysis.

4.3.3 Findings Related to Other Lycees

When the sub-sample of Other Lycees is taken into consideration, as far as the average ÖSS scores are concerned, none of the independent variables was found to be significant to enter the regression analysis. Within the sub-sample of Other Lycees, although SPC appeared as the only significant predictor of achievement in terms of the ÖYS ratios, direction of its influence was found to be contrary to expectations.

All these expected results and the contradictions will be discussed in the next chapter.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

This chapter is devoted both to the discussion of the results reported in the previous chapter, and to the recommendations for future studies.

5.1 Discussion of the Findings

Multiple regression analysis for the whole sample of the lycees revealed that the variable ``facilities" (FAC) appeared to be the only significant predictor of achievement in terms of average ÖSS scores. For the ÖYS ratios, the variables ``facilities" (FAC) and the ``student per class" (SPC) were found to be the significant predictors.

Regression coefficient results for the whole sample show that there was a positive correlation between ``facilities" and achievement measured in two different ways. (Beta=0.4577, $p<.01$, and Beta=0.4350, $p<.01$, respectively). When achievement was measured in terms of ÖYS ratios, it was found that there was a negative correlation between the achievement and the ``students per class" (Beta=-0.2914, $p<.01$), as expected.

These findings were in line with the researcher`s expectations. In other words, achievement increases as ``facilities" increases and achievement decreases as the average number of the students per class increases.

Although all these findings seem to be supported both theoretically and empirically at the first instance, the decieving notion of the data comprising the whole sample became appearant when the regression results from the two sub-samples were investigated, in detail.

Indeed, the multiple regression analysis results concerning the sub-sample of Public Lycees, in relation to average ÖSS scores showed that, ``students per class" (SPC) appeared to be the only significant predictor of the achievement. Similarly, multiple regression analysis results concerning the sub-sample of Other Lycees in relation to the ÖYS ratios also showed that, ``student per class" (SPC) was the unique significant predictor. However, in both cases the ``positive" signs of the correlation coefficients were obviously ``meaningless", both logically and educationally. It can not be true that as the average number of the students per class increases, so does achievement, contrary to most expectations.

As can be seen from the relevant correlation matrices in the previous chapter, correlations that were observed to be significant for the whole sample, unexpectedly disappeared in the case of sub-samples. It was also noticed that even the signs of the correlation coefficents for some pairs were reversed.

The comparison of all those contradictory findings from the sub-samples demonstrated that the results originated from the nature of the sub-samples. In other words, as it can be easily seen from the correlation matrices that there are significant linear relationships between the independent variables and depended variable when two separate sub-groups of the lycees are considered as a single population. This is not the case when the sub-samples are considered seperately.

Glass and Stanley (1970) indicate that ``a substantial correlation between two variables is a fact that can be explained differently in different situations''. According to them, significant correlation can result when distinct groups, with different average values on the two variables are pooled together. (Glass and Stanley, 1970). Considering the data of this study and what Glass and Stanley indicate, it can be argued that the relatively high level of achievement and relatively advantageous nature of the ``facilities`` and ``other school variables`` of the Other Lycees versus the relatively low achievement level and poor structures of the Public Lycees resulted in the situation explained above.

As a conclusion, due to the results obtained above, one can not support the argument that school characteristics, described previously, are integral to academic achievement of the students within the lycees in the Province of Ankara. But, as far as the variables and the experimental method used in this analysis are concerned, this study also can not be regarded to be sufficient in revealing whether the `out-of-school factors`` were more influential than ``in-school characteristics`` in explaining the variance on educational performance of lycee students, obviously.

The main reason for the controversy observed in the present study seems to be due to the method of measurement of this influence. That is, to find the real influence of class-size, it is necessary to fix factors such as; the type of class, the types of students, the teachers, and the instructional techniques, etc.,. The reasercher wishes to indicate that when those requirements are not met, as often is the case, the positive results which could be created due to class-size are minimized because of the existences of different type of teacher, different type of instruction, and different type of student participating in the experiment.

Therefore, if any researcher wants to determine the ``unique" influence of class-size, experiments in classes of similar type of students, teachers, class-rooms and type of instruction methods must be provided.

This conclusion is consistent with some past research reviewed. As Boocock (1980) suggested, the relevant question in this sort of analyses is whether size is ``meaningfully related" to learning efficiency. Therefore, ``what seems more likely is that size alone is not a strong determining factor but rather is related to other factors that affect classroom productivity. In other words, size may be a causal factor, but it can be understood only when considered simultaneously with other factors" (Boocock, 1980). Also Preece (1987) concluded that the achievement deficit in a large class was a consequence of the heterogenity of the class rather than its size per se.

The "positive" signs of the beta coeffients of the "students-per-class" in both sub-samples, may be regarded as an indicator of the high-success levels of the lycees especially located in the metropolitan areas where schools always have high numbers of the relatively selected students, who would be successful in any class-size. Köse (1989) also quotes some past research that success level of students attending to high schools in metropolitan urban centers exceeds the level of students attending high schools located in small cities and towns. He also reports that there are significant disparities between high schools located in different geographical regions which have significant effects on students' academic achievement. According to him, also, social and economic characteristics of the environment surrounding the high schools have significant impacts on the success level of schools' student population.

The other ``unexpected``. directions of the correlations should also be understood within the framework of their own nature of the sub-samples, themselves, rather than attempting to reach some general conclusions.

According to McKenzie's opinion, "adding or subtracting one or two pupils to or from each average size class in a large district will cost or save a million dollars and have little effect on outcome variables" (McKenzie, 1983). Thus smaller is consistently better but much more expensive and it can be argued that small increases in size of already large classes is not very much worse.

It is also important to remember that, the validity and the reliability of the ÖSS and the ÖYS examinations are out of the scope of this study. ÖSS and ÖYS were assumed to be true and unbiased measures of achievement.

Demirok (1990) tried to determine if there were any between University Selection and Placement Examinations' scores and the achievements in high-schools and the universities. The study was conducted at the Hacettepe University and no significant correlation was found between the University Selection Examination scores and the achievement levels in the lycees. As far as the University Placement Examination scores were concerned, among the different cathegorical scores of the University Entrance Examination, only the Turkish-Mathematics scores were found to be significantly correlated with the lycee achievement levels. Similarly, Özçelik (1982), points out to the many difficulties of searching for the validity of the ÖSS and the ÖYS examinations.

5.2 Recommendations

The findings of the present study could suggest the following: Future surveys may be needed to examine such findings, even using different variables, models, and samples. On the basis of the findings of this study the following can be recommended for future studies:

1- *This study can be replicated for both of the sub-samples, separately, by using some other school variables (e.g., quality of teachers, school district, quality of the equipment and the facilities, total enrollment size, physical size of the school and the classes, tutorial hours, students' attendence levels, teacher interaction with students, school-related motivations of the students, and, so on) whose effects on achievement are often theoretically emphasized.*

2- *A similar study can also be conducted by controlling the out-of-school variables, such as family background characteristics, IQ, attendence to the preparatory courses for university entrance examinations, non-school related motivators of the students, and by controlling the effects of audio-visual factors, etc.*

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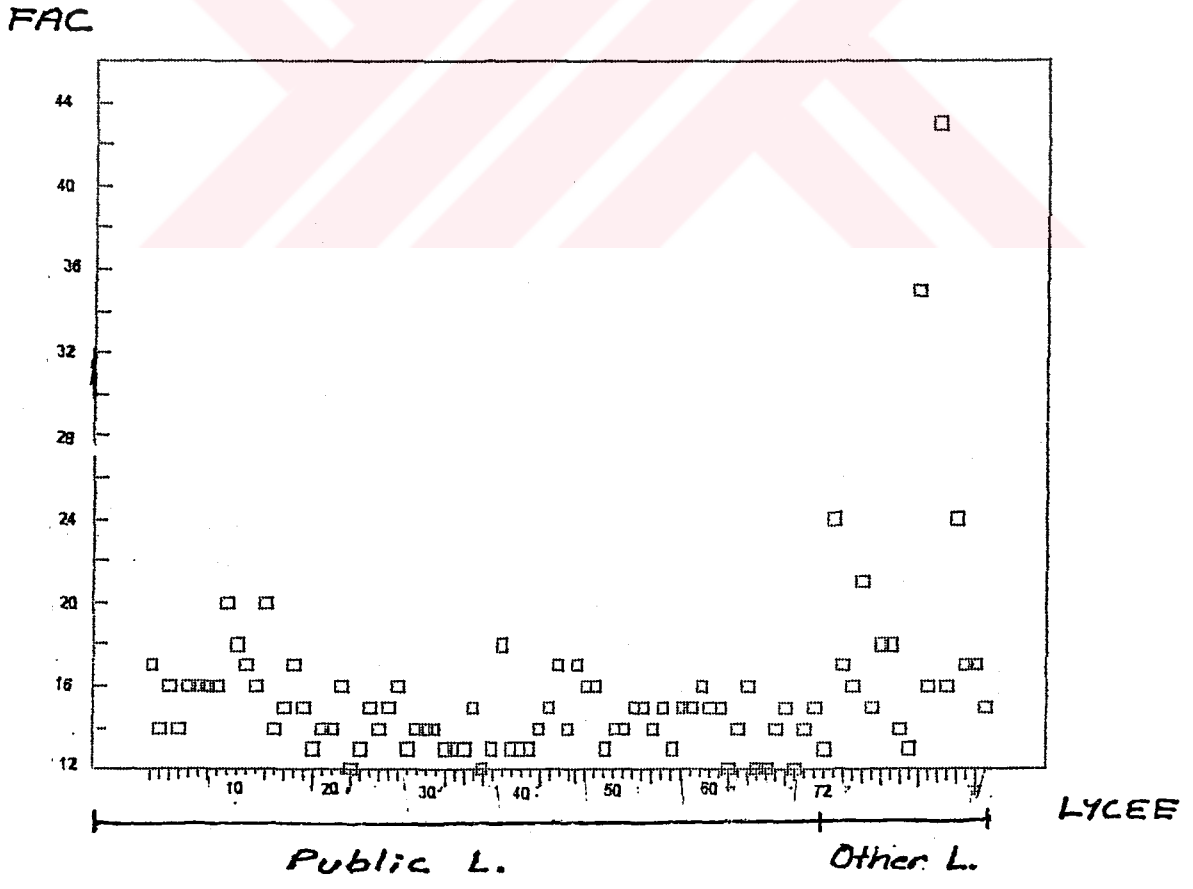
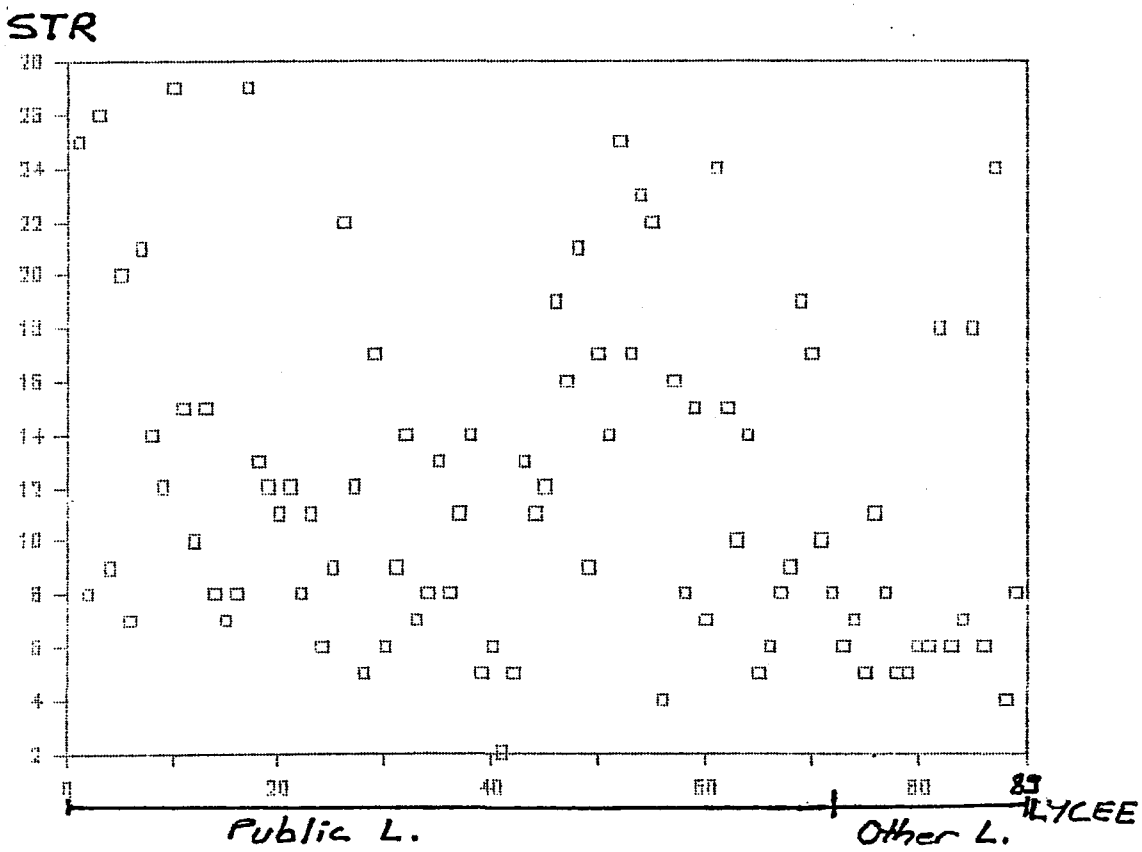
APPENDICES

APPENDIX A

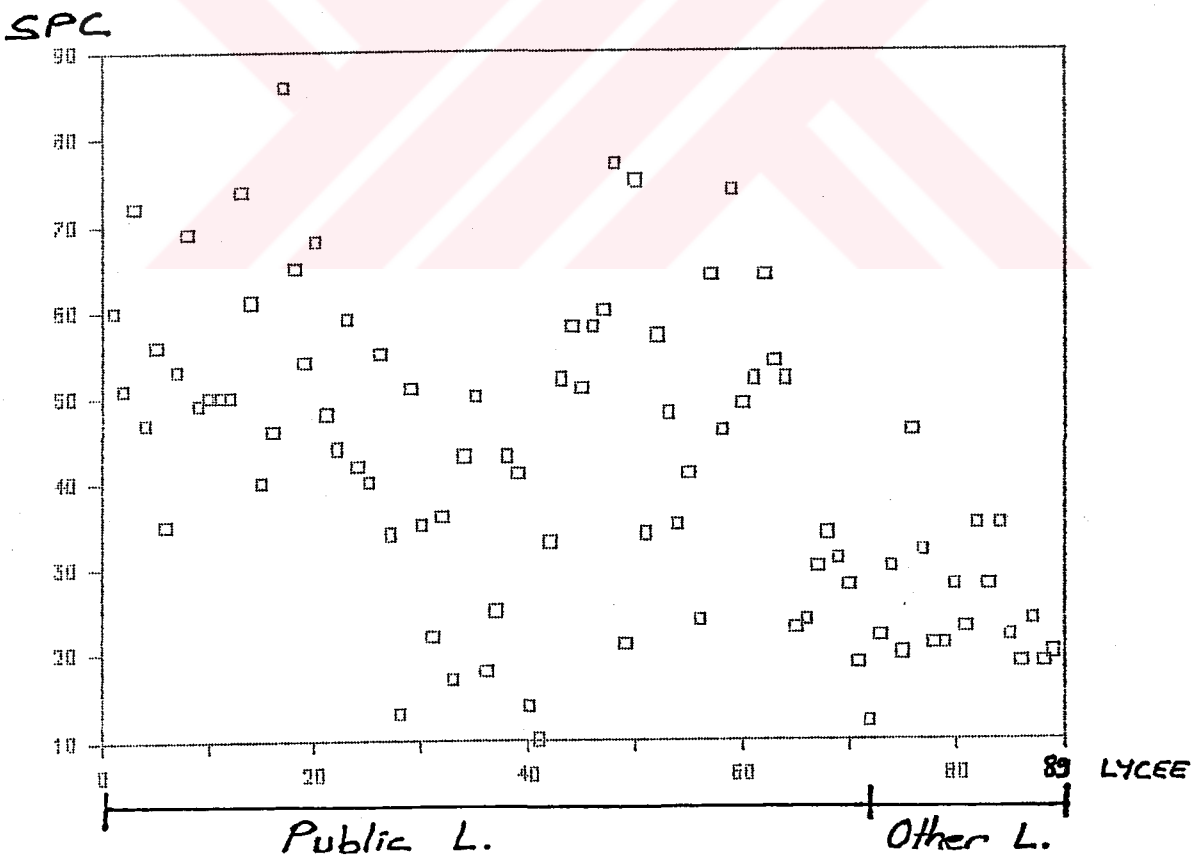
SCATTER-DIAGRAMS OF THE VARIABLES



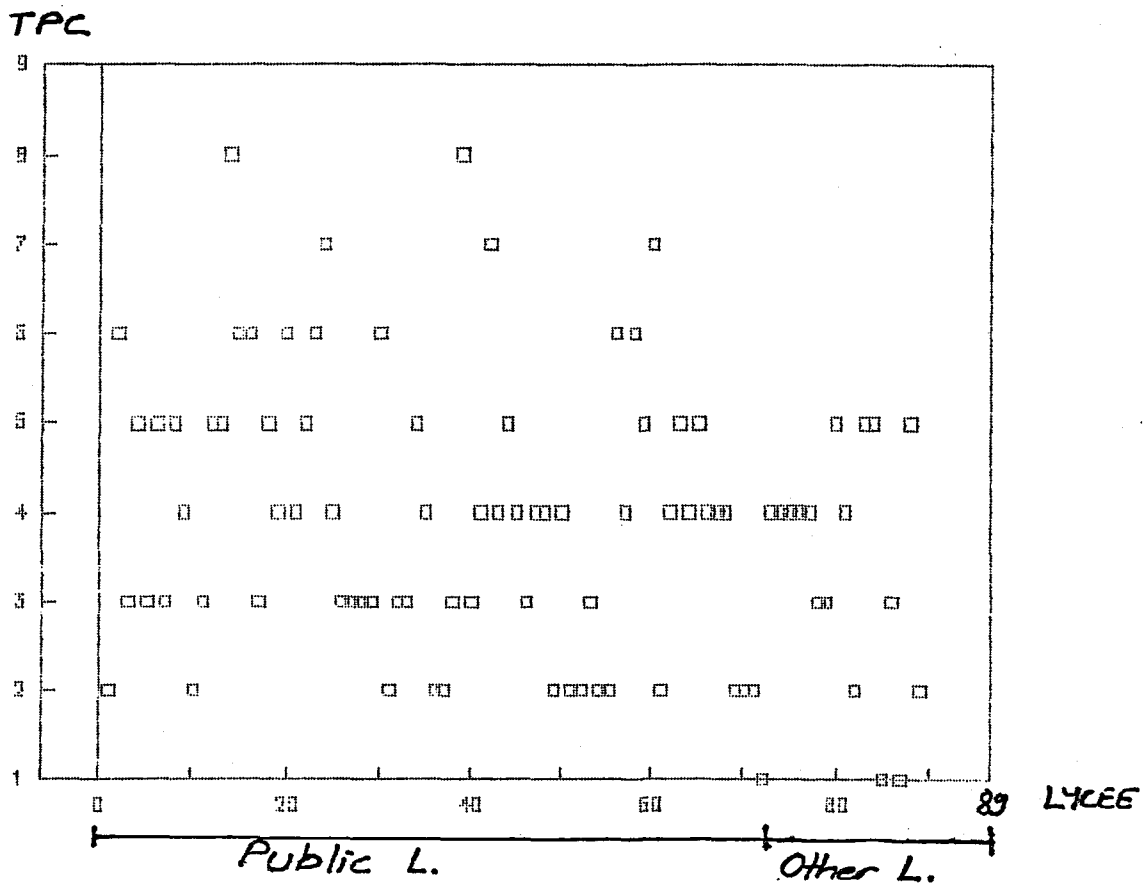
Scatter-diagram of Facilities



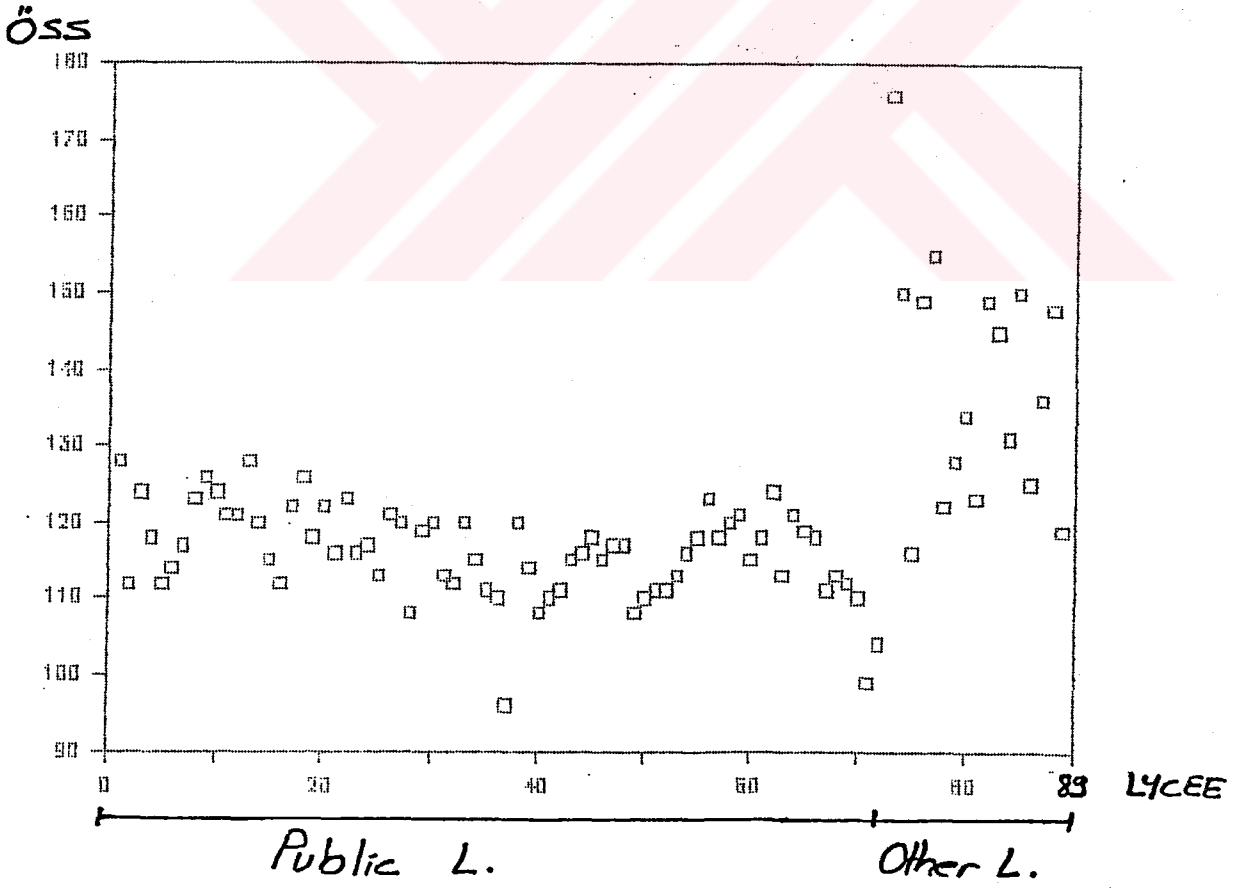
Scatter-diagram of Student-Teacher Ratio



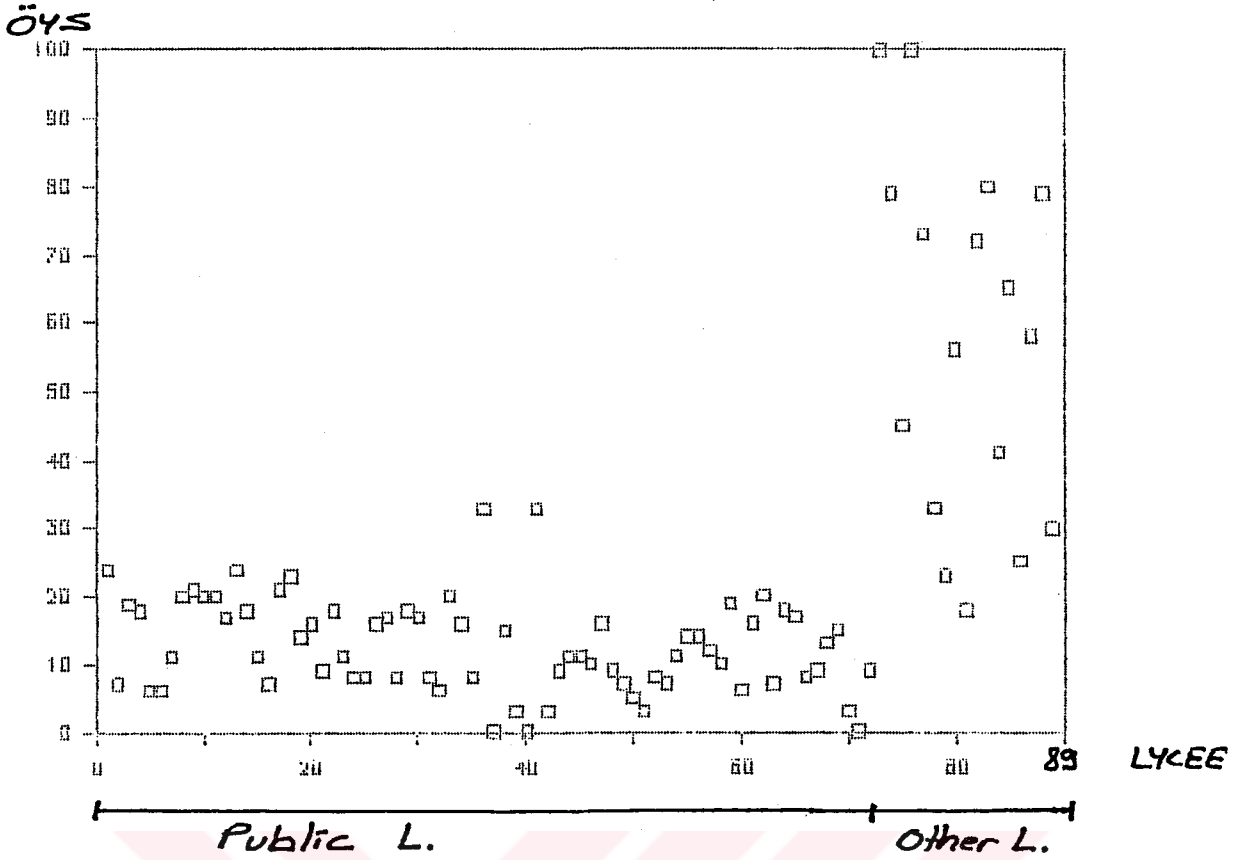
Scatter-diagram of Students per Class



Scatter-diagram of Teachers per Class



Scatter-diagram of Average ÖSS Scores



Scatter-diagram of ÖYS Ratios

APPENDIX B

LISTS OF THE LYCEES

PUBLIC LYCEES:

1. Ankara Lisesi
2. Esenevler Lisesi
3. Gazi Lisesi
4. İnönü Lisesi
5. Uluğbey Lisesi
6. Yeşilöz Lisesi
7. Yıldırım Beyazıt Lisesi
8. Anıttepe Lisesi
9. Atatürk Lisesi
10. Ayrancı Lisesi
11. Cumhuriyet Lisesi
12. Çankaya Lisesi
13. Deneme Lisesi
14. Dikmen Lisesi
15. 50. Yıl Lisesi
16. İncesu Lisesi
17. Kurtuluş Lisesi
18. Kocatepe Mimar Kemal Lisesi
19. Ömer Seyfettin Lisesi
20. Sokullu Mehmet Paşa Lisesi
21. Seyranbağları Lisesi
22. Tınaztepe Lisesi
23. Mehmetçik Lisesi
24. Dr. Şerafettin Tombuloğlu Lisesi
25. Aktepe Lisesi
26. Aydınlıkevler Lisesi
27. Beypazarı Lisesi
28. Çamlıdere Lisesi
29. Çubuk Lisesi
30. Elmadağ Lisesi
31. Güdül Lisesi
32. Haymana Lisesi
33. Kalecik Lisesi
34. Kazan Lisesi
35. Şereflikoçhisar Lisesi
36. Çalören Lisesi
37. Kaçarlı Lisesi
38. Polatlı Lisesi
39. Nallıhan Lisesi

40.Çayırhan Lisesi
41.Sarıyar Lisesi
42.Kızılcahamam Lisesi
43.Etlik Lisesi
44.Fatih Sultan Mehmet Lisesi
45.İncirli Lisesi
46.Kalaba Lisesi
47. Kanuni Lisesi
48. Keçiören Lisesi
49. Bağlum Lisesi
50. Abidinpaşa Lisesi
51. Gülveren Lisesi
52. Mamak Lisesi
53. Tuzluçayır Lisesi
54. İbn-i Sina Lisesi
55. Sincan Lisesi
56. Yenikent Lisesi
57. Alpaslan Lisesi
58. Gazi Çiftliği Lisesi
59. Halide Edip Lisesi
60. Mehmet Akif Ersoy Lisesi
61. Mimar Sinan Lisesi
62. Mustafa Kemal Lisesi
63. Şentepe Lisesi
64. Yahya Kemal Lisesi
65. Akyurt Lisesi
66. Ayaş Lisesi
67. Bala Lisesi
68. Kılıçaslan Lisesi
69. Farabi Lisesi
70. Fatih Lisesi
71. Evren Lisesi
72. Oyaca Lisesi

"OTHER" LYCEES:

1. Ankara Fen Lisesi
2. Ankara Anadolu Lisesi
3. Çankaya Anadolu Lisesi
4. Gazi Anadolu Lisesi
5. Atatürk Anadolu Lisesi
6. Özel Muradiye Kız Lisesi
7. Özel Muradiye Erkek Lisesi
8. Ayşe Abla Özel Türk Lisesi
9. Fatoş Abla Türk Lisesi

10.TED Türk Lisesi
11.Tevfik Fikret Türk Lisesi
12.Yükseliş Türk Lisesi
13.Yüce Fen Lisesi
14.Evrensel Fen Lisesi
15.Arı Fen Lisesi
16.Özel Samanyolu Erkek Lisesi
17.Polatlı Özel Özer Lisesi